Standardised Nutrition Diagnosis Terminology: Implications for Dietetics Practice

Zuriati Ibrahim

BSc. (Hons) (Dietetics), MHlthSc. (Nutrition)

A thesis submitted for the degree of Doctor of Philosophy

School of Health Sciences, Faculty of Health
The University of Newcastle
Australia

September 2010

Statement of originality

This thesis contains no material which has been accepted for the award of any degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying subject to the provisions of the Copyright Act 1968.

I hereby certify that the work embodied in this thesis is the result of original research, which was completed subsequent to admission to candidature for the degree of Doctor of Philosophy.

Zuriati Ibrahim

Dedication

It is with much love and gratitude that I dedicate this thesis to my Mum, without whose unconditional love, wholehearted support and constant prayers, this task would have seemed overwhelming. You are my inspiration, strength and resilience when the world seems too hard to cope with. To my Dad, thank you for your encouragement and constant prayers in your own way. I am greatly indebted to you always and love you both very much.

Acknowledgments

All praises are due to Almighty Allah, the most beneficent and the most merciful, who in His infinite mercy and grace enabled me to complete this thesis.

There are number of people without whom this thesis might not have been completed, and to whom I am greatly indebted. My deep appreciation and heartfelt gratitude goes to my principle supervisor, Professor Sandra Capra, for her invaluable guidance, wealth of knowledge, vast experience and strong commitment to this research process. I have been inspired by her vision, enthusiasm and infinite energy for research and the profession of dietetics. I am particularly indebted to her for the relentless effort and encouragement that she maintained during the critical write-up phase even after she moved interstate. Thank you, Sandra, for sharing your brilliance, critical thinking skills, time and energy throughout my doctoral journey. I also wish to express my sincere appreciation and thanks to my co-supervisor, Dr Surinder Baines, for the dedication, energy and encouragement she has given me during the last four years. Supervision by these two women throughout this PhD journey has provided me with a new perspective on research. I also thank them for patiently reviewing and editing this thesis. I am truly grateful and fortunate to have been one of their doctoral students.

Thank you to Cheryl Watterson, Director of Nutrition and Dietetics, Greater Newcastle Acute Hospital Network, John Hunter Hospital, for assistance at the beginning of Phase 1 of this research. Also, I would like to acknowledge the representatives of the Dietitians Association of Australia, the American Dietetic Association, the British Dietetic Association, the Dietitians of Canada, the New Zealand Dietetic Association and the Malaysian Dietitians' Association for their valuable assistance during the survey recruitment stage.

I would like to express my deepest gratitude to the clinical dietetics practitioners from Australia, the United States, the United Kingdom, Canada, New Zealand and Malaysia who participated in this study, for without them this thesis would not have been possible. I am profoundly thankful to the third-year dietetics students from two Australian universities, who provided useful data and supported this research.

I offer special thanks to Dr Anne Statham for her thorough editing of this thesis. I would also like to thank the School of Health Sciences administration and support staff for their practical assistance throughout my doctoral study. My special appreciation goes to Elaine Terry for her generous help and invaluable effort during the thesis submission process. Thanks to my PhD peers – Dr Michelle Palmer, who generously provided her time and assistance especially at the beginning of this study, Dr Jane Watson and Dr Afsoon Mehraban, whose ‘research lessons learnt’ taught me a lot about the PhD experience.

My heartfelt appreciation goes to the many people who lift me up every day with their compassionate support; there are too many of you to mention, but I greatly appreciate you all. In particular, special thanks must also go to my housemates, Hani, Mel, Dash, Yani, Izza, Wardiah and Shanana, who are also my good friends and sisters – thanks for your understanding, emotional support and for accommodating my various needs in a myriad of ways. I cherish every moment we have spent together during the past four years in Newcastle.

My gratitude also goes to the very special people in my life whose endless love, encouragement and prayers over the years have helped me become the person I am today. My beloved mother and best friend, thank you for all your amazing wisdom and the very special love and encouragement you always give me. You are the best mother any child could wish for. My heartfelt respect and special thanks go to Dad, and my brothers and sisters back home whose sublime blessing, love and sacrifice inspired me most in my doctoral journey. Finally, I would like to express my deepest appreciation for the Ministry of Higher Education, Federal Government of Malaysia, for granting me a scholarship and my employer, the University Putra Malaysia, for granting study leave.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

ADA	American Dietetic Association
ADI	assessment, diagnosis, intervention
ADIME	assessment, diagnosis, intervention and monitoring and evaluation
AEB	as evidenced by
AMA	American Medical Association
ANOVA	analysis of variance
AU	Australia
BMI	Body Mass Index
CA	Canada
CAP	College of American Pathology
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CPT	Current Procedural Terminology
DAR	Diagnosis, assessment and recommendation
DCV	Diagnostic content validity
DOB	Date of birth
D-S NDC	dietetic specific nutrition diagnosis codes
EBP	evidence-based practice
EHR	electronic health record
ICD	International Classification of Diseases
ICD-10-AM	International Classification of Diseases Australian Modification
ICD-9-CM	International Classification of Diseases Ninth Edition Clinical Modification
ICF	International Classification of Functioning, Disability and Health
ICNP	International Classification of Nursing Practice
IDNT	International Dietetics and Nutrition Terminology
IFI	Indicator for Intervention
IHTSDO	International Health Terminology Standards Development Organisation
LOINC	Logical Observation Identifiers Names and Codes
LOS	length of stay
MNA	Mini Nutritional Assessment
MNT	Medical Nutrition Therapy
MRN	medical record number
MY	Malaysia
NAHCC	National Allied Health Classification Committee
NANDA	North American Nursing Diagnosis Association
NCP	Nutrition Care Process
NCPM	nutrition care process and model
NDT	Nutrition diagnostic term
NHDD	National Health Data Dictionary
NIC	Nursing Interventions Classification
NLM	National Library of Medicine
NOC	Nursing Outcomes Classification
NZ	New Zealand
PES	problem, etiology, signs and symptoms
PIE	problem, intervention and evaluation
QIC	quality improvement cube
RD	registered dietitian
RT	related to
SGA	Subjective Global Assessment
SND	standardised nutrition diagnosis
SNOMED	Systematised Nomenclature of Medicine
SNOMED CT	Systematised Nomenclature of Medicine Clinical Terms
SNOMED RT	Systematised Nomenclature of Medicine Reference Terminology
SPSS®	Statistical Package for the Social Sciences
TPN	Total Parenteral Nutrition
UK	United Kingdom
UMLS	Unified Medical Language System
US	United States
WHO	World Health Organisation

Abstract

Standardised Nutrition Diagnosis (SND) as part of the Nutrition Care Process (NCP) has been implemented in the United States by the American Dietetic Association (ADA). This study is the first investigation of the potential for SND to be implemented beyond the United States. Research was conducted in two phases: (1) a case study of Australian dietetics practice and (2) a cross-sectional mail survey designed to investigate the extent of, and potential for, international SND implementation. Phase 1 involved application of descriptive case study methodology to an existing dataset of 274 patient records from three Australian hospitals. Of these records, 85 showed evidence of attendance by a dietitian. Results revealed incomplete documentation of the NCP in Australian dietetics practice, lack of understanding of the Nutrition Diagnosis step and use of non-standardised terms in documentation of nutrition care. In Phase 2, a convenience sample (n=420) of clinical dietetics practitioners in Australia, Canada, Malaysia, New Zealand, the United States and the United Kingdom was mailed a pre-tested and piloted self-administered questionnaire. Completed questionnaires were returned by a total of 85 practitioners from Australia (55.3%), Canada (25.9%) and Other Countries (18.8%). The questionnaire was also completed by a comparison sample (n=37) of third-year Australian dietetics students. When asked to identify, define, justify and rank NDTs using information provided in a case scenario, most practitioners, regardless of country of practice, did not demonstrate ability to accurately apply SND. Level of experience with medical nutrition therapy was demonstrated to have no impact on whether practitioners correctly identified, justified or ranked NDTs; however, less-experienced practitioners (≤10 years) were more likely to provide valid definitions for NDTs than more-experienced (>10 years) practitioners. The Australian dietetics students were no more or less adept at SND application than the Australian dietetics practitioners. This research highlights widespread lack of awareness and understanding of the NCP and SND. Complexity of SND is flagged as a potential obstacle to successful international adoption, and a strong case is made for supporting implementation with rigorous educational programs and systematic ongoing professional training. Anticipated challenges to SND implementation are far outweighed by the opportunities it presents to ensure that care of patients is translatable within and across settings, and that dietetics professionals are able to effectively and convincingly communicate their distinct role in patient outcomes.

Chapter 1

Introduction

The field of dietetics is dynamic. The profession is constantly evolving and expanding as roles for clinical, administrator and research dietitians are created in all areas of healthcare and in diverse public and private settings (DeChicco & Matarese, 2007; Hess, 2007; Leonberg, 2007). This evolution is a result of synergies in professional practice, healthcare reforms, a focus on quality of healthcare outcomes, and advancements in information technology (Charney, 2007; Erickson-Weerts, 1999; Leonberg, 2007; Thomas & Bishop, 2007; Vaughan & Manning, 2004).

Despite this evolution in the scope of dietetics practice, the profession has visibility issues, with the work of dietitians frequently disregarded or concealed within other healthcare disciplines (Anthony, 2007; DeChicco & Matarese, 2007; Lacey & Cross, 2002; Shronts, 1996). In an era of evidence-based medicine, healthcare services are increasingly defined by patient outcomes and quality improvement (Barr, Schumacher, & Myers, 2001; Leonberg, 2007). Furthermore, with the inevitable advent of electronic medical records, “dietitians will be held accountable for the effectiveness of their interventions and succinct documentation of patient outcomes” (Brewer & Heinzl, 2006, p. 2). Inadequate or inconsistent documentation of nutrition care processes with ambiguous terminology will have a hugely negative impact on efficacy, efficiency and accountability of the dietetics profession (Gardner-Cardani, Yonkoski, & Kerestes, 2007; Hakel-Smith, Lewis, & Eskridge, 2005). Other health professions – including medicine and nursing – already use profession-specific standardised care processes and vocabularies that distinguish them as unique care providers. It is imperative that dietetics practitioners are able to effectively and convincingly communicate their distinct role in improving patient outcomes. To this end, in 2003 the American Dietetic Association (ADA) developed, and subsequently advocated the use of, a systematic approach to provision of nutrition care called the Nutrition Care Process (NCP) (Lacey & Pritchett, 2003). The NCP provides dietetics practitioners with a standardised framework for critical thinking and decision-making with the objective of improving consistency and quality of care while garnering greater recognition for the role of the dietetics practitioner within the healthcare system (ADA, 2009).

The NCP comprises four interrelated steps: (1) Nutrition Assessment, (2) Nutrition Diagnosis, (3) Nutrition Intervention, and (4) Nutrition Monitoring and Evaluation (Lacey & Pritchett, 2003). These steps constitute a standardised nutrition care approach that cultivates efficiency in practice by minimising duplications, and fostering constancy and synchronisation of care (ADA's Nutrition Care Process Task Force, 2004). Prior to development of the ADA's standardised NCP, dietetics practitioners used various approaches to the provision of nutrition care without a formal Nutrition Diagnosis step (Brylinsky, 1996; Gates, 1992; Mason, Wenberg, & Welsch, 1982). The ADA added the second NCP step of Nutrition Diagnosis in 2003 to demonstrate the core responsibility of dietetics practitioners (Lacey & Pritchett, 2003). Nutrition Diagnosis is defined as "the identification and labeling that describes an actual occurrence, risk of, or potential for developing a nutritional problem that dietetics professionals are responsible for treating independently" (Lacey & Pritchett, 2003, p. 1065); this is distinct from a medical diagnosis (ADA, 2006; Sandrick, 2002). To produce desirable outcomes in nutrition care, nutrition interventions need to be accurate. Obviously, the Nutrition Intervention step of the NCP is highly influenced by the accuracy of Nutrition Diagnosis. Therefore, despite being a new concept, Nutrition Diagnosis plays a crucial role in delivering desirable outcomes that ultimately lead to quality nutrition care (ADA, 2006, 2008; Charney, Escott-Stump, & Mahan, 2008; Charney et al., 2006; Enrione, 2008; Sandrick, 2002).

The concept of a standardised language for dietetics became a reality for American dietitians when the ADA described a Standardised Nutrition Diagnosis (SND) terminology at the 2005 Food and Nutrition Conference and Exhibition in Hawaii, and published *Nutrition Diagnosis: A Critical Step in the Nutrition Care Process*, in which 62 nutrition diagnoses with definitions, etiologies, and signs and symptoms were identified (ADA, 2005). 'To open dialogue on the potential for its standardised language to be adopted beyond the US context, the ADA hosted an international meeting of representatives of dietetic associations. Subsequently, the ADA's standardised language became known as the International Dietetics and Nutrition Terminology (IDNT) (ADA, 2008, 2009). Since the introduction of SND, standardised terminology has been developed for the other NCP steps; standard taxonomy was published for Nutrition Intervention in 2007 (ADA, 2007a), for

Nutrition Monitoring and Evaluation in 2008 (ADA, 2008) and for Nutrition Assessment in 2009 (ADA, 2009).

Internationally, the health systems of many nations are moving toward electronic medical records and a more standardised approach to recording information (Ash & Bates, 2005; Yasunaga, Imamura, Yamaki, & Endo, 2008). In Australia, the International Classification of Diseases Australian Modification (ICD-10-AM) currently being used by health professionals does not provide the level of detail necessary for the accurate description of Medical Nutrition Therapy (MNT) (Roberts, Innes, & Walker, 1998). There is a need for national implementation of a standardised dietetics language that can be incorporated within electronic systems. Although a standardised nutritional care process and associated standardised language are available in the form of ADA's NCP and IDNT, these require validation within the Australian and international contexts before they can be incorporated into documentation systems outside the United States. Is the American standardised language applicable to dietetics practice in other countries?

Implementation of a standardised dietetics language requires a fundamental paradigm shift in the way clinical dietetics is conducted. However, the potential benefits of adoption of the NCP and SND beyond the United States are profound. Internationally, dietetics practice will be characterised by a more sophisticated approach that results in increased visibility of the healthcare contributions of dietetics practitioners, more effective communication of their distinct role in patient care, greater accountability and improved outcomes. (Lacey & Pritchett, 2003; Myers, 2007).

1.1 RESEARCH CONTRIBUTION

The impetus for this research arose from the inclusion of the Nutrition Diagnosis step in the NCP and the associated development of standardised language in the United States (ADA, 2005). In order to introduce the new concept of Standardised Nutrition Diagnosis (SND) in dietetics practice in Australia or any other country, and to plan for effective educational programs that minimise the theory-practice gap, it is necessary to investigate how nutritional care is documented in current dietetics

practice. At the commencement of data collection for this project in November 2005, details of the ADA's NCP and Nutrition Diagnosis had been disseminated in dietetics journals and the NCP was being taught in some Australian university dietetics programs. Consequently, it was possible that some standardised NCP documentation was already being practiced in Australia.

That standardised language is a rapidly evolving field is reflected in the fact that four updates of the ADA's standardised language were published during the production of this thesis (ADA, 2006, 2007a, 2008, 2009). *Nutrition Diagnosis: A Critical Step in the Nutrition Care Process* (ADA, 2005, 2006) was referred to during the framework-construction stage of this study. Subsequent research stages referred to those updates published as the *International Dietetics and Nutrition Terminology Reference Manual* (ADA, 2007a, 2008, 2009).

1.1.1 Research questions

This study addresses several research questions:

1. Do clinical dietetics practitioners in Australia document all four steps of the ADA's NCP?
2. Do clinical dietetics practitioners in Australia already use standardised language in documenting NCP?
3. Are clinical dietetics practitioners able to apply the Nutrition Diagnosis step of the NCP to correctly identify nutrition diagnostic terms (NDTs)?
4. Are clinical dietetics practitioners able to define NDTs in language that is congruent with the ADA's standardised terminology?
5. To what extent do clinical dietetics practitioners use evidence to justify their process of Nutrition Diagnosis?
6. Are clinical dietetics practitioners able to appropriately rank NDTs based on priority in nutritional management?
7. Are Australian dietetics students who have been taught about the NCP and Nutrition Diagnosis more adept at identifying, defining, justifying and ranking NDTs than Australian clinical dietetics practitioners?

8. How can understanding of Standardised Nutrition Diagnosis (SND) be facilitated for clinical dietetics practitioners and dietetics students?

To answer these research questions, this study was conducted in two phases. Phase 1 – a case study of current dietetics practice in Australia – was designed to answer research questions 1 and 2. Phase 2 – an international survey of clinical dietetics practitioners with an Australian-context comparison sample of dietetics students – was designed to answer research questions 3-8.

1.1.2 Aim and objectives: Phase 1

Phase 1 of this study aimed to explore the current practice of nutrition care in Australia, with specific emphasis on the identification of issues relating to the extent of, and potential for, implementation of the standardised language of the ADA's NCP.

The objectives of Phase 1 were:

1. To investigate the extent to which current clinical dietetics practice in Australia follows the steps of the ADA's NCP
2. To investigate the extent to which the second step of the NCP – Nutrition Diagnosis – is being practised by clinical dietetics practitioners in Australia
3. To compare the nutritional terms used by clinical dietetics practitioners in Australia with the ADA's standardised terminology

1.1.3 Aim and objectives: Phase 2

Phase 2 of this study aimed to investigate the current extent of, and potential for, international implementation of the standardised language of the ADA's NCP.

The objectives of Phase 2 were:

1. To compare the nutrition diagnostic terms (NDTs) selected by clinical dietetics practitioners in response to a hypothetical case scenario with the ADA-standardised NDTs used to construct the case scenario
2. To compare clinical dietetics practitioners' definitions of NDTs with ADA's standardised definitions
3. To assess the extent of evidence-based practice in clinical dietetics practitioners' nutrition diagnostic process
4. To identify issues pertaining to improving clinical dietetics practitioners' and dietetics students' understanding of the concept of Standardised Nutrition Diagnosis (SND)

1.1.4 Hypotheses

The following hypotheses relevant to Phase 2 of the research were proposed:

1. Country of practice will have no effect on the number of NDTs practitioners nominate in response to the case study.
2. The majority of clinical dietetics practitioners from all surveyed countries will correctly identify NDTs relevant to the case study.
3. The majority of clinical dietetics practitioners from all countries will be capable of defining NDTs in language that is congruent with the ADA's standardised terminology.
4. Level of MNT experience will have no effect on practitioners' ability to correctly identify, define, justify and rank NDTs.
5. There is no difference between Australian dietetics students' and Australian clinical dietetics practitioners' ability to correctly identify, define, justify and rank NDTs.

1.2 SIGNIFICANCE OF THE STUDY

Validity of Nutrition Diagnosis in dietetics practice is recognised as a dietetics research priority area "critical for the advancement of the dietetics profession" (ADA, 2007b; Myers, 2007). This is the first study to investigate the potential for

implementing the ADA's standardised language for Nutrition Diagnosis in contexts other than America. Given the pressing international need for a uniform method of communicating the role of dietetics professionals in healthcare, this study is timely.

This research adds substantially to the body of literature relevant to standardised language for dietetics by providing insight into the extent of NCP documentation currently being practiced by Australian dietetics practitioners and the potential for international implementation of the NCP and SND. It holds relevance for professional associations, academic institutions and dietetics practitioners, and provides recommendations for change management and the educational task ahead.

1.3 THESIS STRUCTURE

Chapter 2 of this thesis reviews the literature to provide a background for the research, identify gaps in the body of dietetic knowledge and develop the study's theoretical framework. *Chapter 3* presents Phase 1 – a case study of current dietetics practice in Australia. It details the methods involved, describes the findings and discusses the results. Several issues are identified for exploration in Phase 2. *Chapter 4* explains the materials and methods used in Phase 2 – a cross-sectional mail survey designed to investigate the extent of, and potential for, international implementation of Standardised Nutrition Diagnosis (SND). *Chapter 5* presents the Phase 2 results, and *Chapter 6* discusses the findings of Phase 2 and addresses the study limitations. Finally, *Chapter 7* presents the study conclusions, discusses their implications for the dietetics profession, provides recommendations and identifies areas for future research.

Chapter 2

Literature Review

This chapter reviews the literature relevant to standardised language in dietetics. It outlines the history of the development of standardised language in healthcare professions, identifies gaps in knowledge and positions this study in the context of previous research to develop a theoretical framework underpinning research. Section 2.1 describes the literature search strategy. Section 2.2 provides background information. Sections 2.3, 2.4 and 2.5 describe the Cascade Model of the nutrition care system, consider care processes in other health professions and present a chronology of nutrition care process models. The ADA's standardised NCP is the focus of Section 2.6. The Nutrition Diagnosis step is elaborated in Section 2.7, and standardised language is explored in Sections 2.8 and 2.9. Section 2.10 presents the study's theoretical framework and the chapter concludes with a brief summary.

2.1 LITERATURE SEARCH STRATEGY

An extensive search was conducted to locate literature relevant to standardised language in dietetics. No time-frame limitation was imposed. The search strategy had two main stages; these focused, firstly, on literature pertinent to standardised language in the healthcare professions of medicine, nursing, physical therapy and occupational therapy and, secondly, on literature specific to the field of nutrition and dietetics.

A keyword search of relevant electronic bibliographic databases – Blackwell Synergy, MEDLINE, Cumulative Index to Nursing and Allied Health Literature, Journals@Ovid, ProQuest 5000, PubMed, Scopus and ScienceDirect – was undertaken using terms such as 'standardised language,' 'nutrition care process' and 'nutrition diagnosis.' Due to a huge number of results for 'nursing standardised language,' the search was limited to aspects of the language relevant to outcomes for the profession, professional practice and education, rather than technical details of the language itself. Tables of contents of leading clinical nutrition and dietetics journals (*Journal of the American Dietetic Association*, *Topics in Clinical Nutrition*, *Nutrition*, *Nutrition and Dietetics*) were perused for articles not identified by the keyword search. Because the ADA was responsible for the development of the NCP and Nutrition Diagnosis, few directly relevant articles were located in journals

other than the *Journal of the American Dietetic Association*. Furthermore, only five journal articles directly related to standardised language for Nutrition Diagnosis were located during this research project.

The snowball technique (Faugier & Sargeant, 1997) was used effectively; this involved following up references from the bibliographies of seminal articles, textbooks and ADA publications. The online search engine Google™ was utilised for an extensive Internet search. Australian and international digital thesis databases (Australian Digital Thesis Program, 2008; Networked Digital Library of Theses and Dissertations, 2008) were searched for abstracts relating to the NCP and Nutrition Diagnosis. Information was also sourced from individuals with access to unpublished research and updates on any preliminary work in relation to standardised language. All source material was sorted thematically and critically analysed.

2.2 BACKGROUND TO THE RESEARCH

2.2.1 Evolution of the dietetics profession

The field of dietetics is continuously evolving in response to dietitian role expansion, health care reforms and the explosion of knowledge and technology (Powers & Wheeler, 1993; Shronts, 1996). In 1969, a committee of the ADA delineated dietetics as

> … a profession concerned with the science and art of human nutrition care, an essential component of the health sciences. It includes the extending and imparting of knowledge concerning foods which will provide nutrients sufficient for health and during disease throughout the life cycle and the management of group feeding for these purposes (ADA Committee on Goals of Education for Dietetics, 1969, p. 92).

Subsequently, dietetics was viewed as a “diverse service profession” (Mason, Wenberg, & Welsch, 1982, p. 5), and one that contributes to better outcomes for all food and nutrition-related problems for various groups of people (Shronts, 1996). More recently, the ADA defined the profession as

> …the integration and application of principles derived from the sciences of food, nutrition, management, communication, and biological, physiological, behavioural, and social sciences to achieve and maintain optimal human health, within flexible scope of practice boundaries to capture the breadth of the profession (O'Sullivan-Maillet, Skates, & Pritchett, 2005, p. 635).

These definitions reflect the expansion in the roles of dietetics professionals over the last four decades (DeChicco & Matarese, 2007).

It has been asserted that the profession of dietetics should encompass certain characteristics, including a distinguished body of knowledge, education advancement (O'Sullivan-Maillet, 1997), a code of ethics (ADA, 2003) and commitment in provision of nutrition care (Mason et al., 1982). Mason et al. (1982) and O'Sullivan-Maillet (1997) stressed the importance of achieving competency recognition of dietetics professionals via continuous professional development. Certainly, the issues of competency and accountability of dietetics professionals in the healthcare services are core challenges for the profession (Fuhrman, 2002; Shronts, 1996). Chernoff (1993) highlighted the necessity for dietetics professionals to possess the critical thinking skills necessary to face these challenges.

Today, standardised language is continuing the evolution of the dietetics profession. Figure 2.1 illustrates how the concept of standardised language is now central to dietetics practice. The focus of this research project is Standardardised Nutrition Diagnosis; the outer rings of Figure 2.1 reflect the implications of this concept in dietetics practice and clinical dietetics. The Cascade Model and its relevance to this study are explained in Sections 2.3 and 2.6.1.

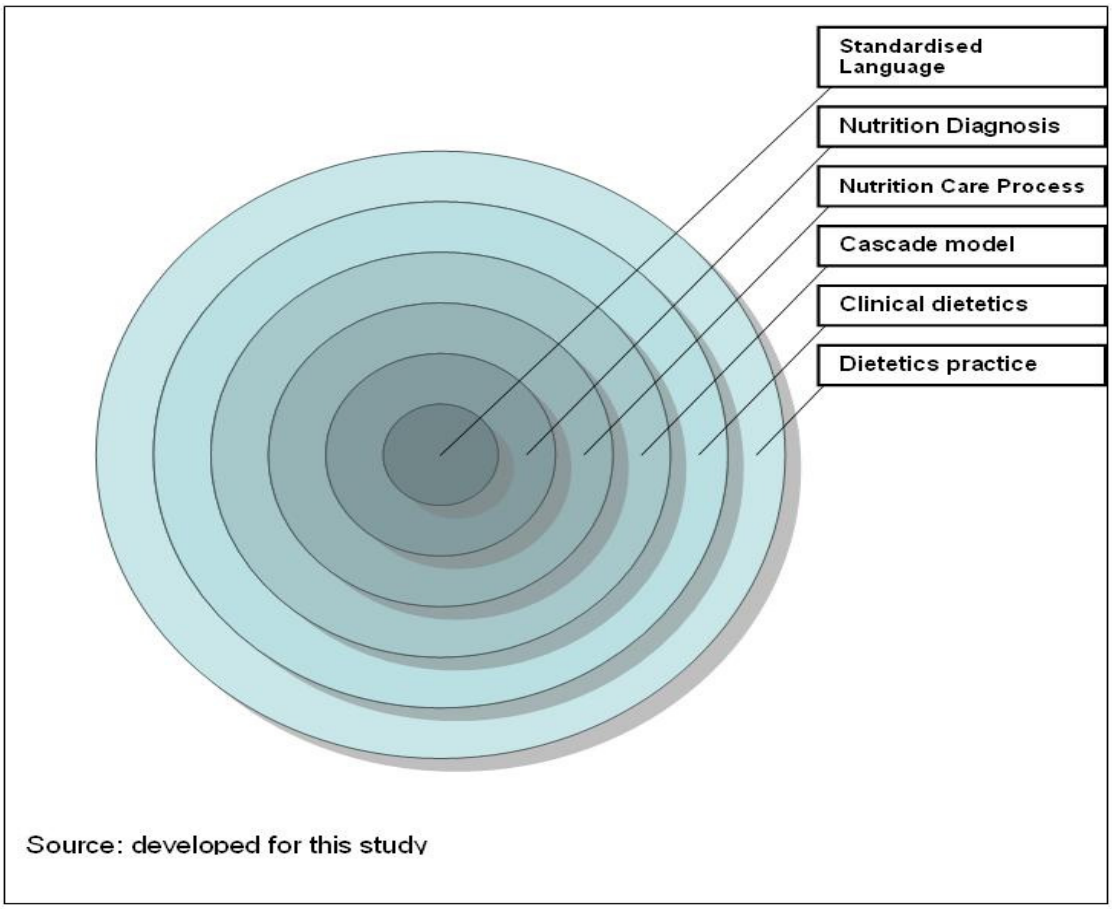


Figure 2.1 Standardised language in the context of dietetics practice

2.2.2 Dietetics practice

As translators of the science of food and nutrition into the skills of providing nutrition care (Mason et al., 1982; Skipper & Winkler, 1992), dietitians have been regarded as 'gatekeepers' or the first people who deal with patients with nutrition-related problems (Skipper & Winkler, 1992). Dietetics practice, which originated in the nutritional care of hospitalised soldiers during World War I (Leyse & Kight, 1993; Skipper & Winkler, 1992), has evolved from a preoccupation with food preparation into the management of enteral and parenteral nutrition (Skipper & Winkler, 1992) and, more recently, into the provision of evidence-based Medical Nutrition Therapy (Erickson-Weerts, 1999).

Early dietetics practice became structured into four major areas: administration, clinical or dietotherapy, community or social welfare, and education or teaching

(Mason et al., 1982; Skipper & Winkler, 1992). Dietotherapy has since been relabelled 'diet therapy' and, more recently, 'clinical dietetics' (Winterfeldt, Bogle, & Ebro, 2005). While today's domains of practice are similarly structured in areas of clinical dietetics, community dietetics, food service systems, and education and research, the scope of practice has broadened considerably (Kieselhorst, Skates, & Pritchett, 2005) as a result of the transformation of knowledge, healthcare and technology (ADA, 2006c).

The evolution of dietetics practice has, over the years, exposed dietetics professionals to more challenging issues, such as the need for consistency in practice, the divergence from experience-based practice to evidence-based practice (Skipper & Winkler, 1992), and outcomes management (Eck et al., 1998; Lacey & Pritchett, 2003). In 1996, Shronts identified a dietetics image problem involving professional accountability. The broadened scope of practice has increased the importance of competency in service delivery to professional credibility and accountability and, by extension, to the visibility of dietitians among other healthcare professionals (ADA, 2006c).

2.2.3 Clinical dietetics

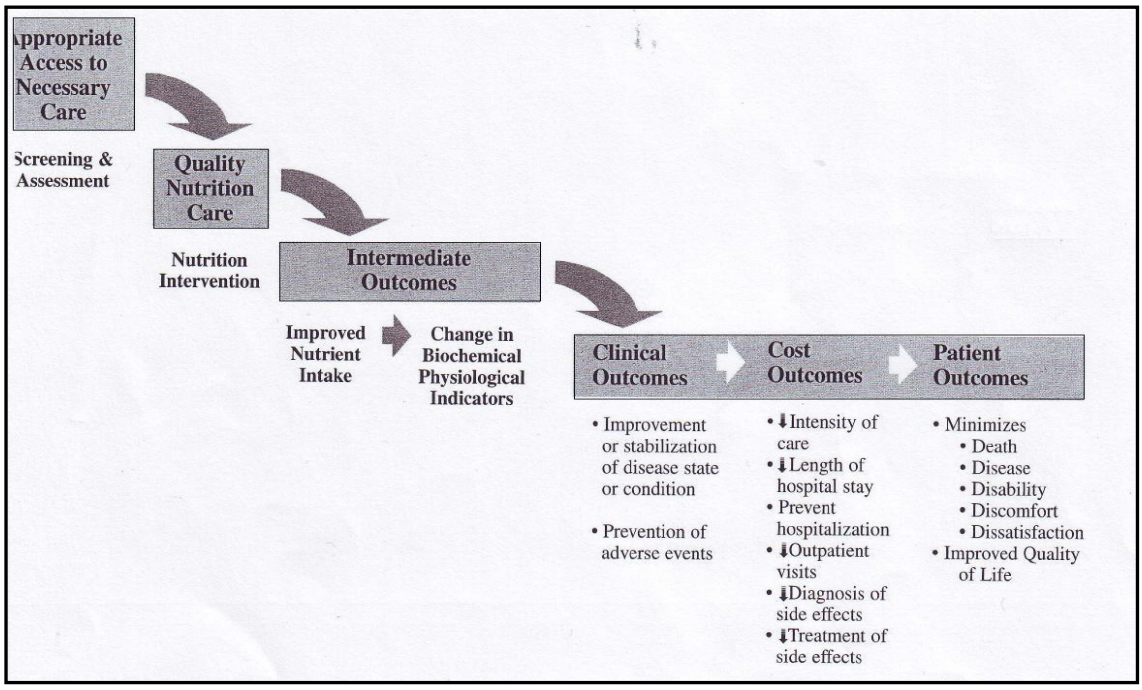
The majority of dietetics professionals work as clinical dietitians (Calabro, Bright, & Bahl, 2001; Skipper & Winkler, 1992) within three primary areas of clinical practice – acute care, ambulatory care and long-term care (Winterfeldt et al., 2005). Leyse (1996) viewed clinical dietetics as the translation of nutritional science knowledge into the planning of nutrition intervention for the improvement of the nutritional health of patients. A clinical dietitian, therefore, is a healthcare professional who is knowledgeable about MNT, provides nutrition care, assesses the nutritional needs of patients (Mason et al., 1982), implements the nutrition care plan, and evaluates the outcomes (Skipper & Winkler, 1992; Winterfeldt et al., 2005). Mason et al. (1982) maintained that the practice of clinical dietetics and provision of nutrition care involve four activities: "assessment, planning, implementation and evaluation" (Mason et al., 1982, p. 10).

According to Mason et al. (1982), the core service of clinical dietitians, provision of nutrition care, should be approached as a whole system of interconnected components. The role of clinical dietitians in screening and assessing patients' nutritional status, and providing appropriate nutrition intervention has been well reported (Winterfeldt et al., 2005). However, far too little emphasis has been placed on the whole nutrition care system inclusive of the impact of these nutrition interventions.

2.3 CASCADE MODEL

In 1996, Splett developed a model of the whole nutrition care system that depicted a 'cascade of events' that impact on the effectiveness of nutrition interventions (Splett, 1996, p. 22) (Figure 2.2). The Cascade Model emphasised that the outcomes of nutrition intervention are dependent on access to appropriate screening and assessment procedures followed by the provision of quality nutrition care.

In the first stage of the Cascade Model – 'appropriate access to necessary care' – "those who need nutrition intervention get it, those who get it, need it" (Splett, 1996, p.26). Nutrition screening identifies patients at risk of malnutrition or those who require nutrition risk assessment and nutrition intervention for specific diseases or diagnoses (Splett, 1996).



Source: Splett (1996, p. 22)

Figure 2.2 The cascade of events leading to evidence on the effectiveness and cost effectiveness of nutrition interventions

The second stage of the Cascade Model – 'quality nutrition care' – refers to the primary service of the clinical dietitian – nutrition intervention. It is provided in various settings and designed based on practice guidelines or the best judgement of the dietitian (Splett, 1996). Many factors can complicate the success of nutrition intervention, including patient compliance, organisation restriction in implementing nutrition protocols and any interruptions during the process (Splett, 1996). Accurate nutrition intervention by dietetics professionals is essential for positive outcomes.

Finally, the Cascade Model draws attention to the various outcomes of the nutrition intervention. 'Intermediate outcomes' measure the value of the intervention as indicated by the improvement in nutrient intake, which leads to changes in biochemical or physiological indicators. 'Clinical outcomes' refer to the impact of the nutrition intervention on the disease state. 'Cost outcomes' relate to positive clinical outcomes that result in substantial cost reduction. Finally, 'Patient outcomes' relate to improvement in quality of life and willingness to pay for healthcare (Splett, 1996). Overall, evaluation of effectiveness of any nutrition intervention is determined by the improvement in clinical indicators and observation of the cascade of outcomes (Splett, 1996). Because of the importance of achieving

positive outcomes as a result of effective and successful nutrition intervention, there should be no interruptions or blockages of events.

2.4 CARE PROCESSES IN OTHER PROFESSIONS

Standardised healthcare processes have been established in the professions of nursing (Alfaro-LeFevre, 2002; Davis, Billings, & Ryland, 1994; Doenges & Moorhouse, 2008; Gardner, 2003; Iyer, Taptich, & Bernocchi-Losey, 1995; Parfitt, 1993; Wilkinson, 2007; Yura & Walsh, 1988), and physical and occupational therapy (Hagedorn, 2001; Sumsion, 2006). In these professions, the care processes and models have been incorporated in education and practice with the aim of standardising and organising provision of care to clients/patients. Within the bodies of literature in these professions, there is ample evidence that implementation of standardised care processes leads to consistency in healthcare provision and assurance of continuity of care.

Since its introduction in the 1950s, the nursing process has evolved from three steps (assessment, planning and evaluation) to four steps (assessment, planning, implementation and evaluation) and, with the addition of a nursing diagnosis step in the mid-1970s, to five steps (assessment, diagnosis, planning, implementation and evaluation) (Alfaro-LeFevre, 2002; Doenges & Moorhouse, 2008; Gardner, 2003; Iyer et al., 1995; Maas & Delaney, 2004; Mason & Attree, 1997; Parfitt, 1993; Wilkinson, 2007; Yura & Walsh, 1988). Since then, the nursing process has been formally incorporated in nursing curricula and practice (Doenges & Moorhouse, 2008; Iyer et al., 1995).

The nursing process has been described as a systematic, client-centred (Gardner, 2003), flexible (Yura & Walsh, 1988), cyclical and sequential approach to nursing practice. It has been regarded as a foundation for critical thinking in nursing (Alfaro-LeFevre, 2002), universally applicable in various settings (Yura & Walsh, 1988), and outcome-directed (Wilkinson, 2007). It has become the framework for nursing practice, which organises the information about the client/patient (Gardner, 2003) and fulfils the needs of the client/patient via a problem-solving method (Iyer et al., 1995). Critical thinking, decision making and problem solving are major

components of practicing nursing process (Ackley & Ladwig, 2008; Gardner, 2003; Iyer et al., 1995).

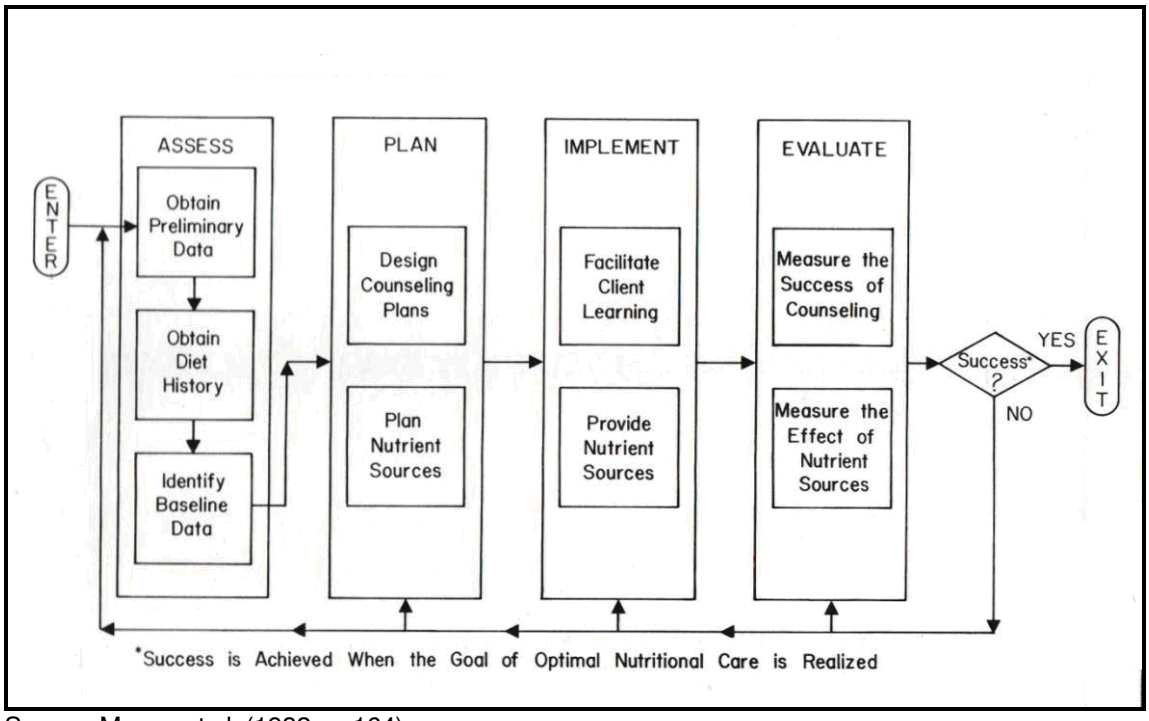
Similarly, the profession of occupational therapy has a five-step standardised care process that consists of a sequence of activities provided by the therapist during the provision of client/patient service: referral, assessment and data gathering, client set goals, partnership to attain goals and evaluation (Hagedorn, 2001; Sumsion, 2006).

2.5 EVOLUTION OF THE NUTRITION CARE PROCESS

In the profession of dietetics today, the Nutrition Care Process (NCP) is the foundation on which dietetics practice is based. It describes the organised systematic approach taken by dietetics professionals to meet the nutritional needs of individual clients/patients (Gardner-Cardani, Yonkoski, & Kerestes, 2007; Gates, 1992; Lacey & Cross, 2002; Lacey & Pritchett, 2003; Splett & Myers, 2001). Prior to adoption of the ADA's standardised NCP, a variety of NCP models were proposed. The following section reviews these models in chronological order.

2.5.1 Model for Provision of Nutrition Care (Mason et al., 1982)

In 1982, Mason et al. proposed a model of nutrition care comprised of four components: assessment, planning, implementation and evaluation (Figure 2.3). This model conceptualised nutrition care provision as sequential components initiated by the referral to a dietetics professional. This system approach emphasised that nutrition care is successful when the goals have been achieved (Mason et al., 1982).

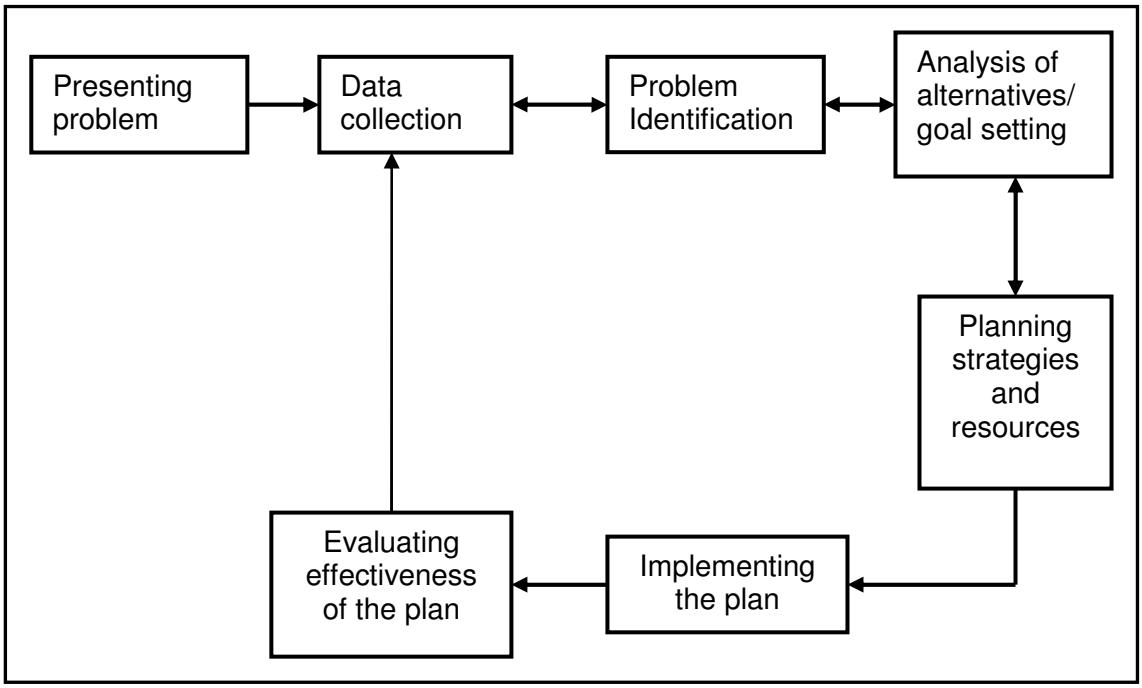


Source: Mason et al. (1982, p. 164)

Figure 2.3 Model for the Provision of Nutritional Care (Mason et al., 1982)

2.5.2 Nutrition Care Process (Gates, 1992)

In 1992, Gates proposed a seven-step model for NCP (Figure 2.4). In contrast to the model developed by Mason et al. (1982), Gates (1992) introduced three new steps: 'presenting problem,' which precedes 'data collection' (the equivalent of Mason et al.'s 'assess' component), and 'problem identification' and 'analysis of alternatives/goal setting' that precede planning. Despite these differences, the Gates (1992) and Mason et al. (1982) models take a similar sequential approach. The existence of a nutrition-related problem step in the Gates (1992) model is a precursor of the nutrition diagnosis concept; however, detailed description of the activity involved in this step is unavailable.

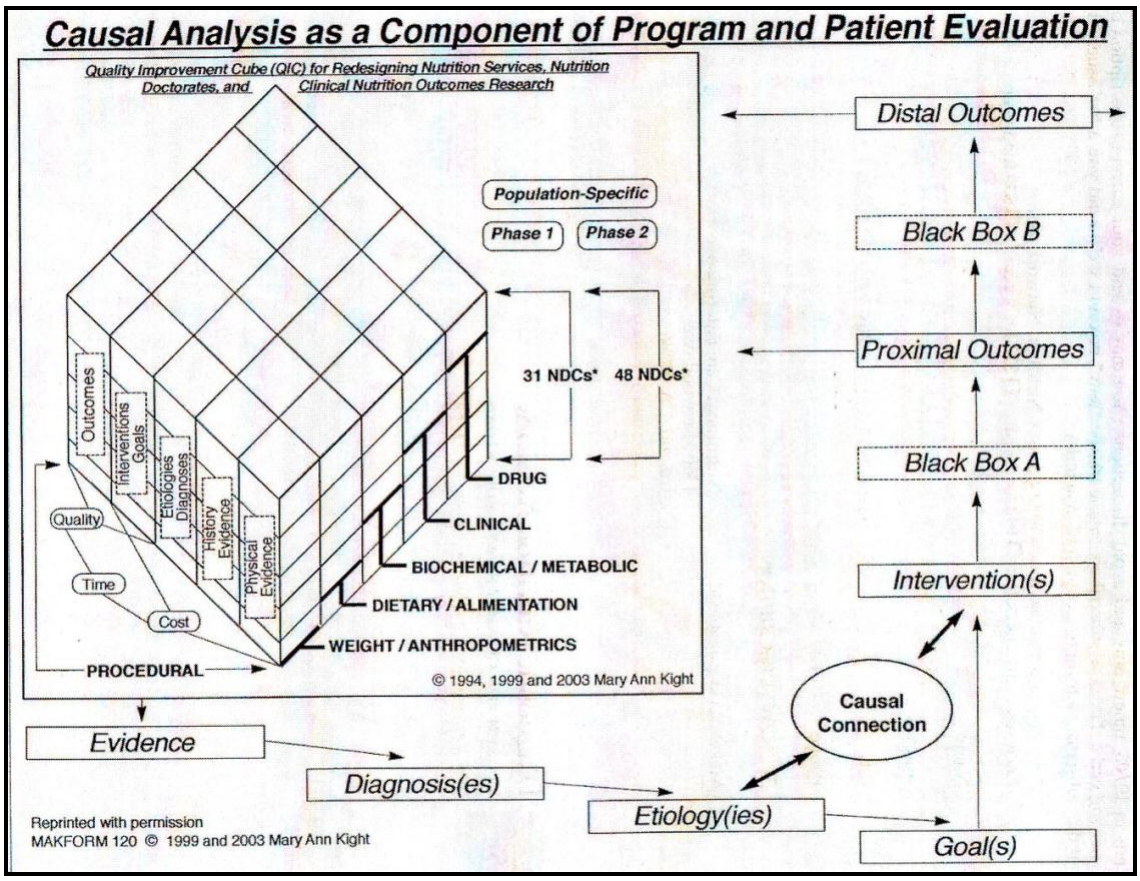


Source: Gates (1992, p. 77)

Figure 2.4 A model of Nutrition Care Process Gates, (1992, p. 77)

2.5.3 Nine-Step Nutritional Care Process (Kight, 1993)

In 1993, Kight developed a Nine-Step Nutritional Care Process guided by a three-dimension Quality Improvement Cube (QIC) (Figure 2.5). The primary dimension includes five axes of nutrition indicators: weight/anthropometrics, dietary/alimentation, biochemical/metabolic, clinical and drug. The procedural dimension contains physical, history, diagnoses, etiologies, interventions and outcomes components. The population-specific dimension relates to the nutritional diagnostic codes (Brewer & Heinzl, 2006; Picchioni, 2002; Sandrick, 2002).



Source: Parrington (2003, p. 7)

Figure 2.5 Quality Improvement Cube (QIC) guided Nine-Step Nutritional Care Process (Kight, 1993)

The Nine-Step Nutritional Care Process, as the name implies, consisted of nine linear steps. Step one is the process of gathering evidence using the primary dimension of the QIC; this step is consistent with the assessment process in the Mason et al. (1982) and Gates (1992) models. Step two involves identification of primary dietetic-specific nutrition diagnosis codes (D-S NDC) (see Section 2.7.2). This step represented a new component in NCP. Step three is the process of identifying the etiology(ies) of the nutrition diagnosis(es), which then leads to determination of goals (step four) and nutrition intervention (step five). Step six involves the evaluation of critical thinking using 'Black Box A,' which was described by Picchioni (2002, p. 5) as a "mechanism involved in the nutriokinetic and nutriodynamic phase of intervention." Step seven, 'Proximal Outcomes,' relates to the evaluation of short-term outcomes from the intervention. Step eight, 'Black Box B,' refers to the 'body mechanism' response to intervention for outcomes measurement. Both 'black boxes' are tools for evaluation of nutrition care and patient outcomes (Sandrick, 2002). The final step, 'Distal Outcomes,' involves evaluation of long-term outcomes of the intervention (Picchioni, 2002).

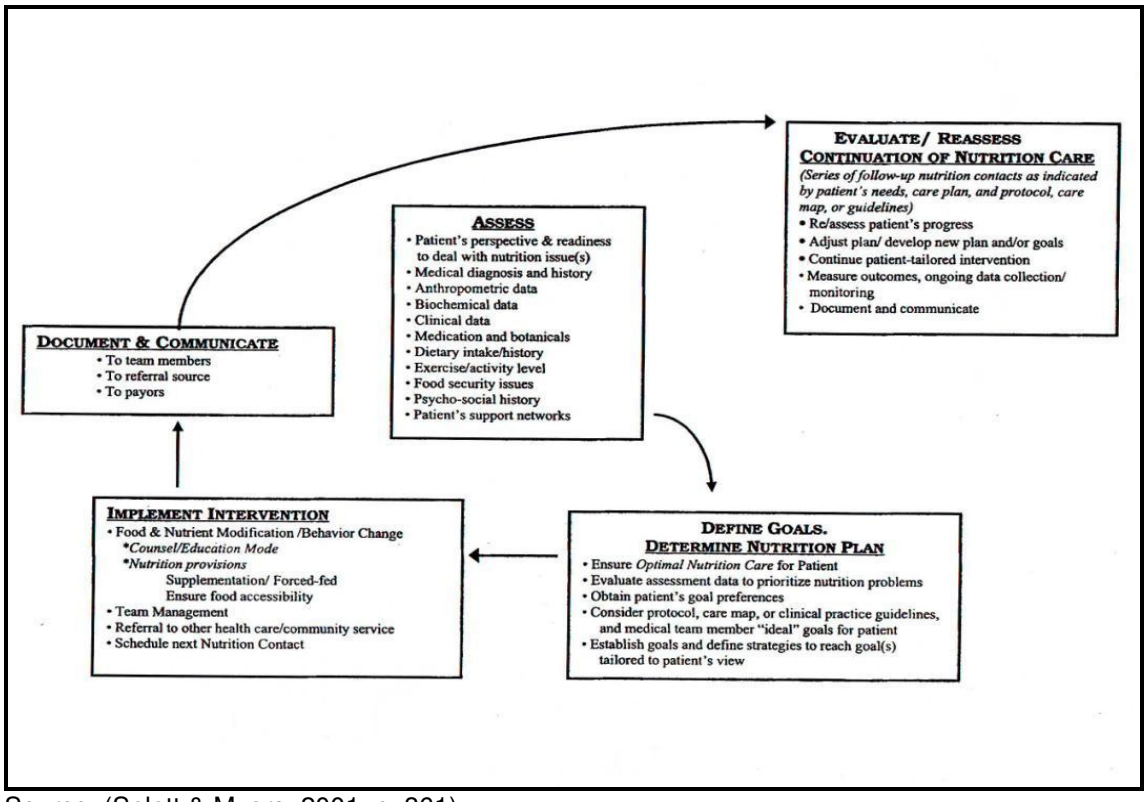
The Nine-step Nutritional Care Process recognises the necessity for critical thinking in the nutritional care decision-making process (Brewer & Heinzl, 2006) and measurement of patient outcomes (Sandrick, 2002), and, importantly, introduced the concept of nutrition diagnosis in the care process. However, this model was highly theoretical and, arguably, too complex for widespread application in practice.

2.5.4 Nutrition Care Process (Brylinsky, 1996, p. 403)

Brylinsky's (1996, p. 403) five-component NCP model was used in education and practice for several years. It featured in nutrition texts and, therefore, was widely referenced by dietetics students and professionals. While its components were similar to those in the Mason et al. (1982) and Gates (1992) models, a 'nutrition related problem identification' step referred to the medical diagnosis as the nutrition-related problem.

2.5.5 Nutrition Care Model (Splett & Myers, 2001)

In 2001, Splett and Myers proposed a Nutrition Care Model (Figure 2.6) to stimulate discussion regarding development of a standardised model of nutrition care and to stress the importance of measuring outcomes. This model encompassed the whole nutrition care system as three main components: a trigger event that precipitated provision of nutrition care, a five-step NCP and the nutrition-related outcomes determined by the results of the nutrition care. Of the four categories of nutrition care outcomes – client/patient-related, nutrition-related, clinical and cost of healthcare (Splett & Myers, 2001) – this model placed more emphasis on nutrition-related outcomes.



Source: (Splett & Myers, 2001, p. 361)

Figure 2.6 Nutrition Care Model (Splett & Myers, 2001)

2.5.6 Problem-based Nutrition Care Model (Lacey & Cross, 2002)

As previously mentioned, Kight (1993) incorporated a nutrition diagnosis component in her Nine-Step Nutritional Care Process and Splett and Myers (2001) emphasised nutrition-related outcomes in their model. In 2002, Lacey and Cross

described a nine-step Problem-based Nutrition Care Model that included both of these components (Lacey & Cross, 2002). The assessment step in this model highlighted the problem-based focus that provides structure to objective and subjective data with added emphasis on behaviour changes and readiness of the client/patient. In the manner of Kight's (1993) model, Lacey and Cross (2002) incorporated nutrition diagnosis as the second step and identified the causes of the problem (etiology) as the third step. The fourth step involved description of the signs and symptoms of the problem. Like Splett and Myers' (2001) model, this model acknowledged the importance of documentation as part of the care process by making it a separate step. Lacey and Cross (2002) recommended that nutrition care documentation follow a Problem, Intervention and Evaluation (PIE) or Diagnosis, Assessment and Recommendation (DAR) format. The final two steps are similar to Kight's (1993) seventh and ninth steps, which involve defining and measuring outcomes.

The Problem-based Nutrition Care Model was incorporated in teaching and practice, and provided added value for dietetics professionals and students in terms of instilling organised thinking processes during the provision of nutrition care (Lacey & Cross, 2002).

2.5.7 Summary of the pre-2003 models

It is clear from the above review of the evolution of NCP models that dietetics professionals have taken various different approaches to practice. Table 2.1 summarises all models of nutritional care processes prior to the 2003 development of the ADA's NCP.

Table 2.1 Summary of NCP models prior to the ADA's NCPM[a]

Model	Components / Steps	Purpose/ Advantages	Limitations
Model for Provision of Nutrition Care (Mason et al., 1982)	• Assessment • Planning • Implementation • Evaluation	Provides a structured approach to nutrition care delivery	No nutrition diagnosis step No standardisation of terms to describe each process
Nutrition Care Process (Gates, 1992)	• Presenting problem • Data collection • Problem identification • Analysis of alternatives / goal setting • Planning strategies • Implementating the plan • Evaluating effectiveness of the plan	Provides a framework to learn clinical dietetics practice and a guide for consistent practice	No nutrition diagnosis step Not used as a guide in daily practice No standardisation of terms to describe each process
Nine-Step Nutritional Care Process (Kight, 1993, 2003; Kight & Gammon, 1994a, 1994b)	• Evaluate evidence • Identify nutritional diagnosis(es) • Identify etiology(ies) • Goal(s) • Intervention(s) • Black Box A • Proximal outcomes • Black Box B • Distal outcomes	Incorporates a nutrition diagnosis component in the care process Incorporates an element of critical thinking	Highly theoretical, complex and biomedical based
Nutrition Care Process (Brylinsky, 1996, p. 403)	• Nutritional status assessment • Nutrition related problem identification • Planning and prioritizing objectives • Implementation of nutritional care • Evaluation of nutrition care outcomes	Promotes consistency in communication and practice Included in nutrition text	No nutrition diagnosis step Not used as a guide in daily practice No standardisation of terms to describe each process

Model	Components / Steps	Purpose/ Advantages	Limitations
Nutrition Care Model (Splett & Myers, 2001)	• Assessment • Determination of nutrition plan • Implementation of nutrition intervention • Documentation and communication • Evaluation or reassessment	Emphasises the importance of outcomes of nutritional care	No nutrition diagnosis step No standardisation of terms to describe each process
Problem-based Nutrition Care Model (Lacey & Cross, 2002)	• Problem-based focused (PBF) assessment • Identify nutrition problem (P)/ diagnosis • Identify etiology (E) of the problem • Describe the signs and symptoms of the Problem Intervention Evaluation (PIE) statement • Define desired outcome (based on evidence) • Intervention (causal connection) • Document (PIE or DAR]) • Evaluate short term and intermediate outcomes: behavioural, laboratory, anthropometric, functional, patient satisfaction • Evaluate long term outcomes: cost, disease condition & health status, patient satisfaction	Incorporates defining and measuring outcomes Incorporates identification of 'nutrition diagnosis'/ problem Incorporated in education A basis for a standardised NCP	No standardisation of terms to describe each process

[a]ADA NCPM = American Dietetic Association Nutrition Care Process and Model (Lacey & Pritchett, 2003)
DAR = Diagnosis, Assessment and Recommendation
PIE = Problem, Intervention and Evaluation
NCP = Nutrition Care Process

2.5.8 Need for a standardised NCP

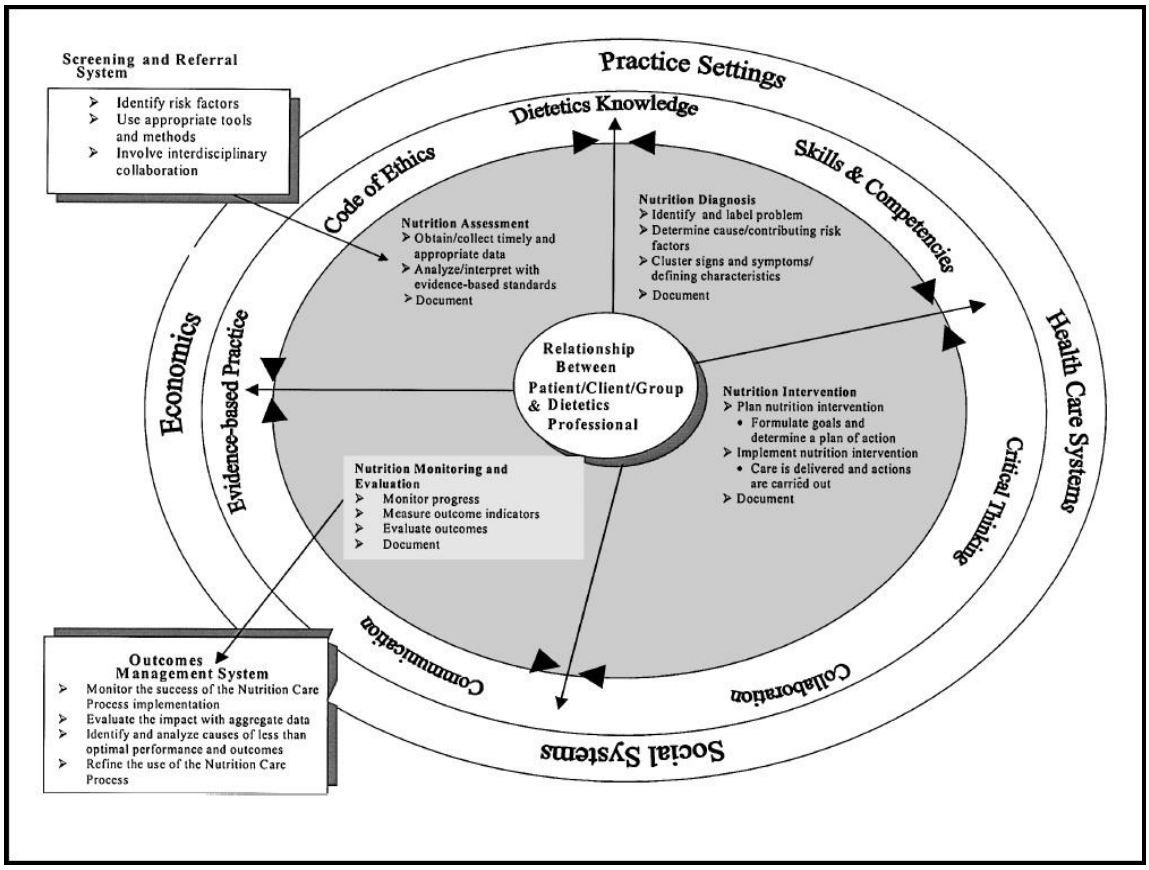
In 2001, the ADA recognised the necessity for adoption of a standardised NCP to serve as a conceptual framework for dietetics practice; this uniform approach would support standardised documentation of each NCP step, and produce comparable data for computerised health records, payment purposes and research (Splett & Myers, 2001). In addition, it was acknowledged that standardised documentation would make the dietetics practitioners' judgements more visible, indicate a clear connection between NCP steps and patient outcomes (Hakel-Smith & Lewis, 2004; Lacey & Cross, 2002), and demonstrate the effectiveness of MNT (Hakel-Smith & Lewis, 2004). Implementation of a standardised NCP also promised consistency in clinical judgement and decision making (Meyer & Gates, 1993), and enhanced credibility and accountability of the profession.

2.6 ADA'S STANDARDISED NCP

In 2003, the ADA endorsed the incorporation of the standardised NCP and Model (Figure 2.7) in dietetics practice, education and research (Lacey & Pritchett, 2003). Lacey and Pritchett (2003, p.1063) defined the ADA's NCP as:

> …a systematic problem-solving method that dietetics professionals use to critically think and make decisions to address nutrition related problems and provide safe and effective quality nutrition care.

Providing a standardised yet individualised approach to MNT, the ADA's NCP promoted the dietetics professional as the unique provider of nutrition care (Lacey & Pritchett, 2003). It was intended that this model replace all previous NCP models in education, practice and research (Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008a). The NCP comprised four interrelated steps: (1) Nutrition Assessment, (2) Nutrition Diagnosis, (3) Nutrition Intervention and (4) Nutrition Monitoring and Evaluation.



Source: Lacey & Pritchett (2003, p. 1062)

Figure 2.7 ADA's NCP and Model

The first step, Nutrition Assessment, is the process of collecting, analysing and interpreting objective and/or subjective data to identify nutrition-related problems (Lacey & Pritchett, 2003; Winkler & Touger-Decker, 2007). This is the step that dietetics professionals are likely to be most familiar with as it is well established in education, practice and research.

The second step, Nutrition Diagnosis, which involves naming the specific nutrition-related problem, is a new component in the NCP. Although some previous care processes (Kight, 1993; Lacey & Cross, 2002) have incorporated nutrition diagnosis, there is little published information available on how this step should be implemented in dietetics practice. There are three components of nutrition diagnosis: the nutrition-related problem (diagnosis), the cause of the problem (etiology) and the signs and symptoms (Lacey & Pritchett, 2003). Because these components determine the accuracy of subsequent steps in the care process, the Nutrition Diagnosis step is considered to be crucially important (Sandrick, 2002). A

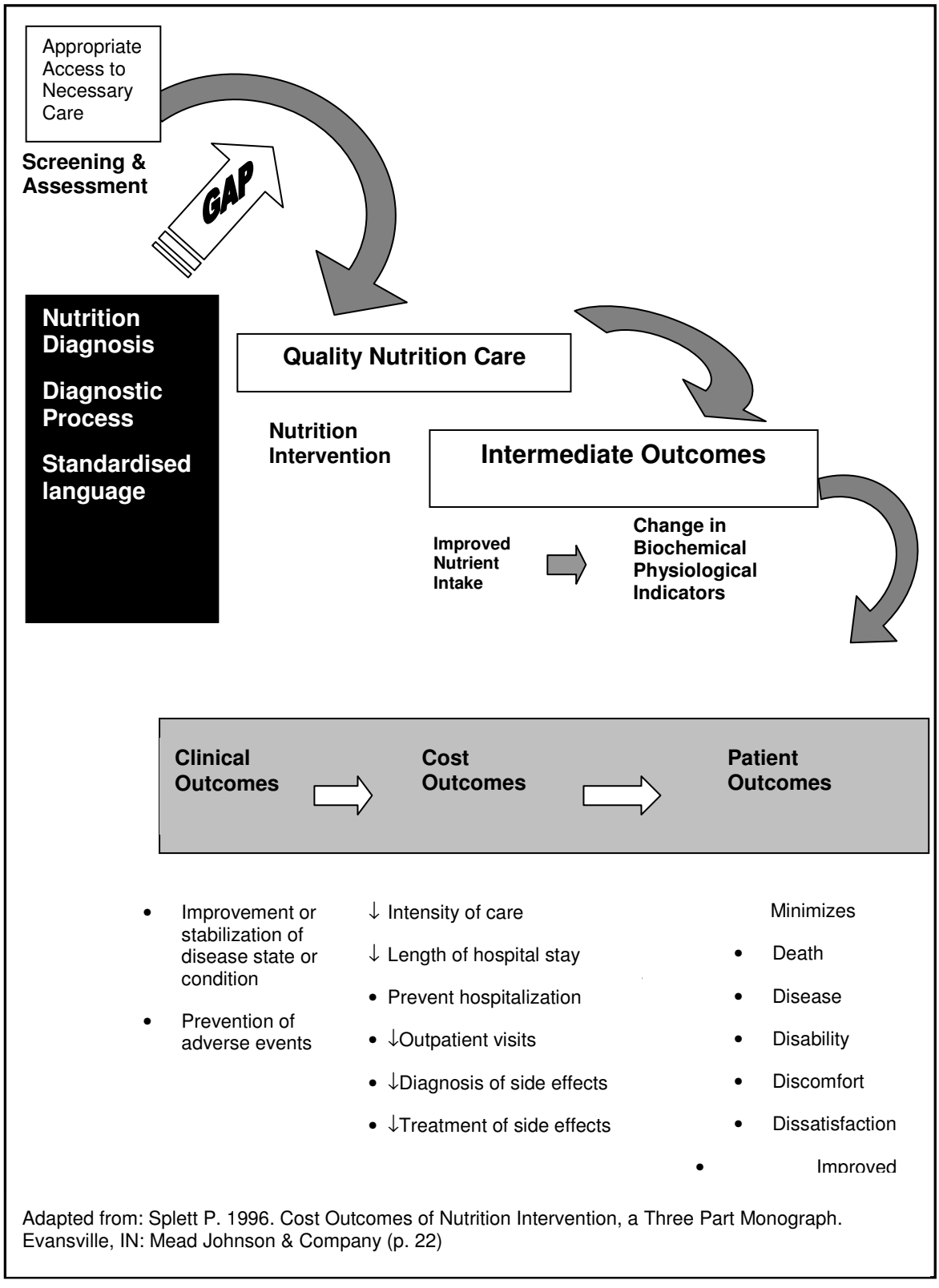
more detailed description of the Nutrition Diagnosis concept is presented in Section 2.7

The third step, Nutrition Intervention, refers to planning the 'client-driven' action to solve the nutrition-related problem (Winkler & Touger-Decker, 2007)). Nutrition Intervention involves two interrelated activities: planning and implementation. In the planning stage, dietetics professionals prioritise the nutrition diagnoses, refer to clinical guidelines (e.g. MNT Evidence-Based Guides for Practice) pertaining to the specific nutrition-related problem (ADA, 2007) and determine the goals for each diagnosis. Implementation refers to the specific actions taken to communicate and carry out the nutrition care plan.

The fourth step, Nutrition Monitoring and Evaluation, is undertaken to determine whether nutrition care outcomes relevant to the Nutrition Diagnosis and Nutrition Intervention plans are being achieved.

2.6.1 Relevance to the Cascade Model

The ADA's NCP highlighted the existence of a critical gap in Splett's (Splett, 1996) Cascade Model of events in the nutrition care system (Section 2.3). For years, dietetians had been practicing nutrition assessment followed directly by implementation of an intervention plan. The interrelatedness of all four steps in the ADA's NCP means that each step builds on the preceding ones, and the process will be interrupted if a step is incomplete or missing (Gardner, 2003). As illustrated in Figure 2.8, the NCP step of Nutrition Diagnosis provides the crucial link between Nutrition Assessment and Nutrition Intervention.



Adapted from: Splett P. 1996. Cost Outcomes of Nutrition Intervention, a Three Part Monograph. Evansville, IN: Mead Johnson & Company (p. 22)

Figure 2.8 The 'gap' in the cascade of events leading to evidence of the effectiveness and cost-effectiveness of nutrition interventions

2.6.2 Difference between the NCP and MNT

While the NCP is a consistent approach to provision of nutrition care through well-defined steps, Medical Nutrition Therapy (MNT) has been defined as: "nutritional diagnostic, therapy, and counselling services for the purposes of disease management, which are furnished by a registered dietitian or nutrition professional" (Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008a, p. 1116). Therefore, MNT is one of several types of nutrition care that dietetics professionals use standardised NCP to provide; other types of nutrition care services include nutrition education, feeding assistance and preventative nutrition care (ADA, 2007; Lacey & Pritchett, 2003). Meyer and Gates (1993) explained that MNT promotes individualised care using the consistent NCP approach.

2.6.3 Progress

Since its conception in 2003, the ADA's NCP has been implemented in US dietetics practice, education and research. Its inclusion in the Scope of Dietetics Practice Framework, the Standards of Practice in Nutrition Care and the Standards of Professional Performance (Kieselhorst, Skates, & Pritchett, 2005; O'Sullivan-Maillet et al., 2005) reinforce it as the underlying concept of dietetics practice. In education, the ADA's NCP has been incorporated in various nutrition and dietetics texts (Charney, Escott-Stump, & Mahan, 2008; DeBruyne, Whitney, & Pinna, 2008; Escott-Stump, 2008; Rolfes, Pinna, & Whitney, 2006; Winkler & Touger-Decker, 2007) and, from March, 2009, all US dietetics education programs were required to incorporate NCPM content (Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008a). In professional development, the US Registration Examination for Dietitians was revised and updated to include the ADA's NCP steps and a continuous education module was developed to enhance understanding and implementation in practice (Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008a).

2.6.4 Research

No research literature on the implementation of the ADA's NCP in countries other than the United States was available for retrieval during this research project. However, a small body of directly relevant American research was located; this comprised three journal articles, one Masters dissertation and eleven poster abstracts. This work focused on dietitians' attitudes to, and perceptions of, the standardised NCP (Connell & Molaison, 2008; Gourley, 2007); documentation of NCP (Hakel-Smith, Lewis, & Eskridge, 2005); implementation of NCP in dietetics education (Campbell, Anderson, Larson, & Petty, 2007; Gilboy, 2008; Lacey, 2006); implementation of NCP in clinical practice (Gardner-Cardani, Faut, & Yonkoski, 2007; Gardner-Cardani, Yonkoski et al., 2007; Roberts & Shiner, 2009; Yonkoski & Gardner-Cardani, 2007); and implementation of NCP in the electronic medical record (Buzek & Priest, 2009; Haws Rice, Olsen, & Randall, 2007; Trombley & Rodrigues, 2008; Weis, 2008) (Table 2.2).

Table 2.2 Summary of research directly related to the ADA's NCP and Model[a]

Title (Reference)	Aims	Method	Results & Conclusions
Attitudes and perceptions of dietitians towards NCP:			
Assessing perceptions toward implementation of the NCP among Registered Dietitians in Northeast Tennessee (Gourley, 2007)	• To survey RDs in Northeast Tennessee to determine attitudes towards implementation of the NCP prior to and following education about the NCP	• Sampling: Convenience • Sample: 100 RDs • 1st phase: pre-test electronic survey • 2nd phase: written survey after a workshop Participants implemented the NCP within 6-8 weeks after the workshop. • 3rd phase: electronic survey sent after the implementation of NCP	• Improvement in attitudes to, beliefs about and understanding of the NCP after the workshop; • RDs did not feel comfortable teaching the NCP to dietetic interns; implementation of NCP faces problems inherent in facilities. • Recommended professional development to increase RD confidence to implement NCP.
Internship preceptors perceptions and use of the NCP (Connell & Molaison, 2008)	• To determine dietetic internship preceptors' attitudes to the use of NCP, and to assess their current use and perceived difficulty incorporating NCP into their facility	Survey assessed attitudes related to the ability of NCP to address desired outcomes and difficulty in implementation Sample: 45 preceptors/instructors	• Overall, participants' opinions on the NCP were neutral to slightly positive; participants were uncertain about the difficulty in implementing NCP; more than half were familiar with the NCP, but had no training in its use. • Recommended practical training in use of, and how to implement, the NCP.
Documentation of NCP:			
Orientation to NCP standards improves nutrition care documentation by nutrition practitioners (Hakel-Smith et al., 2005)	• To compare documentation of two groups of clinical nutrition practitioners for evidence of the NCP	• A retrospective chart review; a comparison of documentation of two groups of nutrition practitioners from two institutions • Sample: 60 randomly selected patient records	• Nutrition practitioners with orientation to NCP standards documented more related NCP steps than practitioners without this orientation. • Recommended provision of

Title (Reference)	Aims	Method	Results & Conclusions
		Institution A = practitioners who received initial orientation & routine reinforcement in use of NCP standards; Institution B = practitioners who received orientation in use of a further assessment & MNT intervention procedure	continuous practical education in use and documentation of NCP to improve the documentation of nutrition care and patient outcomes.
Implementation of NCP in dietetics education:			
Teaching ADA's NCP and nutrition diagnoses: one educator's story of a work in progress (Lacey, 2006)	• To incorporate ADA's NCP in dietetics curricula	• Incorporation of NCP components into the MNT course outline in didactic and dietetic internship programs	• Use of case studies assists understanding of NCP and standardised language; learning nutrition diagnosis is challenging and needs repetition to enhance competency & understanding.
The future of dietetics practice: teaching the NCP and standardized language (Campbell et al., 2007)	• To describe an approach to teaching and practicing NCP and standardised language	• Incorporation of the NCP and standardised language into dietetics curriculum using a collaborative approach applying the Dreyfus model • Learning methods: lecture, guest speakers from facilities currently charting with ADI case studies and ADI charting in the clinical setting.	• Students exposed to the collaborative approach advanced faster as interns and achieved a higher level of NCP competence.
Incorporating the NCP into nutrition education and community nutrition courses (Gilboy, 2008)	• To describe a step-wise approach to integrate the NCP for dietetic students	• Incorporation of the NCP as a framework to link courses in nutrition education and community nutrition	• Learning in this systematic way provided students with knowledge and skills in nutrition education and community nutrition, integrating the NCP framework in preparation for the proficiency and expert stages of knowledge expected in dietetic

Title (Reference)	Aims	Method	Results & Conclusions
			internships and in practice.
Implementation of NCP in clinical practice:			
NCP implementation: a change management perspective (Gardner-Cardani, Yonkoski et al., 2007)	• To incorporate the NCP at the university hospital	• Nutrition Diagnosis Steering Committee, use of peer coaches and group work	• Implementation of NCP in practice suggests a need for dietitians to learn about the process, develop new skills and change previous habits; • It is important that staff members are motivated and feel safe to change.
NCP continuous improvement (Gardner-Cardani, Faut et al., 2007)	• To describe two continuous learning activities to promote staff competency with the NCP	• Use of instructors, case study workshops, an informal chart note evaluation tool, a chart audit process, an NCP-focused monthly newsletter, and interactive presentations; employed strategies of self-evaluation, individual feedback, and small and large group learning of NCP	• Successful transition from SOAP to NCP-format documentation style; ongoing NCP learning is essential to increase competency.
Resource utilization for NCP implementation (Yonkoski & Gardner-Cardani, 2007)	• To estimate resources allocated to implement the NCP in a university hospital	• Information gathering, presentation of the NCP model to staff, development of a chart audit process, site visits and creation of a rollout schedule for 30 inpatient RDs (6 months); • pilot tested by 6 RDs; developed guidelines & documentation template in weekly meetings; after 4 months, the 6 RDs became instructors of other staff members	• Inpatient NCP implementation spanned one year and cost $500 per RD; costs could be decreased if implementation was spread over a longer period.

Title (Reference)	Aims	Method	Results & Conclusions
NCP in a tertiary teaching hospital: implementation strategies and impact on clinical productivity (Roberts & Shiner, 2009)	• To understand the steps in implementation of NCP in acute-care settings and how implementation affects clinical productivity (CP)	• A committee for training of trainers for RDs was formed 9 months before implementation; training and a resources book were provided to other RDs 2 months before implementation; CP was documented	• NCP implementation requires planning, time and training. Implementation barriers identified were: fear of change, training all RDs, and the perception that CP would decline.
Implementation of NCP in electronic record:			
Application of the ADA's NCP and Model in the electronic medical record (Haws Rice et al., 2007)	• To embed the standardised language of the NCP into EMR	• EMR framework for selecting nutrition diagnosis, goals and follow up dates	• The EMR facilitates efficient use of the NCP and Model with automated lists, documentation and reports; the reports improve communication among caregivers, are used for staff training and quality outcome monitoring.
NCP in the electronic medical record (Weis, 2008)	• To understand the benefits of utilising the NCP in an EMR	• A template using NCP was created to replace the SOAP note default format in EMR	• Standardised language used in diagnosis and intervention allows for outcomes evaluation.
Implementation of the NCP in the affinity patient charting system (Trombley & Rodrigues, 2008)	• To demonstrate maintenance of productivity, competency and regulatory compliance with implementation of the NCP	• RDs were trained in the NCP over a 6-month period; all Nutrition Diagnosis and Nutrition Intervention terminology was included in the patient charting system; a minimum of five chart reviews were conducted quarterly on each RD	• Use of the NCP did not result in decreased productivity; chart audit scores improved to an annual high; competency will increase when staff are accustomed to the NCP.

Title (Reference)	Aims	Method	Results & Conclusions
Implementing the NCP in the hospital setting using electronic health records (Buzek & Priest, 2009)	• To create a computerised charting system that incorporates the NCP	• Using Horizon Expert Documentation, ER 10.1, PC View 7.30, assessment and follow up notes were designed with the ADIME backbone; the PES statement was included in the diagnosis section	• Challenges identified during the implementation process included conformity to using the electronic health record, transition from SOAP format, level of confidence in using the MNT diagnosis, and using monitoring and evaluation to determine if nutritional goals were met.

NCP = Nutrition Care Process; RD = Registered Dietitian, EMR = Electronic Medical Record; ADIME = Assessment, Diagnosis, Intervention, Monitoring and Evaluation; SOAP = Subjective, Objective, Assessment, Plan; CP = Clinical Productivity, PES = Problem, Etiology, Signs and symptoms; MNT = Medical Nutrition Therapy

2.7 NUTRITION DIAGNOSIS

The word 'diagnosis,' according to the Compact Oxford Dictionary of English Language, means to distinguish or discern. Balint et al. (2006, p. 133) referred to diagnosis as a 'discriminatory' process. In clinical health, diagnosis refers to a statement that identifies any undesirable state (Iyer et al., 1995) from a group of signs and symptoms (Gordon, 1976). In 2003, the Nutrition Diagnosis step of the NCP was defined as:

> …the identification and labeling that describes an actual occurrence, risk of, or potential for developing a nutritional problem that dietetics professionals are responsible for treating independently (Lacey & Pritchett, 2003, p. 1065).

However, in a recent update of the ADA's NCP, it was clarified that the modifiers 'potential for' and 'risk of' should not be used with diagnoses as there is no data that show a cause-and-effect relationship between nutritional risk and nutrition diagnoses (Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008a). Consequently, the revised definition of Nutrition Diagnosis became:

> Nutrition Diagnosis is a food and nutrition professional's identification and labelling of an existing nutrition problem that the food and nutrition professional is responsible for treating independently (Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008a, p. 1114)

2.7.1 Diagnosis concept in other healthcare professions

Traditionally, use of the word 'diagnosis' has been reserved for the physician, due to its medical connotations (King, 1967). Indeed, the medical diagnosis has been practiced for more than 300 years and is firmly incorporated in the medical curriculum (Balint et al., 2006; King, 1967). The medical diagnostic process involves data gathering from the client/patient, data interpretation, and formation of a treatment plan (Chambers, 1962), and requires knowledge, intuition and reasoning skill (Groves, 2008; King, 1967). Medical diagnosis in clinical practice ensures consistency in medical documentation and medical care delivery, thereby

facilitating visibility of the profession and accountability of the professional (Carpenito-Moyet, 2008).

Application of diagnosis beyond the medical paradigm has aroused a variety of reactions (Chambers, 1962). When the Nutrition Diagnosis step was incorporated into the ADA's standardised NCP, some dietetics practitioners were hesitant to diagnose nutrition-related problems because they were under the misconception that only physicians made diagnoses. However, the diagnosis term is not unique to medicine (King, 1967). Diagnoses are made in various professions, including engineering, business and science as well as healthcare. The process of problem identification is usually the most crucial aspect of any profession; it requires knowledge, skills and a high level of expertise to pinpoint the most accurate diagnosis (Iyer et al., 1995; Komorita, 1963).

In the field of nursing, the term 'nursing diagnosis' was first used in the 1950s (Gardner, 2003). The classification system for clinical problems was introduced in nursing practice ten years later to describe the clinical judgments made by nurses (Gordon, 1998; Iyer et al., 1995), and nursing diagnosis was officially included in the nursing process in the mid-1970s. Today, the nursing diagnosis is well established in nursing practice, and is embedded in the nursing curriculum (Iyer et al., 1995). The benefits of nursing diagnosis practice for the profession and patient outcomes are widely acknowledged; these include a tool for critical thinking (Gordon, 1998), increased visibility of nursing practice (Frederick et al., 2001; Wilkinson, 2007), promotion of uniform documentation, support for appropriate reimbursement and improved client/patient outcomes (Müller-Staub, Lavin, Needham, & van Achterberg, 2006; Rothberg, 1967; Weir-Hughes, 2007; Welton & Halloran, 2005).

In the field of pharmacy, a conceptual framework for pharmaceutical diagnosis involving a process of identifying, defining and labelling drug-related problems was proposed in 1997 (Culbertson, Larson, Cady, Kale, & Force, 1997). It was expected that pharmaceutical diagnosis would provide practitioners and students with a problem-solving approach, standardise practice, and improve continuity of care and evaluation of clinical performance (Culbertson et al., 1997).

2.7.2 History of Nutrition Diagnosis development

Just as other health professions have recognised the advantages of incorporating a diagnosis component in their specific care processes, the dietetics profession is now cognisant of the necessity for its inclusion. As previously discussed (Section 2.5), some of the NCP models prior to the ADA's standardised NCP identified a nutrition-related problem step (Brylinsky, 1996; Gates, 1992; Kight, 1993; Lacey & Cross, 2002), However, they provided little detail about how to conduct this process. Moreover, dietetics practitioners have traditionally identified the medical diagnosis as the nutrition-related problem.

Prior to the development of the ADA's Nutrition Diagnosis step, the concept of nutrition diagnosis was introduced by Kight (1993) in the form of dietetic-specific nutritional diagnostic codes (D-S NDCs). As an avenue for advancement of the dietetics profession, Kight developed 74 D-S NDCs (Kight & Gammon, 1994a, 1994b). In 2003, another thirty were added to the initial codes resulting in a total of 104 nutrition-specific and related nutritional diagnostic codes (Kight, 2003).

The ADA's 2003 endorsement of the inclusion of a Nutrition Diagnosis step as part of a standardised NCP recognised the potential to infuse dietetics practice with a 'higher-valued cognitive level' and to achieve effective expression of the dietitian's role (Sandrick, 2002, p. 429). Additionally, Nutrition Diagnosis emphasised the vital connection between Nutrition Assessment and Nutrition Intervention, which leads to evaluation of outcomes (Oakland, 1997; Winkler & Touger-Decker, 2007).

2.7.3 Components

Each nutrition diagnostic category has three distinct components: the nutrition diagnostic term (NDT) or problem, the etiology of the problem, and the signs and symptoms. The etiology and signs/symptoms of the NDT distinguish the problem and discriminate the patient states (ADA, 2006b, 2007, 2008, 2009).

Nutrition diagnostic term (Problem)

The NDT serves as a label for the nutrition-related problem identified by a dietetics practitioner. There are 62 nutrition diagnoses in a framework of three domains – Intake, Clinical and Behavioural-Environment (ADA, 2006b). The ADA's continuous review process has resulted in exclusion of two NDTs (hypometabolism and hypermetabolism) because they are not treatable by dietitians (ADA, 2008). To facilitate accurate diagnosis, it is the ADA's intention that NDTs clearly and precisely describe client/patient conditions (ADA, 2006b, 2007, 2008, 2009). It is imperative that dietetics practitioners understand the definitions of each NDT if they are going to distinguish between similar diagnoses (Carpenito-Moyet, 2008).

Etiology

The etiology, or cause of the problem, is the most crucial indicator for determining a diagnosis, upon which care depends. Etiologies are "factors contributing to the existence of, or maintenance of pathophysiological, psychosocial, situational, developmental, cultural, and/or environmental problems" (ADA, 2009, p. 198).

Signs and symptoms

Signs and symptoms, also known as defining characteristics of the problem, refer to the cues that reflect the subjective and/or objective characteristics of the nutrition diagnosis identified. These defining characteristics are ascertained during the first step of the NCP – Nutrition Assessment (ADA, 2006b, 2007, 2008, 2009) and serve as a guide for monitoring and evaluating the effectiveness of the Nutrition Intervention (Jenkins, Myers, Charney, & Escott-Stump, 2006; Lacey & Pritchett, 2003).

2.7.4 Nutrition diagnostic process

Diagnosis is both a process and a product (Wilkinson, 2007). The diagnostic process refers to the decision-making process of reaching a diagnosis as an outcome (Iyer et al., 1995). In medicine, it has been acknowledged that the process of decision making to identify a diagnosis involves knowledge and

reasoning skills, which require interaction between cognition, knowledge and clinical experience (Groves, 2008). In nursing, the diagnostic process has been described as involving analysis and review of data, formulation of the diagnosis and validation of the diagnosis (Doenges & Moorhouse, 2008; Gordon, 1976; Iyer et al., 1995; Price, 1980). Similarly, in dietetics, the diagnostic process involves processing data from the Nutrition Assessment step, and synthesis and evaluation of the nutrition diagnosis (ADA, 2009; Kight, 1993; Lacey & Pritchett, 2003). The required processes of analysis, review, interpretation and classification of the data are referred to as the problem-solving method (Doenges & Moorhouse, 2008).

The nutrition diagnosis process may be difficult as it requires not only knowledge, but application of reasoning skills (Kight, 1993). These reasoning skills are also referred to as clinical judgment, clinical reasoning, clinical decision making or diagnostic reasoning (Meyer & Gates, 1993). These terms tend to be used interchangeably in the literature (Groves, 2008; Kight, 1993). Clinical reasoning has been described as the cognitive and decision-making process undertaken during review and analysis of client/patient data (Higgs, 2008). A well-established theory of clinical reasoning is hypothetico-deductive reasoning, which refers to a process whereby a practitioner organises the clinical data, generates a hypothesis using knowledge and experience, evaluates this hypothesis based on the available data and, ultimately, decides the diagnosis (Gates, 1992; Groves, 2008; Kight, 1993).

Clinical reasoning skills are influenced by many factors, such as the amount of information available, the complexity of the client/patient's problem and the practitioners' level of experience (Groves, 2008). However, little attention has been given to clinical reasoning as this concept was first raised in the context of dietetics in Gates' 1992 model (Section 2.5.2). The inception of Nutrition Diagnosis as a core component of the NCP gives new prominence to application of clinical reasoning skills in dietetics practice.

Identification of clear, accurate nutrition diagnoses is an essential outcome of the diagnostic process. Application of critical thinking is necessary to improve the accuracy of the diagnoses (Carroll-Johnson, 2001; Lunney, 2003). When more

than one diagnosis is identified, the most urgent problem should be given highest priority (Kight, 1993; Wilkinson, 2007). A Nutrition Diagnosis from the Intake domain (see Section 2.9.2) should take priority over one from the Clinical or Behavioural-Environmental domains as the Intake domain is more specific to the role of dietitians (ADA, 2008, 2009). Dietetics practitioners need to evaluate each Nutrition Diagnosis component prior to finalising the diagnosis. The problem should be a nutrition-related problem that is treatable by dietetics practitioners, the etiology should be the 'root cause' of the problem that can be addressed with the Nutrition Intervention, and the signs and symptoms should be measurable to indicate whether the problem has been resolved or improved (ADA, 2008, 2009).

While the diagnostic processes in medicine, nursing and dietetics follow similar steps, the the respective diagnostic-process outcomes are distinct and specific to each profession. Nutrition Diagnosis should not be confused with medical diagnosis as the Nutrition Diagnosis evolves with the progress of the patient (Lacey & Pritchett, 2003).

2.7.5 Documentation

To enhance efficacy and continuity of care, dietetics practitioners need to translate the diagnostic hypothesis (Kight, 1993) into a written Nutrition Diagnosis statement. The ADA has prescribed a standardised Nutrition Diagnosis format referred to as the PES statement; this highly structured statement names the nutrition problem (P), identifies its etiology (E) using the connecting phrase 'related to' and states the signs/symptoms (S) using the connecting phrase 'as evidenced by' (Lacey & Pritchett, 2003; Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008b). The PES statement should be clear and concise, individualised to each client/patient, related to a single nutrition diagnosis and an etiology, and may be revised as new data becomes available (ADA, 2008, 2009).

2.7.6 Research

The search for literature focused on the implementation of the new Nutrition Diagnosis step in the ADA's standardised NCP revealed only one journal article

(Mathieu, Foust, & Ouellette, 2005) and five abstracts for poster presentation (Emery, 2007; Jones & Danis, 2007; Ritter-Gooder & Lewis, 2009; Suen, 2008). Most of the research (Table 2.3) reported that the implementation of Nutrition Diagnosis in dietetics practice required an organised approach and extensive training programs.

Table 2.3 Summary of research directly related to Nutrition Diagnosis

Title (Reference)	Aim	Method	Results
Implementing Nutrition Diagnosis, step two in the NCP and Model: challenges and lessons learned in two health care facilities (Mathieu et al., 2005)	To generate background information and timelines, and identify challenges associated with pilot implementation of NCPM and standardised Nutrition Diagnosis in two US hospitals	Training in, and implementation of, the NCP, ADI charting and PES statements for RDs in both hospitals	The initial implementation process depended on the approval from administrators of both hospitals; difficulties surrounding the introduction of the new concept included changing RDs' thought processes; RDs with personality types flexible to change took less time to embrace the new concept; training and distribution of resources should be done prior to implementation; the process is time consuming.
Implementation strategies for Nutrition Diagnosis in an acute care university hospital setting – the University of Pittsburgh Medical Center – a sample action plan and toolkit for success (Jones & Danis, 2007)	To identify issues and strategies to consider when implementing Nutrition Diagnosis in a healthcare facility	A survey of dietitians in various healthcare settings, and a case study of Nutrition Diagnosis implementation strategies	The survey revealed that the majority of dietitians are not practicing Nutrition Diagnosis, and are unaware of the standardised language; many struggle to implement Nutrition Diagnosis. The case study described how a staff culture that espoused the NCP and Nutrition Diagnosis was achieved through effective planning and leadership; an implementation 'toolkit' was produced.
Nutrition diagnosis and intervention: a case report (Emery, 2007)	To apply the process of Nutrition Diagnosis and intervention in an MNT case	A case report that demonstrates the use of standardised Nutrition Diagnosis and Intervention in clinical nutrition care	The case report exemplified the use of standardised Nutrition Diagnosis with a PES statement, and demonstrated the improved efficacy, value of dietetics services and ability to gather outcomes data.

Title (Reference)	Aim	Method	Results
Challenges in implementing the Nutrition Diagnosis statement in acute care hospitals (Suen, 2008)	To describe the challenges faced and the importance of training all RDs to identify nutrition diagnoses	A case study of RD proficiency with NCP and Nutrition Diagnosis in two acute care hospitals in California; training sessions used the IDNT reference manual supplemented with professional advice Subjects: 11 practicing RDs, 3 new graduates	Practising RDs were able to master Nutrition Diagnosis within 2 weeks after 4 training sessions whereas new graduates required 1 month and 6-8 training sessions; the implementation of Nutrition Diagnosis should be properly organised with appropriate and adequate training programs.
Content validity of nutrition diagnostic term involuntary weight loss (Ritter-Gooder & Lewis, 2009)	To validate content of the nutrition diagnostic term NC-3.2 involuntary weight loss using expert raters	Descriptive mail survey in which a list of definitions, etiologies, signs & symptoms were rated using a 5-point Likert scale; diagnostic content validity scores were calculated Sample: 110 Board Certified Specialists in Gerontological Nutrition	Majority of items were valid for the diagnostic term; 36% of participants recommended adding language to etiologies; 40% recommended adding language to signs and symptoms

RD = Registered Dietitian
NCP = Nutrition Care Process
NCPM = Nutrition Care Process and Model
US = United States
PES = Problem, Etiology, Sign and symptoms
ADI = Assessment, Diagnosis, Intervention,
MNT = Medical Nutrition Therapy
IDNT = International Dietetics & Nutrition Terminology

2.8 STANDARDISED LANGUAGES IN HEALTHCARE PROFESSIONS

Standardised language in a healthcare context refers to a uniform set of terms that describe the elements of practice specific to each profession (Beyea, 1999; Clark, 1999). As previously discussed, healthcare delivery in medicine, nursing and some other health professions is characterised by standardised care processes that facilitate consistency of care across settings, structure communication within and across professions, allow for evaluation of the quality of care, and increase the visibility of professional practice (Aquilino & Keenan, 2000; Wilkinson, 2007).

2.8.1 Medicine

The medical profession recognised the need for standardised language in clinical practice more than three decades ago (Balint et al., 2006; Clark, 1999). The established standardised medical terminology systems, which evolve with advancement in knowledge and technology, are the International Classification of Diseases (ICD), Current Procedural Terminology (CPT), Logical Observation Identifiers Names and Codes (LOINC), Systematised Nomenclature of Medicine (SNOMED) and the Unified Medical Language System (UMLS) (Table 2.4).

Table 2.4 Summary of systems of standardised terminology used in medicine

Standardised terminology (Reference)	Developer	Focus	Comments
International Classification of Diseases (ICD) (WHO, 2007)	World Health Organisation	Classification of diseases and mortality data	First version published as 'International List of Causes of Death' in 1893; the sixth edition (ICD-6) included causes of morbidity; the ICD Clinical Modification (ICD-9-CM) published in 1977 included additional morbidity data; the current edition (ICD-10) has been adapted for Australia (ICD-10-AM) and Canada (ICD-10-CA); despite ongoing revision, Rose et al. (2001) identified evidence of ambiguity and redundancy in categories
Current Procedural Terminology (CPT) (American Medical Association, 2008)	American Medical Association	Uniform terms and codes for medical services and clinical procedures	Developed in 1966; codes are specific to the United States, where they are used for the billing of medical procedures, insurance claims and analysis of clinical procedures (Lathrop, Davis, & Nolte, 2009)
Logical Observation Identifiers Names and Codes (LOINC, 2007)	Regenstrief Institute	Standardised laboratory tests and clinical observations	Developed in 1994; codes are universal identifiers of laboratory tests and clinical observations; cover 98% of laboratory tests, and assist in exchange and merging of data for outcome management and research (Forrey et al., 1996; Rose et al., 2001)
Systematised Nomenclature of Medicine (SNOMED) (IHTSDO (n.d.), 2009; Spackman, 2007)	College of American Pathology	Comprehensive multiaxial and hierarchical classification of medical terms: diagnosis, clinical procedures, etiologies, etc.	Developed in 1965 as Systematised Nomenclature of Pathology (SNOP); evolved into SNOMED in 1977; SNOMED Reference Terminology (RT) includes 180,000 terms linked to 110,000 concepts (Rose et al., 2001); in 1999 SNOMED RT merged with the United Kingdom's Clinical Terms Version 3 to form SNOMED Clinical Terms (CT), which is the most comprehensive healthcare terminology used in more than 50 countries (Elkin et al., 2006); extensive evidence suggests that SNOMED CT is the most accurate system for coding diagnoses (Lathrop et al., 2009) with clear advantages over ICD (Vardy, Gill, & Israeli, 1998)
Unified Medical Language System (UMLS, 2006)	National Library of Medicine	Integration of different medical vocabularies	Developed in 1986; a multi-purpose resource that enables data mapping across more than 100 different terminologies, including ICD, CPT, SNOMED and LOINC (Clark, 1999; Richesson & Krischer, 2007)

2.8.2 Nursing

Use of standardised language to document nursing care has been recognised as imperative for increasing the visibility of the nursing profession (Clark, 1999), improving patient outcomes (Delaney et al., 1992; Delaney & Moorhead, 1995), and responding to the emergence of the electronic health record (Aquilino & Keenan, 2000; J. Clark, Craft-Rosenberg, & Delaney, 2000; Swan, Lang, & McGinley, 2004). Clark and Lang (1992) described a model of language in nursing practice that specified that concepts represented by a term or a code (label) must be unique and unambiguous; that terms and concepts must be logically linked, non-redundant and have definitions acceptable to all users (de Keizer & Abu-Hanna, 2000; de Lusignan, 2005); and that terms with common characteristics can be grouped to comprise a classification (Clark, 1999; de Lusignan, 2005; Wilkinson, 2007). Because medical systems of standardised terminologies such as the ICD are not directly relevant to nursing (Aquilino & Keenan, 2000), the nursing profession has developed their own standardised terminologies (Hardiker, 2004). Standardised nursing taxonomies approved by the American Nurses Association for uniform database development are the North American Nursing Diagnosis Association (NANDA), the Nursing Interventions Classification (NIC), the Nursing Outcomes Classification (NOC), the Omaha System, and the International Classification for Nursing Practice (ICNP) (Table 2.5)

.

Table 2.5 Summary of standardised nursing terminology

Taxonomy (Reference)	Developer	Elements /focus	Comments
North American Nursing Diagnosis Association (NANDA) (NANDA International, 2008)	NANDA	Diagnoses	The first American nursing language taxonomy; development began in 1973; intended for use in any clinical setting; current NANDA Taxonomy II contains 206 diagnoses organized into 13 domains and 47 classes; modelled into SNOMED-CT; in 2002, became known as NANDA International to reflect broadened scope of standardised language application and membership
Nursing Interventions Classification (NIC) (University of Iowa, 2006)	University of Iowa	Interventions	Developed in 1987; standardised classification of nursing interventions; describes interventions performed by nurses; intended for use in any setting; contains 542 interventions organised into 7 domains and 30 classes
Nursing Outcomes Classification (NOC) (University of Iowa, 2006)	University of Iowa	Outcomes	Developed in 1991; standardised classification of nursing outcomes; intended for use in any setting; contains 330 outcomes; designed to complement the NIC in computerised systems
Omaha System (Omaha System, 2007)	Visiting Nurses Association of Omaha, Nebraska	Diagnoses, interventions, outcomes	Patient classification system for use in community health settings; includes three components – a problem classification scheme, an intervention scheme and a problem rating scale for outcomes
International Classification for Nursing Practice (ICNP) (Clark & Lang, 1997; Simpson, 2007)	International Council of Nurses	Nursing phenomenon (diagnoses), interventions, outcomes	Development began in 1990; designed to combine and integrate nursing diagnosis, interventions, and outcomes for use in all nursing practice settings; intends to provide a common language for nurses throughout the world

SNOMED-CT=Systematised Nomenclature of Medicine Clinical Terms

2.8.3 International Classification of Functioning, Disability and Health (ICF)

In addition to the ICD (Section 2.8.1), the World Health Organisation (WHO) developed the International Classification of Functioning, Disability and Health (ICF) to standardise and provide a framework for description of health and health-related states based on a biopsychosocial model of 'body functions,' 'body structures,' 'activity and participation,' and 'environmental factors.' The ICF is designed to complement the ICD classification system and facilitate the provision of consistent internationally comparable data for health planning (WHO, 2002).

Since its 2001 endorsement by all 191 WHO member states (WHO, 2007), the ICF has been adopted by professionals in physical and occupational therapy because it refers specifically to body functions and disabilities (Mittrach et al., 2008). However, some authors have argued that because the ICF was not developed by occupational therapists and lacks client-oriented assessment, it is inadequate as a standardised language for occupational therapists (Haglund & Henriksson, 2003; Hammell, 2004). The nursing profession has raised a similar argument; nurses have experienced difficulties applying the ICF classification to nursing practice as it was not designed by nurses and was not specifically constructed for nursing care (Heinen, van Achterberg, Roodbol, & Frederiks, 2005) . This indicates that while the ICF facilitates communication among healthcare professionals, it is not a substitution for profession-specific standardised language.

2.8.4 Indicator for Intervention (IFI) for Allied Health

Since the early 1990s in Australia, the National Allied Health Classification Committee (NAHCC) has been working on an Indicator for Intervention (IFI) codeset. This committee, a voluntary group of allied health professionals and association representatives, liaises with the Australian Government Department of Health and Ageing (NAHCC, 2008). The development of IFI is an initiative towards a national standardised classification system for allied health professions. The IFI codes describe the main reasons for provision of services by allied health professionals; they are unrelated to diagnoses and are more likely to be one of the

symptoms and/or behavioural characteristics of the client/patient (Australian Psychological Society, 2008; NAHCC, 2008).

The IFI uses the ICF framework as the foundation of its classification system whereby three-digit ICF codes are used in IFI for each component of the ICF, i.e. 'body functions,' 'body structures,' 'activity and participation' and 'environment.' In 2005, the Department of Health and Ageing appointed the Australian Psychological Society to pilot test the IFI code set (Australian Psychological Society, 2008). The resultant pilot study, conducted in 12 public hospitals, with 400 allied health professionals from 11 disparate professions, revealed that most professionals could allocate IFI codes in a reliable way. However, qualitative data indicated that some professionals experienced difficulty allocating the IFI codes, which "may reflect the very broad range of issues they are presented with, and the complexity of client presentation which may require more than two IFIs; or other profession-specific difficulties…" (Australian Psychological Society, 2008).

2.8.5 Research in nursing

Generally, research on the use of standardised language in healthcare delivery has demonstrated hugely positive implications for practice, individual professionals and professions as a whole. Table 2.6 summarises research that has been conducted on the use of standardised language in the profession of nursing.

Table 2.6 Summary of research directly related to standardised language in nursing

Authors	Aim	Method	Results / Conclusions
Rantz, Miller, & Jacobs (1985)	To implement nursing diagnosis in practice	Pilot study of use of nursing diagnosis in a new admission care plan using NANDA taxonomy in a long-term care facility; a care plan audit was conducted after 6 months	Care plan is more systematic with nursing diagnosis; greater involvement of nurses; promotion of critical thinking; improved quality of care.
Frederick et al. (2001)	To incorporate NANDA, NIC and NOC in computerized system	Implementatation and documentation of NANDA, NIC and NOC in three hospitals Educational process: video and presentation to staff	Standardised nursing languages increased the visibility of nursing practice; consistent core charting throughout hospitals; data were easily retrieved.
Welton & Halloran (2005)	To investigate whether inclusion of the nursing diagnoses in the hospital discharge abstract improves hospital outcomes	A retrospective analysis of 123 241 patient admissions; nursing diagnoses were inserted into the discharge abstract and compared with 5 hospital outcomes using multivariate regression	Explanatory power and model discrimination improved by 30-146% across the outcome variables of hospital length of stay, ICU length of stay, total charges, probability of death and discharge to a nursing home; nursing care is an independent predictor of patient hospital outcomes and resource use.
Müller-Staub et al. (2006)	Systematic review of the outcomes of nursing diagnostics	Medline, CINAHL and Cochrane database search	Nursing diagnostics improves assessment documentation, quality of interventions and outcomes.
Maria. Müller-Staub, Needham, Odenbreit, Lavin, & van Achterberg (2007)	To evaluate the impact of the quality of nursing diagnoses, interventions and outcomes in an acute-care hospital	In a pre-test and post-test experimental design study, nurses from 12 wards received case-discussion-method instruction in implementation of nursing diagnoses, interventions and outcomes; 2 sets of 36 randomly selected nursing records were evaluated before and after the educational program	Significant improvement in the quality of nursing diagnoses, interventions and outcomes documentation after the educational program; use of NANDA, NIC and NOC led to higher quality nursing diagnosis documentation, etiology-specific nursing interventions and nursing-sensitive patient outcomes.

Authors	Aim	Method	Results / Conclusions
Paganin, Moraes, Pokorski, & Rabelo (2008)	To identify the impact of institutional, professional and personal factors on nurses efforts to make nursing diagnoses	A cross-sectional study with a questionnaire designed to measure groups of factors	Factors that inhibit the use of nursing diagnoses include busy shifts, number of patients per nurse, involvement in administrative tasks.
Kautz & Van Horn (2008)	To explore the use of standardised language (NANDA, NIC, NOC) in the development of evidence-based practice	Literature search focused on family interventions, nursing diagnoses, nursing interventions and nursing outcomes	The use of NANDA, NIC and NOC as research frameworks will facilitate the development of evidence-based practice guidelines.
Morales-Asencio et al. (2009)	To measure frequency of nursing diagnoses made during home visits, to explore the related use of resources, mortality, institutionalisation and satisfaction	Observational, longitudinal follow up study; analysis of nursing diagnoses made during a 34-month period; regression analysis was used to relate diagnoses to resource-use, mortality, institutionalisation and satisfaction	Of 240 subjects (129 patients, 118 caregivers), 94% had nursing diagnoses; significant difference in the use of physiotherapy and rehabilitation services; no relation with institutionalisation and satisfaction; concluded that nursing diagnoses are sound predictors of resource use.
Müller-Staub (2009)	To report effects of nursing diagnostics implementation; summary of results of six studies	Two systematic reviews, instrument development and testing, a pre-post intervention study, and a cluster randomised trial	Careful implementation of standardized nursing language significantly improved the quality of documentation, the accuracy of diagnoses, the effectiveness of interventions and resulted in better patient outcomes.

NANDA = North American Nursing Diagnosis Association
NIC = Nursing Interventions Classification
NOC = Nursing Outcomes Classification

2.9 STANDARDISED DIETETICS LANGUAGE

In 2005, the introduction of standardised language heralded the next evolution in dietetics practice with uniform terms for nutrition diagnostic terminology (ADA, 2005).

2.9.1 International Dietetics and Nutrition Terminology (IDNT)

Exploration of Nutrition Diagnosis terminology by the ADA began in 2002; the potential for use of Kight's coding system (see Section 2.7.2) was rejected in favour of developing a new system (ADA, 2006a). The formation of a Standardised Language Task Force led to the 2005 publication of *Nutrition Diagnosis: A Critical Step in the NCP* (ADA, 2005) in which diagnostic terms with definitions, etiologies, and defining characteristics were identified (ADA, 2005, 2006b). Also in 2005, the ADA endeavoured to broaden the scope of its standardised language by hosting a meeting of representatives of international dietetics associations (ADA, 2008, 2009). Subsequently, the ADA standardised language became known as the International Dietetics and Nutrition Terminology (IDNT).

According to the ADA, the NCP and IDNT are complementary tools: "The NCPM is a problem-solving model, while the IDNT provides a standardized set of terms used to describe the results of each step of the model" (Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008b). Indeed, since the introduction of standardised terminology for Nutrition Diagnosis, standardised terminology has been developed for the other NCP steps; standard taxonomy was published for Nutrition Intervention in 2007, for Nutrition Monitoring and Evaluation in 2008, and for Nutrition Assessment in 2009. Annual IDNT updates incorporate revision as a result of ongoing research and feedback from dietetics practitioners (ADA, 2007). The current *International Dietetics and Nutrition Terminology Reference Manual* (ADA, 2009) includes more than 500 terms describing all four steps of the NCP. The IDNT reference sheets serve as a guide for dietetics practitioners to use the standardised dietetics language in practice (ADA, 2009).

2.9.2 Standardised nutrition diagnostic terminology

Standardised nutrition diagnostic terminology complements the Nutrition Diagnosis step in the NCP; it is part of the IDNT classification system and serves as a tool to control the documentation of Nutrition Diagnosis. The ADA identified 62 nutrition diagnoses within three domains – Intake (NI), Clinical (NC) and Behavioural-Environmental (NB). The *Intake* domain is defined as "actual problems related to intake of energy, nutrients, fluids, or bioactive substances through oral diet or nutrition support" (ADA, 2006b). This domain encompasses five classes: 'Energy balance,' 'Oral or nutrition support intake,' 'Fluid intake,' 'Bioactive substances intake' and 'Nutrient intake.' The Nutrient intake class has five subclasses: 'Fat and cholesterol,' 'Protein,' 'Carbohydrate and fiber,' 'Vitamin' and 'Mineral.' The *Clinical* domain is defined as "any nutritional finding/problems identified as related to medical or physical conditions" (ADA, 2006b). It has three classes: 'Functional,' 'Biochemical' and 'Weight.' The *Behavioural-Environmental* domain is defined as "nutritional findings/problems identified as related to knowledge, attitutes/beliefs, physical environment, or food supply and safety" (ADA, 2006b). Within this domain, there are three classes: 'Knowledge and beliefs,' 'Physical activity and function,' and 'Food safety and access' (ADA, 2006b).

The nutrition diagnostic terms (NDTs) are coded according to the domain, class and subclass that they belong to. For instance, 'Inadequate oral/food beverage intake' is coded as NI-2.1, which means that this NDT is from the Intake (NI) domain and within the second class – 'Oral or nutrition support intake' (2.1).

2.9.3 Advantages

Many authors have speculated that the use of a standardised dietetics language will be profoundly beneficial for the client/patient, the dietetics professional and the profession as a whole (Hakel-Smith & Lewis, 2004; Parrington, 2004; Sandrick, 2002). The ADA has publicised the capacity for use of a standardised dietetics language with the NCP to: facilitate consistent documentation of high-quality nutrition care; enhance the visibility of dietetics professionals and distinguish them as the expert providers of nutrition care; suit adoption into electronic health records

and incorporation into larger documentation systems; support improvements in evidence-based practice; and offer opportunities and efficiencies to research (Writing Group of the Nutrition Care Process/Standardized Language Committee, 2008b). Others, including Hakel-Smith & Lewis (2004) and Jenkins et al. (2006), maintained that adoption of a standardised dietetics language is essential.

2.9.4 Research

As a standardised language for the dietetics profession is a relatively new concept, very few directly relevant studies have reached completion. To date, the fledgling body of literature comprises one doctoral dissertation (Charney, 2006), one journal article (Enrione, 2008) and nine abstracts for poster presentation (Becker, Lusk, Walker, & Wills-Gallagher, 2009; Corado & Pascual, 2008; Holben & Murray, 2008; Hutcheson, Touger-Decker, O'Sullivan-Maillet, Byham-Gray, & Wien, 2007; McCarthy, Pavlinac, & Ryan-Borchers, 2008; Mueller et al., 2008; Regan et al., 2009; Suen, 2009; Swan, 2007). These are summarised in Table 2.7.

Table 2.7 Summary of research in standardised dietetics language

Title (Reference)	Aim	Method	Results
Reliability of nutrition diagnostic labels when used by registered dietitians at three levels of practice (Charney, 2006)	To test the reliability of nutrition diagnostic labels used by RDs at three level of practice when diagnosing problems	Internet-based case study; education module on Nutrition Diagnosis; participants selected NDTs from 60 labels; percentage agreement was measured and compared for RDs at three levels of practice: (1) entry level (0-18 months) (n= 110) (2) beyond entry level (3-7 years) (n=113) (3) expert RDs (n=56)	34 NDTs reached > 60% agreement; good to excellent agreement was demonstrated in selection of NDTs
Utilization of the standardized language of dietetics in clinical practice (Hutcheson et al., 2007)	To identify the level of agreement between the ADA defining characteristics and a suburban acute-care hospital's defining characteristics for the three ADA Nutrition Diagnostic Labels most frequently used by dietitians	Retrospective descriptive study using a sample of charts (n=2525) in a 264-bed community hospital over a 6-month period Level of % agreements: High > 80% Moderate 50-79% Low < 50%	The three most frequently used diagnostic labels were 'Inadequate Oral Food/Beverage Intake' (Poor Intake), 'Underweight' and 'Involuntary Weight Loss;' the ADA defining characteristics at high agreement: Poor Intake: 'Conditions associated with disease/treatment' and 'Insufficient energy intake;' Underweight: 'Muscle wasting,' 'Malnutrition,' 'Illness' and 'BMI;' and Weight Loss: 'Weight loss percent,' 'Conditions associated with disease/treatment' and 'Fat loss/muscle wasting'
Standardized nutrition language used in an electronic health record (Swan, 2007)	To describe implementation of standardised Nutrition Diagnosis and Nutrition Intervention terminologies into an electronic health record	Incorporation of the standardised nutrition diagnoses and intervention terminologies into the electronic health record system	The new documentation is much simpler and translates the patients' conditions consistently within and across settings.

Title (Reference)	Aim	Method	Results
Content validation of nutrition diagnoses (Enrione, 2008)	To validate content of standardised Nutrition Diagnosis terminologies	Questionnaires consisting of 62 nutrition diagnoses with their components (definitions, etiologies and signs/symptoms) were mailed to RDs; participants rated the components on a 5-point Likert-type scale; diagnostic content validity score were calculated. Sample: 193 RDs	All definitions had a diagnostic content validity score greater than or equal to 0.80; 14% of the 327 etiologies and 9% of the 796 signs/symptoms were categorised as minor; all diagnoses had a total diagnostic content validity score greater than 0.80, except inadequate and excessive bioactive substance intakes; RDs understood the terminology and validated the components.
Implementation of standardized language by clinical preceptors at a large dietetic internship program (McCarthy et al., 2008)	To describe implementation of standardised language	A 10-item web-based survey was developed to evaluate familiarity with standardised language, utilisation of resources that support NCP and standardised language, and actual implementation of the terms. Sample: 71 preceptors	One-third of respondants reported using standardised language for documenting Nutrition Diagnosis; the findings support inclusion of standardised language in the electronic health record; identified barriers to NCP implementation serve as a guide for future research.
Progressive implementation of the NCP and standardized language into MNT documentation (Mueller et al., 2008)	To employ continuous and interactive education for successful implementation of the NCP and standardised language into MNT documentation	A series of eight weekly in-service training sessions on the NCP covering foundation concepts, implementation of NCP, writing Nutrition Diagnosis PES statements, educational tools & group discussion. Sample: 15 dietitians and 10 dietetic interns	Small group discussions assisted staff with the incorporation of Nutrition Diagnosis standardised language into the electronic medical record.
Incorporating the NCP and standardized language into a didactic program in dietetics curriculum (Holben & Murray, 2008)	To review strategy and outcomes of incorporation of NCP and standardised language in dietetics education	Incorporation of NCP and standardised language into MNT I, MNT II and nutrition counseling practicum courses. Learning method: case study, use NCP step and document in ADI style Learning resource: IDNT Reference Manual	The process promotes an understanding of MNT and enhanced skills development.

Title (Reference)	Aim	Method	Results
Successes in implementing the NCP and standardized language in clinical practice (Corado & Pascual, 2008)	To demonstrate benefits of implementing NCP in practice	Implementation of the NCP and standardised language in an acute-care facility; measurement of benefits to dietitian productivity	After a 3-month adjustment period, dietitians documented shorter, diagnosis-specific chart notes; there was a 30% improvement in daily productivity and a 15% improvement in acknowledgement of RD recommendations by primary care providers.
Knowledge, perceptions and practices of registered dietitians in the dietetics practice group, consultant dietitians in health care facilities, regarding the ADA's standardized language to document the NCP (Regan et al., 2009)	To examine dietitians' knowledge, perceptions and practices regarding use of standardised language to document the NCP	Prospective, Internet-based survey	RDs who used standardised language in their practice were more knowledgeable and held more positive perceptions of standardised language compared to those who did not use it.
The design and implementation of an electronic medical record template using standardised language and the NCP (Becker et al., 2009)	To describe the design process and implementation of a documentation template for using standardised language and the NCP	Standardised language for Nutrition Diagnosis was added to the electronic documentation system	Improvement in consistency of documentation by dietitians.
Implementating electronic health records with standardised language for the NCP in acute care hospital (Suen, 2009)	To assess dietetics professionals' adoption of, and satisfaction with, using standardised language, and to assess perceived effects on productivity, quality of care and perceived barriers to adoption	The implementation process involved design, development and testing of clinical documentation system for 6 months; provision of staff training prior to implementation	The dietetic production in documentation improved by 25% 2 months after implementation of electronic health record

RD = Registered Dietitian
NCP = Nutrition Care Process
PES = Problem, Etiology, Signs and symptoms
MNT = Medical Nutrition Therapy
IDNT = International Dietetics and Nutrition Terminology

2.10 THEORETICAL FRAMEWORK

This literature review has revealed the existence of gaps in dietetics practice and research that need addressing to ensure accountability of the profession. Information about how dietetics professionals practice nutrition care and, in particular, how they document the nutrition problem is sparse, and non-existent outside the United States. Figure 2.8 drew attention to the prior absence of the Nutrition Diagnosis step, and its associated diagnostic reasoning process and standardised language, from the cascade of events once perceived as representative of the whole nutrition care system. The ADA is determined to support evidence-based practice in dietetics, domestically and internationally, with a complete NCP and standardised terminology. The name 'International Dietetics and Nutrition Terminology' implies a controlled dietetics vocabulary that is internationally recognised and has achieved international consensus. However, as the standardised taxonomies for the NCP were developed in the United States and as, to date, no published research on IDNT implementation in clinical dietetics practice beyond the United States is available, validation of IDNT terms to ensure the translation of language across settings and countries is warranted. Indeed, Lunney (2008) stated that an international standardised classification should achieve consensus from each country that is going adopt the system.

The theoretical framework for this research project is summarised in Figure 2.9. The focus – standardised Nutrition Diagnosis terminology – is highlighted as the shaded area in the diagram. The project's two phases of research (described in Section 1.2) are designed to address the two major gaps relating to lack of knowledge about current practice of nutrition care and a need to validate the ADA's standardised Nutrition Diagnosis terminology in contexts outside the United States.

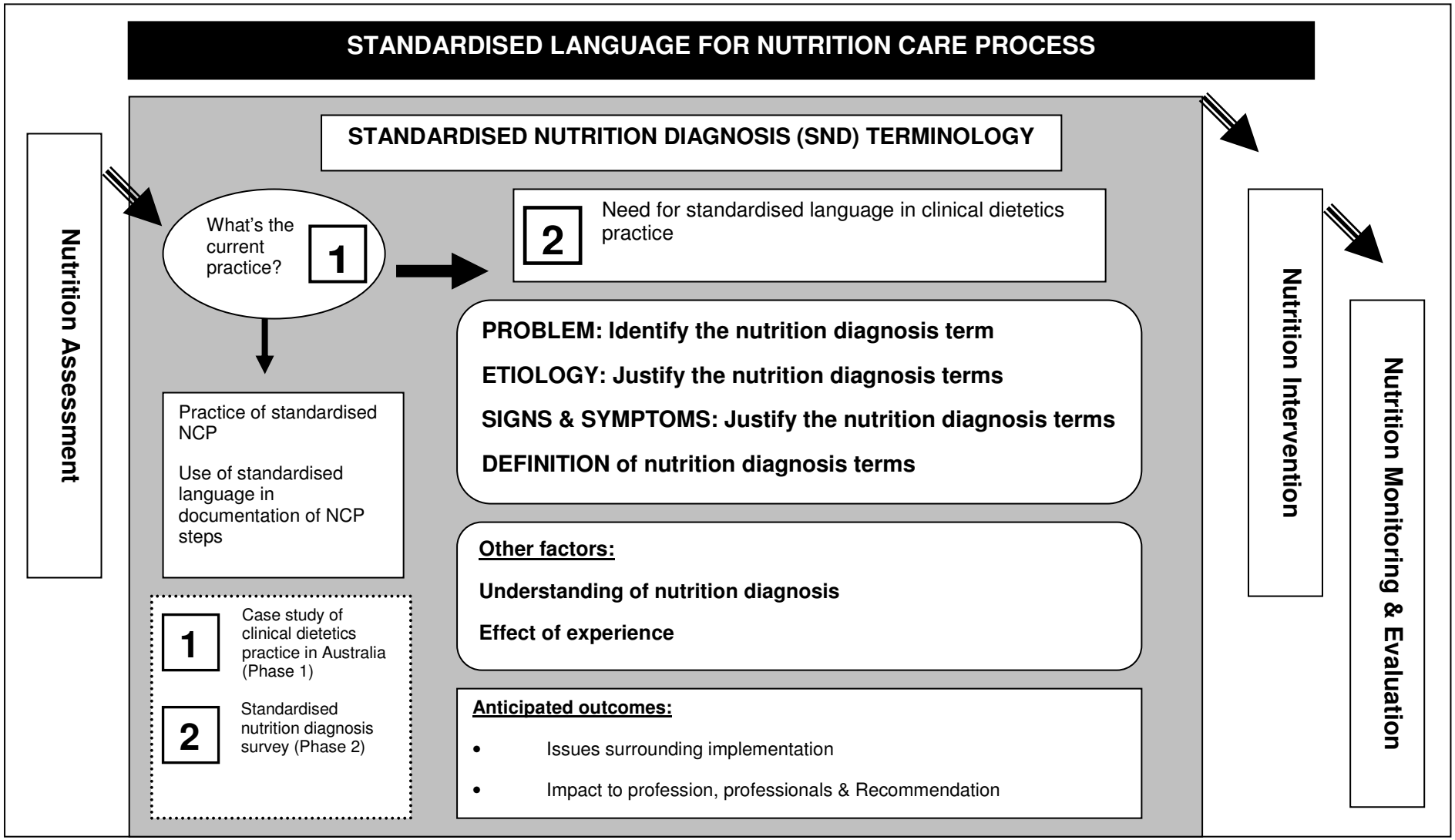


Figure 2.9 Theoretical framework for this research project

2.11 SUMMARY

This chapter has provided background to the research. It has considered Splett's (1996) Cascade Model of the nutrition care system, chronicled the evolution of nutrition care process models, and considered care processes in other health professions. The ADA's standardised NCP and Model were described and relevant research was summarised. This was followed by further elaboration of the relatively new second step of the NCP – Nutrition Diagnosis – and a summary of relevant research. Standardised language was explored, firstly in other healthcare professions and, secondly, specific to dietetics. Finally, a theoretical framework for the research project was presented.

This review has revealed that dietetics has been left far behind other healthcare professions that consistently utilise profession-specific standardised classification systems. Until the ADA's development of the IDNT classification system, dietetics professionals and researchers did not have a uniform language to describe the NCP. The literature has revealed an enormous potential for research in the field of standardised dietetics language; particularly, it has identified gaps in the knowledge of current dietetic practice and whether the ADA's standardised dietetics language is applicable for dietetic practice in countries outside the United States.

Chapter 3

Case study of clinical dietetics practice in Australia (Phase 1)

This chapter focuses on the study's Phase 1 research – a case study of clinical dietetics practice at three Australian sites, including a large tertiary teaching hospital. Section 3.1 provides an overview of the case study and revisits the relevant research questions, aim and objectives as outlined in Chapter 1. Research methods and analysis procedures are explained in Section 3.2. Section 3.3 presents the results of the case study. In Section 3.4, results are discussed in the context of the research questions, and the study's limitations are considered. Section 3.5 concludes the chapter and establishes a link to Phase 2.

3.1 OVERVIEW OF PHASE 1

While many aspects of dietetics practice have attracted substantial research interest (e.g. Byham-Gray, Gilbride, Dixon, & Stage, 2005; Charney, 2007; Erickson-Weerts, 1999; Fuhrman, 2002; Touger-Decker, 2006; Vaughan & Manning, 2004), the degree to which the ADA's NCP is documented in current dietetics practice has received little research attention (Hakel-Smith, Lewis, & Eskridge, 2005). Indeed, the literature review presented in Chapter 2 revealed no published studies on the documentation of the NCP in Australian dietetics practice. Recognition of the potential for positive outcomes resulting from a standardised care process in clinical dietetics, as evidenced by various studies in other healthcare professions (Lathrop, Davis, & Nolte, 2009; Müller-Staub, 2009; Natalie, 2008), warrants urgency in bridging any documentation gaps and minimising inconsistencies in dietetics practice. The importance of mapping the state of current practice prior to implementation of new concepts was stressed by the nursing profession before the introduction of the concepts of nursing process, nursing diagnosis and standardised nursing language (Brunckhorst, Placzek, Payne, McInerney, & Parzuchowski, 1989; Gordon, Sweeney, & McKeehan, 1980). Similarly, understanding current practice in dietetics is crucial for unearthing issues pertaining to the application of standardised language in the NCP. Therefore, Phase 1 of this study investigated current practice of NCP and the use of standardised language by dietitians in three Australian hospitals. An existing dataset was used to explore Australian dietetic documentation practices. The findings provided a snapshot of nutritional care documented by Australian clinical

dietetics practitioners, and insight into the issues relating to implementation of standardised language for the NCP.

3.1.1 Research questions

As outlined in Chapter 1, Phase 1 of this research project addressed two research questions:

1. Do clinical dietetics practitioners in Australia document all four steps of the ADA's NCP?
2. Do clinical dietetics practitioners in Australia already use standardised language in documenting NCP?

3.1.2 Aim and objectives

The aim of Phase 1 was to explore the current practice of nutrition care in Australia, with specific emphasis on the identification of issues relating to the extent of, and potential for, implementation of the standardised language of the ADA's NCP.

The objectives of Phase 1 were:

1. To investigate the extent to which current clinical dietetics practice in Australia follows the steps of the ADA's NCP
2. To investigate the extent to which the second step of the ADA's NCP – Nutrition Diagnosis – is being practised by clinical dietetics practitioners in Australia
3. To compare the nutritional terms used by clinical dietetics practitioners in Australia with the ADA's standardised terminology

3.2 RESEARCH METHODS

To explore current clinical dietetics practice in Australia, Phase 1 involved application of descriptive case study methodology (Yin, 2003) to an existing de-identified malnutrition dataset retrieved in 2005. Advantages of using this dataset included data stability, the capacity for repeat views and quantitative analysis (Yin, 2003). This research design facilitated exploration of both qualitative and quantitative data that addressed the research objectives.

3.2.1 Description of the dataset

The dataset used for Phase 1 was generated in 2005 for a nutrition and dietetics quality improvement research project on malnutrition from 10 wards (including medical, surgical and rehabilitation) of adult patients in three Australian hospitals. The data were collected from a cross-sectional audit by a group of researchers, including seven clinical dietetics practitioners and professional staff members of a large tertiary teaching hospital. The project aimed for early identification of malnourished hospital patients and the early implementation of best practice treatment for malnutrition. Access to the dataset was obtained upon agreement and approval from the principal investigator of the quality improvement research project.

The malnutrition project dataset was retrieved in Microsoft Access® and Statistical Package for the Social Sciences (SPSS®) formats. The dataset in Access® format included all the patient details that were recorded directly from medical records. The Access® dataset featured six categories of information: 'general information' about the patients, 'assessment details,' 'nutritional status and feeding assistance,' 'physical/cognitive function,' 'weight details,' and 'discharge planning and transfer arrangements.' 'General information' included admission date, length of stay and ward environment. 'Assessment details' included an indication of the screening tool used – either Subjective Global Assessment (SGA) or Mini Nutritional Assessment (MNA) – and dietitian-referral details. The category of information most relevant to the present study was 'nutritional status and feeding assistance,' which included details of dietary intake, medical record documentation of nutritional status by nursing staff, doctors or dietitians, and records of intervention by dietitians.

Characteristics of the dataset retrieved in Microsoft Access® format are presented in Figure 3.1.

The data in SPSS® format included quantitative data such as patient weight, height and BMI that had been coded for the malnutrition study; this was used to complement the more qualitative Access-format data to produce comprehensive patient information. Because the dataset included information from a primary referral hospital that is a central health provider servicing a population of more than a million and where clinical dietitians are actively involved in dietetics teaching, it can be argued that it is representative of current 'advanced' clinical dietetics practice in Australia.

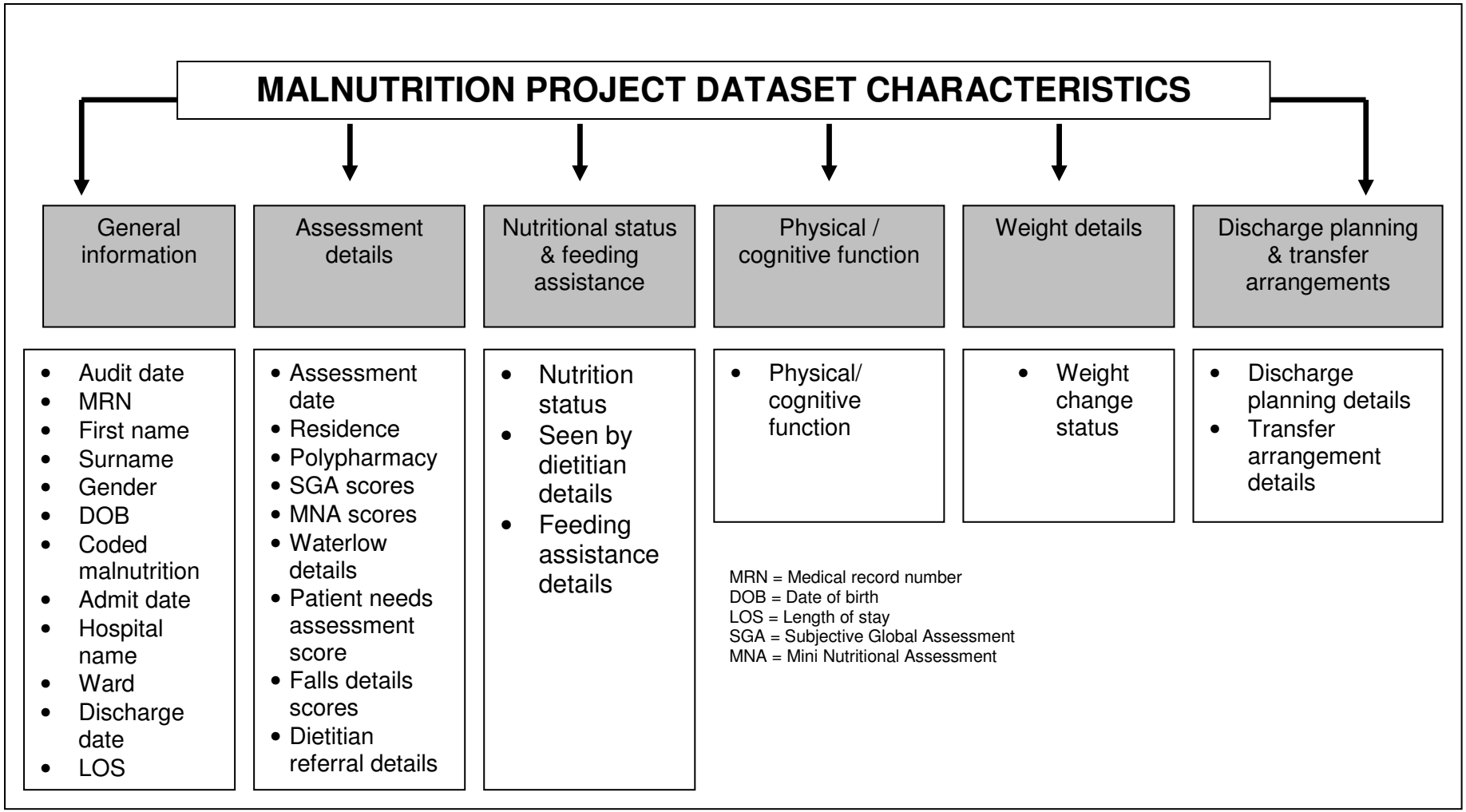


Figure 3.1: Malnutrition project dataset characteristics

3.2.2 Data analysis procedures

Phase 1 data analysis procedures (Figure 3.2) aimed to seek evidence relevant to the study's research objectives and to address the lack of current research into clinical dietetics practice in Australia as highlighted in the literature review. Analysis focused on the process of nutrition care provision and the standardised nutritional terminologies recorded in the dataset, and not on patients' objective data. However, some of the quantitative SPSS-format data were used as evidence of the NCP Nutrition Assessment and Nutrition Intervention steps that had been conducted.

After data cleaning and merging the Access® and SPSS® format information into one SPSS® dataset, exploration of the data involved several stages. In the first stage, evidence of NCP steps was identified in the dataset. Any nutrition care step not documented in the dataset was assumed not to have occurred. Any information relating to the NCP steps of Nutrition Assessment, Nutrition Diagnosis, Nutrition Intervention, and Nutrition Monitoring and Evaluation (ADIME) was included in the analysis. Terms relating to Nutrition Assessment, such as anthropometry measurements, biochemical data, clinical examination and dietary intake, were considered evidence of completing this step. The second step of the ADA's NCP – Nutrition Diagnosis – was considered met if the data contained terms describing the nutrition-related problem. For example, documentation of the term 'malnutrition' was considered evidence of the Nutrition Diagnosis step, considering the ADA's definition of Nutrition Diagnosis as the clinical judgement made by a dietitian to explain a nutrition-related problem that can be solved by the dietitian through Nutrition Intervention (Lacey & Pritchett, 2003; Sandrick, 2002). During this process the accuracy of the nutritional terms used to describe the NCP was not considered as the focus of the analysis was to identify the standardised terms in documentation of nutrition care. The completed steps were presented as percentages and frequencies. The nutrition care steps identified were then checked for consistency with the ADA's NCP steps.

In the second stage, all the identified terms that described NCP steps were recorded. The third stage involved sorting nutritional terms recorded in the dataset

into their relevant NCP step – Nutrition Assessment, Nutrition Diagnosis, Nutrition Intervention, or Nutrition Monitoring and Evaluation. The frequency of nutritional terms used was noted. The fourth stage involved further exploration of the terms relating to Nutrition Diagnosis, the step most recently added to the NCP. Because the ADA specified that nutrition diagnoses should be based on three components – Problem, Etiology and Signs/symptoms (PES) – components of Nutrition Diagnosis were identified and categorised accordingly. Finally, all the nutritional terms recorded in the dataset were compared with the ADA's standardised terminology (ADA, 2008, 2009) for evidence of any standardised language use.

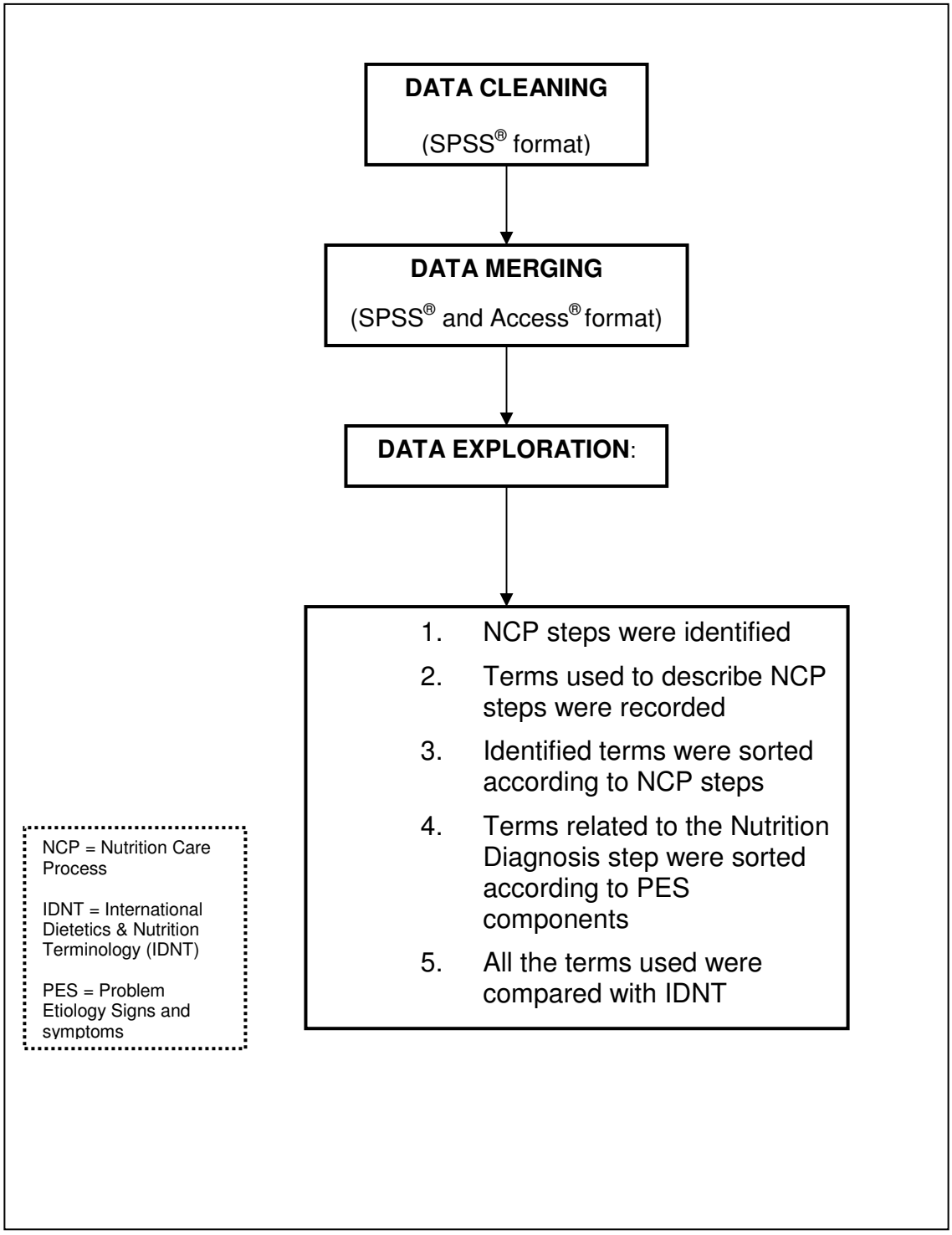


Figure 3.2: Phase 1 data analysis procedures

3.3 RESULTS

Data analysis revealed that a total of 274 patients were screened for malnutrition across three sites using Subjective Global Assessment (SGA) (78.4%) or Mini Nutritional Assessment (MNA) (21.6%). The prevalence of mild-moderate malnutrition indicated by SGA B ('mild-moderate malnutrition') and MNA R ('at risk of malnutrition') was 37%, and 35% of patients were identified as severely malnourished. Exploration of the dataset showed that 31% (n=85) of the patients' records had dietitians' notes; it was therefore assumed that they were attended by dietitians. Further analysis of the dataset focused only on the records that were followed up by dietitians.

3.3.1 NCP steps documented in the dataset

Nutrition Care Process steps were identified in all 85 patients' records and, for the purpose of percentage analysis, the total number of completed steps was divided by the total number of patients seen by dietitians (n=85). This was based on the assumption that only dietitians recorded the nutritional care for patients referred to them. NCP steps documented by clinical dietitians as recorded in the dataset are summarised in Table 3.1

.

Table 3.1 NCP steps documented by clinical dietitians during the nutrition care provision as identified in the malnutrition project dataset

NCP step	Frequency (%)
Nutrition Assessment	71 (83.5)
Nutrition Diagnosis	53 (62.4)
Nutrition Intervention	47 (55.0)
Nutrition Monitoring and Evaluation	21 (24.7)

The data revealed that the records of 83.5% of patients attended by dietitians contained evidence of the first step of the ADA's NCP – Nutrition Assessment. The records of 62.4% of patients attended by dietitians contained evidence of documentation of the Nutrition Diagnosis step. Details of Nutrition Diagnosis terminology used are presented in Section 3.3.2.

The third and particularly the fourth NCP steps were less identifiable in the dataset. There was evidence of Nutrition Intervention documentation recorded for 55% of patients attended by dietitians, and the Nutrition Monitoring and Evaluation step was documented for only 24.7%. This indicates that for more than three-quarters of patients attended by dietitians there was no recorded evidence of monitoring and evaluation. Overall, analysis of the dataset revealed that all four NCP steps were recorded for only 18% of the patients seen by dietitians.

3.3.2 NCP terms recorded in the dataset

Nutritional terms recorded by clinical dietetics practitioners in the 85 patient records that contained evidence of NCP steps were identified and clustered into four

categories based on these steps. Table 3.2 lists these terms as they were recorded in the dataset.

Table 3.2 Terms documented by clinical dietitians and clustered according to NCP steps*

A-assessment	D-diagnosis	I-intervention	M-monitoring and E-evaluation
Weight (n=85)	Malnutrition (n=19)	Supplements (n=23)	Poor/small (n=8)
Height (n=85)	Glucose control (n=10)	Enteral feeds (n=10)	Food chart (n=5)
BMI[a] (n=85)	Weight loss (n=9)	TPN[b] (n=5)	Electrolyte levels (n=4)
Biochemical and metabolic (n=4)	Swallowing/feeding (n=8)	Diabetes diet (n=3)	Self-maintenance (n=2)
	Increased need (n=5)	Modified texture (n=3)	Good (n=2)
	Obesity (n=3)	Full fluid (n=2)	Improved (n=1)
	Vitamin adequacy (n=2)	Clear fluid (n=1)	Eating and drinking well (n=1)
	Mineral adequacy (n=2)	Modified texture and thick (n=1)	
	Encouragement required (n=2)		

*The nutritional terms in each column are independent and there is no relationship between columns
[a]BMI = Body Mass Index
[b]TPN=Total Parenteral Nutrition

It can be seen that the terms recorded are simplified and ambiguous. Their meanings would be fully understood only by the individual practitioners who recorded them. In addition to the terms listed in Table 3.2, there were several others – 'protein' (n=5), 'diet' (n=8), 'moderate' (n=1), '¼' (n=1), '½' (n=1) and 'all' (n=1) – that proved too ambiguous to be classified into any of the four NCP steps. None of the nutritional terms identified were standardised IDNT terms, suggesting that the clinical dietetics practitioners used their own terminology and resorted to using language with which they felt comfortable.

3.3.3 Nutrition Diagnosis terminology recorded in the dataset

Recorded terms relating to the Nutrition Diagnosis step of the NCP (Table 3.2, second column) were further classified into Problem, Etiology and Signs/symptoms (PES) as shown in Table 3.3. None of the Nutrition Diagnosis terms were adequately described, leaving scope for ambiguity and inaccuracy in interpretation.

Table 3.3 Nutritional Diagnosis terms documented by clinical dietitians and classified according to Problem, Etiology and Signs/symptoms (PES)*

P-Problem	E-etiology	S-Sign and Symptoms
Malnutrition (n=19)	Weight loss (n=9)	Glucose control (n=10)
Increased need (n=5)	Swallowing/feeding	
Obesity (n=3)	(n=8)	
Vitamin adequacy (n=2)		
Mineral adequacy (n=2)		
Encouragement required (n=2)		

*No relationship between columns

3.3.4 Comparison of nutritional terms recorded in the dataset with ADA's standardised terminology

Table 3.4 lists the nutritional terms recorded by clinical dietetics practitioners compared with those listed in the *International Dietetics and Nutrition Terminology Reference Manual* (ADA, 2009). It can be seen that in some instances the clinical dietetics practitioners' terms were simplified versions of IDNT terms. Of the 28 terms recorded for all NCP steps, five – 'poor/small,' 'self-maintenance,' 'good,' 'improved,' and 'eating and drinking well' – were non-comparable to terms in the IDNT list. Of the 23 terms that were comparable, most lacked precision. For example, while 'vitamin adequacy' was comparable to the IDNT's 'Inadequate vitamin intake' it is less accurate and invites ambiguity. Several terms used by clinical dietitians to document the Nutritional Diagnosis step were particularly unclear and open to interpretation. For example, the best IDNT matches for 'weight loss' and 'swallowing/feeding' were 'Involuntary weight loss' and 'Swallowing difficulty,' respectively. Nutritional Intervention terms did not equate well with IDNT terms. There was evidence of a tendency for dietetics practitioners to simplify the terms used to speed up the process of documentation. Once again, it appears that although the nutritional terms recorded by the clinical dietetics practitioners no doubt held meaning for them at the time they documented their plans, many would be meaningless to other practitioners who may follow up the cases. This has the potential to interrupt the continuity of care.

Table 3.4 Nutritional terms recorded by clinical dietetics practitioners compared with the ADA's standardised terminology[a]

Clinical dietetics practitioners	IDNT Terms [[b]code]
A- Assessment:	
Weight	Weight [AD-1.1.2]
Height	Height/length [AD-1.1.1]
[c]BMI	Body mass index [AD-1.1.5]
Biochemical and metabolic	Electrolyte and renal profile (1.2)
D-Diagnosis:	
Malnutrition	Malnutrition [NI-5.2]
Glucose control	Altered nutrition-related laboratory values (specify) [NC-2.2]
Weight loss	Involuntary weight loss [NC-3.2]
Swallowing/ feeding	Swallowing difficulty [NC-1.1]
Increased need	Increased nutrient needs (specify) [NI-5.1]
Obesity	Overweight/obesity [NC-3.3]
Vitamin adequacy	Inadequate vitamin intake (specify) [NI-5.9.1]
Mineral adequacy	Inadequate mineral intake (specify) [NI-5.10.1]
Encouragement required	Not ready for diet/lifestyle change [NB-1.3]
I-Intervention:	
Supplements	Medical food supplements (3.1) Vitamin and mineral supplements (3.2) Bioactive substance supplements (3.3)
Enteral feeds	Enteral and parenteral nutrition (2): Initiate [e]EN or [f]PN [ND-2.1] Modify rate, concentration, composition or schedule [ND-2.2] Discontinue EN or PN [ND-2.3] Insert enteral feeding tube [ND-2.4] Site care [ND-2.5]
[g]TPN	Enteral and parenteral nutrition (2): Initiate EN or PN [ND-2.1] Modify rate, concentration, composition or schedule [ND-2.2] Discontinue EN or PN [ND-2.3] Insert enteral feeding tube [ND-2.4] Site care [ND-2.5]
Diabetes diet	General/healthful diet [ND-1.1]
Modified texture	Modify distribution, type, or amount of food or at specified time [ND-1.2]
Full fluid	Specific foods/beverages or groups [ND-1.3]
Clear fluid	Specific foods/beverages or groups [ND-1.3]
Modified texture and thick	Modify distribution, type, or amount of food or at specified time [ND-1.2]
M-E- Monitoring and Evaluation:	
Poor/small	[d]Non-comparable
Food chart	Food intake [FH-1.3.2]
Electrolyte levels	Electrolyte and renal profile [BD-1.2]
Self-maintenance	[d]Non-comparable
Good	[d]Non-comparable
Improved	[d]Non-comparable
Eating and drinking well	[d]Non-comparable

[a]International Dietetics and Nutrition Terminology (IDNT) Reference Manual (ADA, 2009)
[b]code refers to term number for each NCP step term listed in the *IDNT Reference Manual*
[c]Body Mass Index
[d]Nutritional term is ambiguous and/or lacks clarity, or context and is therefore non-comparable to IDNT
[e]Enteral Nutrition, [f]Parenteral Nutrition, [g]Total Parenteral Nutrition

3.4 DISCUSSION

3.4.1 Do clinical dietetics practitioners in Australia document all four steps of the ADA's NCP?

The first Phase 1 objective was *To investigate the extent to which current clinical dietetics practice in Australia follows the steps of the ADA's NCP*. The results (Table 3.1) revealed that for more than three-quarters of patients attended by dietitians at three sites, including a large tertiary training hospital, recorded evidence of the NCP steps was incomplete. Clinical dietetics practitioners were more likely to document the Nutrition Assessment step than any other step. Nearly half of the cases seen by dietitians did not have Nutrition Intervention records, indicating a serious gap in nutritional care documentation. Without the intervention information, the core nutrition-care-delivery component of dietetics practice will remain invisible. Furthermore, demonstrating the quality of patient care becomes difficult when monitoring and evaluation records are unavailable. These findings are consistent with those of Biesemier and Chima (1997), who found that most dietitians did not record the outcome evaluation and did not use a systematic NCP in their daily practice (Gates, 1992). Complete documentation is essential to ensure continuity of care and support the evaluation of quality of patient care (Cheevakasemsook, Chapman, Francis, & Davies, 2006).

The second Phase 1 objective was To investigate the extent to which the second step of the NCP – Nutrition Diagnosis – is being practised by clinical dietetics practitioners in Australia. Evidence of the Nutrition Diagnosis step was recorded for approximately half of the patients referred to dietitians. The identification of terms related to the Nutrition Diagnosis step suggested that dietitians have practiced to identify nutrition-related problems during the provision of nutrition care. Nevertheless, the diagnostic terms recorded varied and the dietitians still appeared to be organising care based on the medical diagnosis. Because standardised language for Nutrition Diagnosis was not introduced in the United States until 2005, the year this study commenced, the degree of familiarity with it among Australian dietitians represented in the dataset was understandably low. The results are consistent with comparable research conducted in the United States which found that the majority of dietitians were not including the Nutrition Diagnosis step in their

practice and were unsure how to implement it (Emery, 2007; Jones & Danis, 2007; Suen, 2008).

Incomplete documentation of NCP steps in the Australian dataset could reflect a lack of understanding of the NCP and the unavailability of the standardised format of documentation. Therefore, there is a requirement to identify training and professional development needs to increase awareness and understanding, and to enhance the ability of clinical dietetics practitioners to implement and document the ADA's NCP, including Nutrition Diagnosis, in dietetics practice.

3.4.2 Do clinical dietetics practitioners in Australia already use standardised language in documenting NCP?

The case study results indicate that standardised language is not used in Australian dietetics practice to document the NCP. Most of the nutritional terms used lacked precision and clarity (Table 3.2). While the dietitians used simplified, non-standardised terms that they were comfortable with, these terms were inadequate for transfer of meaning to other health professionals. Consequently, the dietitians were practising incomplete NCP.

The concept of standardised language for the NCP is relatively new in dietetics and, as explained in Chapter 2, no published research comparable with this Phase 1 study could be located. In the nursing literature, however, a similar situation was reported prior to implementation of standardised nursing diagnosis; nurses used to document care in various ways using whatever words that they wanted, resulting in outcomes that were neither retrievable nor measurable (Carpenito-Moyet, 2008; Elfrink, Bakken, Coenen, McNeil, & Bickford, 2001).

Although the Nutrition Diagnosis step in NCP was described by Lacey and Pritchett in 2003, there was no method for translating the concept into practice until 2005 when the ADA first published standardised nutrition diagnostic terminology (ADA, 2005, 2006). The findings from this study demonstrate that Australian dietitians have yet to develop a clear understanding of the concept of recording Nutrition Diagnosis evidence. Confusion and inconsistency were evident in terms describing etiologies and signs/symptoms. In the dataset, for example, different clinical

dietetics practitioners used various imprecise terms – 'glucose control,' 'poor' and 'difficult' – to describe poor glucose control. Also, there was evidence of a tendency for dietitians to focus on medically diagnosed problems, increasing the likelihood that other problems requiring dietetics intervention may go undiagnosed.

The third Phase 1 objective was *To compare the nutritional terms used by clinical dietetics practitioners in Australia with the ADA's standardised terminology*. Results indicated that most of the terms recorded were imprecise and ambiguous compared with the IDNT terms (Table 3.4). Only five terms matched terms in the IDNT list. Without the use of standardised language, dietetics practice is more susceptible to disruption of continuity of care and the evaluation of patient outcomes is difficult. If the care of patients does not translate within and across settings, clinical dietetics' unique body of knowledge will remain undistinguished and invisible.

Collectively, the results of the Phase 1 case study indicate that there was variability in terminology used by practitioners, and there was no evidence of use of standardised terms. While the data represented only three hospitals, it did include a tertiary referral hospital considered by the nutrition service manager to be indicative of the wider clinical community. The findings have implications for the introduction of Standardised Nutrition Diagnosis (SND) in dietetics practice in Australia; successful implementation will require appropriate training and professional development.

Currently in Australia, there is no standardised dietetics language, but there are moves towards implementing an electronic health record. The need for consistency in national health data was identified with the publication of the *National Health Data Dictionary* (NHDD) (AIHW, 2007). However, the only nutrition-related terms identified in the data dictionary were focused on weight issues (Health Data Standards Comittee, 2006). With the introduction of casemix funding, the attention on coded health data is increasing (Byron & McCathie, 1998), and ICD-10-AM (see Section 2.8) has been used to code all medical records as part of the casemix management system (Roberts, Innes, & Walker, 1998). Since July 2008, the Australian clinical coders assigned the appropriate code for malnutrition if there is

adequate documentation by a dietitian using the malnutrition criteria in the ICD-10-AM Sixth Edition. The ICD-10-AM is a medical/disease listing that includes additional information such as the existence of co-morbidities. While there is potential for incorporation of a standardised dietetics language (i.e. IDNT) within this existing standardised classification system, implementation of the IDNT is an advanced step that most dietetics professionals are, as yet, unfamiliar with. Therefore, it is imperative to test the applicability of the ADA's standardised language for the NCP for use by dietitians in Australia and in other geographical contexts.

3.4.3 Limitations

Phase 1 of this research project was limited to exploration of an existing dataset of documented care to determine the extent of current practice of the ADA's NCP in Australia. The dataset may not have included documentation of all the care delivered; it is possible that details of the nutritional terms recorded were summarised to simplify data entry and coding. A more accurate evaluation of current practice would result from analysis of medical records or interviewing care providers.

Although the findings from this study cannot be extrapolated to include all clinical dietetics practitioners in Australia, the dataset did include records from a large tertiary teaching hospital with a large cluster of clinical dietetics practitioners who were teaching dietetics and, therefore, can be assumed to be relatively up-to-date in terms of professional development.

3.5 SUMMARY

Questions concerning the current practice of nutrition care in Australia with specific emphasis on the potential for implementation of standardised language for the NCP were identified in Chapter 1 as a stimulus for this Phase 1 case study. By applying descriptive case study methodology to an existing de-identified dataset, it was possible to investigate the extent of NCP documentation undertaken by clinical dietetics practitioners in three hospitals in 2005. The findings revealed incomplete documentation of NCP in practice, lack of understanding of the Nutrition Diagnosis

step and use of non-standardised nutritional terms in documentation of nutrition care. Even allowing for the newness of the concept, the ADA's standardised language for the NCP is under-utilised in Australian dietetics practice. It was demonstrated that clinical dietitians, including those at a large tertiary teaching hospital, who are known for quality in practice, active participation in research and early adoption of new strategies, were either unaware of standardised language of the NCP or had problems putting it into practice. This suggests the need for systematic and comprehensive training and continuous professional development for dietetics professionals if standardised language for the NCP is to be successfully implemented in Australia.

These Phase 1 findings lay the groundwork for Phase 2 of this study, which addresses the applicability of implementing the ADA's Standardised Nutrition Diagnosis (SND) (ADA, 2009) terminology in countries other than America.

Chapter 4

Standardised Nutrition Diagnosis Survey (Phase 2): Methods

This chapter details materials and methods for the study's Phase 2 research – a cross-sectional mail survey designed to investigate the existing extent of, and potential for, international implementation of Standardised Nutrition Diagnosis (SND). Section 4.1 provides an overview of Phase 2 and revisits the relevant research questions, aim, objectives and hypotheses as outlined in Chapter 1. Section 4.2 outlines the development of a five-section 'Content Validation of Nutrition Diagnoses' questionnaire. Data collection and data management are presented in Sections 4.3 and 4.4, respectively. Data analysis procedures are described in Section 4.5, and the chapter concludes with a brief summary in Section 4.6.

4.1 OVERVIEW OF PHASE 2

Phase 1 of this research project (Chapter 3) revealed a lack of Standardised Nutrition Diagnosis (SND) in Australian clinical dietetics practice, and indicated that further research into the extent of, and potential for, implementation of SND beyond the United States is warranted. Furthermore, the variability and ambiguity of terms used by dietitians to describe the process of nutritional care suggested widespread lack of awareness and understanding of this new ADA NCP concept and the absence of any systematic approach to its implementation.

When this research project commenced in 2005, the 62 nutrition diagnoses of SND had only recently been published by the ADA (2005); consequently, the majority of dietitians were unfamiliar with them. It was presumed that awareness of SND had spread prior to Phase 2 data collection, undertaken from November 2006 to December 2007. Because SND, which coded nutrition-related problems and classified them into three major domains, was generally perceived by American dietetics practitioners as very complicated (Emery, 2007; Jones & Danis, 2007), it was important to ensure that the survey instrument was capable of being understood by dietitians. To this end, the survey instrument was designed to focus on a single case scenario that would have relevance for the study population. As results from Phase 1 revealed 'malnutrition' to be the term most frequently recorded during nutrition care delivery, a hypothetical malnutrition case scenario was devised.

The survey instrument employed was a self-administered cross-sectional mail questionnaire. This provided a cost-effective and time-efficient method of reaching participants in several countries and suited the technical nature of the questionnaire content. These advantages outweighed the potential for a high response burden (Hulley et al., 2001), particularly as the intention was to seek predominantly qualitative information.

After rigorous pre- and pilot-testing, the 'Content Validation of Nutrition Diagnoses' questionnaire was sent to a convenience sample of clinical dietetics practitioners recruited through their respective dietitians' associations in Australia, Canada, Malaysia, New Zealand, the United States and the United Kingdom. To address research questions 7 and 8, Phase 2 objective 4 and hypothesis 5 (see below), the questionnaire was also completed by a sample of third-year dietetics students who had received instruction in the NCP and Nutrition Diagnosis at one of two Australian universities. Data collected from this sample of students was compared with data collected from the Australian subsample of practitioner participants.

The survey produced a substantial amount of useful data that elucidated issues surrounding the implementation of the NCP and SND in dietetics practice. Significantly, it was the first study to investigate the validity of SND in dietetic contexts beyond the United States.

4.1.1 Research questions

As outlined in Chapter 1, Phase 2 of this research project addressed six research questions:

1. Are clinical dietetics practitioners able to apply the Nutrition Diagnosis step of the NCP to correctly identify nutrition diagnostic terms (NDTs)?
2. Are clinical dietetics practitioners able to define NDTs in language that is congruent with the ADA's standardised terminology?
3. To what extent do clinical dietetics practitioners use evidence to justify their process of Nutrition Diagnosis?

4. Are clinical dietetics practitioners able to appropriately rank NDTs based on priority in nutritional management?
5. Are Australian dietetics students who have been taught about the NCP and Nutrition Diagnosis more adept at identifying, defining, justifying and ranking NDTs than Australian clinical dietetics practitioners?
6. How can understanding of Standardised Nutrition Diagnosis (SND) be facilitated for clinical dietetics practitioners and dietetics students?

4.1.2 Aim and objectives

The aim of Phase 2 was to investigate the current extent of, and potential for, international implementation of the standardised language of the ADA's NCP.

The objectives of Phase 2 were:

1. To compare the NDTs selected by clinical dietetics practitioners in response to a hypothetical case scenario with the ADA-standardised NDTs used to construct the case scenario
2. To compare clinical dietetics practitioners' definitions of NDTs with the ADA's standardised definitions
3. To assess the extent of evidence-based practice in clinical dietetics practitioners' nutrition diagnostic process
4. To identify issues pertaining to improving clinical dietetics practitioners' and dietetics students' understanding of the concept of SND

4.1.3 Hypotheses

The following hypotheses were proposed:

1. Country of practice will have no effect on the number of NDTs practitioners nominate in response to the case study.

2. The majority of clinical dietetics practitioners from all surveyed countries will correctly identify NDTs relevant to the case study.
3. The majority of clinical dietetics practitioners from all countries will be capable of defining NDTs in language that is congruent with the ADA's standardised terminology.
4. Level of MNT experience will have no effect on practitioners' ability to correctly identify, define, justify and rank NDTs.
5. There is no difference between Australian dietetics students' and Australian clinical dietetics practitioners' ability to correctly identify, define, justify and rank NDTs.

4.1.4 Ethics approval

Ethics approval for the conduct of this study was granted by the University of Newcastle Human Research Ethics Committee (Approval number H-289-0906). It was approved that implied consent would be evident through completion and return of the survey questionnaire.

4.2 QUESTIONNAIRE DEVELOPMENT

A preliminary format of the questionnaire was pre-tested by six dietitians who were members of the research advisory team. Feedback from the pre-testing session provided suggestions for finetuning questionnaire layout and question construction, and for improving clarity; these were incorporated into the questionnaire design.

A pilot study of the questionnaire was conducted with eight clinical dietitians practising in a large tertiary teaching hospital. The dietitians were asked to complete the questionnaire and to provide comments regarding its overall design, content and clarity. These dietitians completed the survey in 25 to 45 minutes. Most of them preferred a folded format of the questionnaire as opposed to unfolded A4 sheets. This folded style provided a side-by-side view of sections, which simplified the answering process. Based on feedback from the pilot study, some questionnaire formatting and stylistic changes were made, and an information

statement in the form of an introductory letter for potential participants was prepared (Appendix 1).

The questionnaire comprised five sections: (A) introductory notes on Nutrition Diagnosis, (B) case study, (C) nutrition diagnostic terminology, (D) definitions and justifications of nutrition diagnostic terminology and (E) demographic data (Appendix 2). Sections D and E were dedicated to data collection, while the first three sections provided the information required for participation in the survey. The questionnaire sections are described below.

4.2.1 Section A: Introductory notes on Nutrition Diagnosis

The first section of the questionnaire provided background information in the form of Lacey and Pritchett's (2003) description of Step 2 of the ADA's NCP – Nutrition Diagnosis. It included information on the definition and purpose, components, PES statements and documentation of Nutrition Diagnosis. This section was intended to serve as a general introduction for clinical dietetics practitioners who were unfamiliar with the concept of SND, and to equip participant clinical dietetics practitioners and dietetics students with the information they required to respond to the case study.

4.2.2 Section B: Case study

The second section of the questionnaire contained the survey's core component, a hypothetical case scenario.

Using a reverse process of nutrition diagnostic reasoning, construction of the case study began with selection of four NDTs from the 62 listed in *Nutrition Diagnosis: A Critical Step in the Nutrition Care Process* (ADA, 2005); these terms were 'Inadequate energy intake (NI-1.4),' 'Increased nutrient needs (NI-5.1),' 'Chewing (masticatory) difficulty (NC-1.2)' and 'Food medication interaction (NC-2.3).' Each diagnostic term was then related to the ADA list of standardised etiologies, signs and symptoms, and selected etiologies, signs and symptoms, and relevant demographic data were used to construct a plausible malnutrition case scenario.

Case study components are summarised in Table 4.1. ADA-standardised etiologies, signs and symptoms that related to case-study-component NDTs are presented in bold and underlined. The case study was not designed to assess the Nutrition Assessment skills of the dietitians; rather, it focused on investigating diagnostic reasoning in their use of signs and symptoms to identify nutrition-related problems of the patient/client.

Section B included step-by-step instructions on how to respond to the case study and an example of how to: firstly, identify a nutrition diagnosis; secondly, rank this diagnosis; thirdly, provide a definition for the chosen diagnosis; and, finally, justify the diagnosis.

Table 4.1 Case-study-components NDTs

Diagnosis [code]	Etiologies (Cause/contributing factor) (ADA, 2005)	Signs and symptoms (Defining Characteristics)(ADA, 2009)	Information provided in hypothetical case scenario
Inadequate energy intake [NI -1.4]	Factors gathered during the Nutrition Assessment process that contribute to the existence or the maintenance of pathophysiological, psychosocial, situational, developmental, cultural, and/or environmental problems: Pathologic or physiological causes that result in increased energy requirements or decreased ability to consume sufficient energy, e.g. **increased nutrient needs due to prolonged catabolic illness** Lack of access to food or artificial nutrition, e.g. economic constraints, cultural, or religious practices restricting food given to elderly and/or children Food- and nutrition-related knowledge deficit Psychological causes, e.g. depression or disordered eating	Biochemical data: • Cholesterol Physical examination findings: • Weight loss • Poor dentition Food and nutrition history: Reports or observation of: • Insufficient energy intake from diet compared to needs based on estimated or measured resting metabolic rate • Restriction or omission of energy-dense foods from diet • Food avoidance and/or lack of interest in food • Inability to independently consume foods/fluids (diminished joint mobility of wrist, hand or digits) • Parenteral or enteral nutrition insufficient to meet needs on estimated or measured resting metabolic rate Client history: • Excessive consumption of alcohol or other drugs that reduce hunger	Etiology: • Mr Vegetable was diagnosed with pharyngeal cancer 2 months ago Signs and symptoms: • A diet history indicates his intake is in the order of 4000-6000 kJ depending on how he is feeling
Increased nutrient needs [NI -5.1]	Factors gathered during the Nutrition Assessment process that contribute to the existence or the maintenance of pathophysiological, psychosocial, situational, developmental, cultural, and/or environmental problems: Altered absorption or metabolism of nutrient, e.g. from medications Compromise of organs related to GI function, e.g. pancreas, liver	Biochemical data, medical tests and procedures: • Decreased cholesterol <160 mg/dL, albumin, prealbumin, C-reactive protein, indicating increased stress and increased metabolic needs • Electrolyte/mineral (e.g. potassium, magnesium, phosphorus) abnormalities • Urinary or fecal losses of specific or related nutrient (e.g. fecal fat, d-xylose test) • Vitamin and/or mineral deficiency Anthropometric measurements:	Etiology: • Mr Vegetable was diagnosed with pharyngeal cancer 2 months ago Signs and symptoms: • His current weight is 55 kg (his height is 178 cm) and his usual weight was over 65 kg

Diagnosis [code]	Etiologies (Cause/contributing factor) (ADA, 2005)	Signs and symptoms (Defining Characteristics)(ADA, 2009)	Information provided in hypothetical case scenario
	Decreased functional length of intestine, e.g. short-bowel syndrome Decreased or compromised function of intestine, e.g. celiac disease, Crohn's disease Food- and nutrition-related knowledge deficit **Increased demand for nutrient**, e.g. accelerated growth, wound healing, chronic infection	• Growth failure, based on National Center for Health Statistics (NCHS) growth standards and fetal growth failure • Unintentional weight loss of ≥5% in 1 month or ≥10% in 6 months • Loss of muscle mass, subcutaneous fat • Underweight (BMI < 18.5) Physical examination findings: • Clinical evidence of vitamin/mineral deficiency (e.g. hair loss, bleeding gums, pale nail beds) • Loss of skin integrity, delayed wound healing, or pressure ulcers Food and nutrition history: Reports or observation of: • Inadequate intake of foods/supplement containing needed nutrient as compared to estimated requirements • Intake of foods that do not contain sufficient quantities of available nutrient (e.g. overprocessed, overcooked, or stored improperly) • Food- and nutrition-related knowledge deficit (e.g. lack of information, incorrect information or noncompliance with intake of needed nutrient) Client history: • Fever • Conditions associated with a diagnosis or treatment, e.g. intestinal resection, Crohn's disease, HIV/AIDS, burns, pre-term birth, malnutrition • Medications affecting absorption or metabolism of needed nutrient	a few years ago • In the last few months his clothes seem looser and he thinks he has lost several kg.
Chewing (masticatory) difficulty [NC-1.2]	Factors gathered during the Nutrition Assessment process that contribute to the existence or the maintenance of pathophysiological, psychosocial, situational, developmental, cultural, and/or environmental problems: Craniofacial malformation	Physical examination findings: • Missing teeth • Alterations in cranial nerves V, VII, IX, X, XII • Dry or cracked lips, tongue • Oral lesions • Impaired tongue movement	Etiology, Signs and symptoms: • He has experienced difficulties with eating for some time now, as he finds that some foods no longer have any appeal; he calls

Diagnosis [code]	Etiologies (Cause/contributing factor) (ADA, 2005)	Signs and symptoms (Defining Characteristics)(ADA, 2009)	Information provided in hypothetical case scenario
	Oral surgery Neuromuscular dysfunction Partial or complete edentulism Soft tissue disease (primary or oral manifestations of a systemic disease) Xerostomia	• Ill-fitting dentures or broken dentures Food and nutrition history: Reports or observation of: • Decreased intake of food • Alterations in food intake from usual • Decreased intake or avoidance of food difficult to form into a bolus, e.g. nuts, whole pieces of meat, poultry, fish, fruits, vegetables • Avoidance of foods of age-appropriate texture • Spitting food out or prolonged feeding time Client history: • Conditions associated with a diagnosis or treatment, e.g. alcoholism; Alzheimer's; head, neck or **pharyngeal cancer**; cerebral palsy; cleft lip/palate; oral soft tissue infections (e.g. rheumatoid arthritis, lupus, Crohn's disease, penphigus vulgaris, HIV, diabetes) • Recent major oral surgery • Wired jaw • Chemotherapy with oral side effects Radiation therapy to oral cavity	them 'tasteless' and 'like eating cardboard' because of the dryness of his mouth
Food medication interaction [NC-2.3]	Factors gathered during the Nutrition Assessment process that contribute to the existence or the maintenance of pathophysiological, psychosocial, situational, developmental, cultural, and/or environmental problems: Combined ingestion or administration of medication and food that results in undesirable/harmful interaction	Biochemical data, medical tests and procedures: • Alterations of biochemical tests based on medication affect and patient/client condition Anthropometric measurements: • Alterations of anthropometric measurements based on medication affect and patient/client conditions, e.g. weight gain and corticosteroids Food and nutrition history: Reports or observation of: • Intake that is problematic or inconsistent with OTC, prescribed drugs, herbals, botanicals, and diet supplements, such as: • Fish oils and prolonged bleeding • Coumadin, vitamin K-rich foods	Etiology, Signs and symptoms: • His treatment includes a number of medications (he cannot name them all but he takes 6 types a day) • His GP suggested he was anaemic so he has started iron supplements in the last month • Constipation

Diagnosis [code]	Etiologies (Cause/contributing factor) (ADA, 2005)	Signs and symptoms (Defining Characteristics)(ADA, 2009)	Information provided in hypothetical case scenario
		• High-fat diet while on cholesterol lowering medications • **Iron supplements, constipation** and low fibre diet • Intake that does not support replacement or mitigation of OTC, prescribed drugs, herbals, botanicals, and dietary supplements affects such as potassium-wasting diuretics • Changes in appetite or taste Client history: • Multiple drugs (OTC, prescribed drugs, herbals, botanicals, and dietary supplements) that are known to have food-medication interactions • Medications that require nutrient supplementation that can not be accomplished via food intake, e.g. isoniazid and vit B-6	

4.2.3 Section C: Nutrition diagnostic terminology

This section provided the ADA's list of 62 standardised nutrition diagnostic terms (NDTs) with designated codes as they appeared in *Nutrition Diagnosis: A Critical Step in the Nutrition Care Process* (ADA, 2005) from which participants could select their case study responses. As specified by the ADA, the NDTs were organised into three domains: Intake, Clinical and Behavioural-Environmental (Table 4.2).

Table 4.2 NDT domain definitions

Domain (Code)	Definition (ADA, 2005)
Intake (NI)	Actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support
Clinical (NC)	Nutritional findings/problems identified as related to medical or physical conditions
Behavioural-Environmental (NB)	Nutritional findings/problems identified as related to knowledge, attitude/beliefs, physical environment, or food supply and safety

4.2.4 Section D: Definitions and justifications of nutrition diagnostic terminology

In the fourth section of the questionnaire, survey participants were to document their responses to the Section B case study by nominating their nutrition diagnoses, ranking them, and then writing their definitions and justifications for these chosen NDTs. An example of how to respond was provided to facilitate understanding. Given the content of the case study and the large number of NDTs to choose from in each of the three domains, it was expected that participants would identify more than one NDT.

4.2.5 Section E: Demographic data

The final section of the questionnaire comprised questions about the participants themselves, including where they practiced, their level of education, their nutrition care speciality area, and their extent of experience with MNT and Nutrition Diagnosis.

4.3 DATA COLLECTION

4.3.1 Study population

This study involved clinical dietetics practitioners in Australia, Canada, Malaysia, New Zealand, the United States and the United Kingdom. Practitioners in these countries were targeted because they were likely to use the NCP as part of their dietetics practice. It was important that participants be clinical dietitians who would be in a position to use standardised language.

A sample of third-year dietetics students from two Australian universities with established dietetics programs was also included in this survey. These dietetics students had received instruction on the NCP and Nutrition Diagnosis in the form of a series of lectures ranging from two to three hours duration, as part of their education program. Although equipped with theoretical information, these students had no clinical practice experience. It was anticipated that responses of these dietetics students could be fruitfully compared with those of Australian practitioners and provide insight into issues relevant to the formal inclusion of SND in the dietetics curriculum.

4.3.2 Sampling method

This study employed convenience sampling. Despite its tendency for introduction of selection bias, this sampling method was considered appropriate because this study followed a new avenue of research and the sample size was not expected to be representative of the study population (Pope, Ziebland, & Mays, 2000). The emphasis was on gathering high-quality qualitative data to assess the validity of the ADA's SND in dietetic contexts other than America. No sample size calculations were performed as this study was a descriptive new work with no

existing comparable research on which to base estimates. It was expected that perhaps 20-50 dietitians in each targeted country would participate in the study, providing an estimated sample of 120-300 practitioners. The inclusion criterion was all dietitians who were practicing in clinical nutrition during the study's data collection period (November 2006 – December 2007). Dietitians who were not involved in clinical nutrition practice were excluded from the sample.

4.3.3 Recruitment of practitioner participants

Practitioner participants were recruited through their respective dietitians' association. Members of the Dietitians Association of Australia (DAA) were sent three invitations to participate (one every two weeks for six weeks) via DAA weekly email; also, questionnaires were distributed at the DAA conference in Hobart, Tasmania, on 25 May 2007, and some dietitians attending this conference were approached in person. Information about the study was sent to representatives of the American Dietetic Association (ADA), the British Dietetic Association (BDA), Dietitians of Canada (DC), the New Zealand Dietetic Association (NZDA) and the Malaysian Dietitians' Association (MDA) with the request that they forward it to their members. Practitioners interested in participating had the option of contacting their association representative or emailing the researcher for the questionnaire.

Potential practitioner participants in Australia were given approximately 6 weeks to respond to the email invitation. Reminder emails were sent to representatives of the respective dietetics associations to ask them to encourage their members to respond. Practising clinical dietitians who agreed to participate were sent a package containing an introductory letter that explained the study, its purpose and how to participate, a five-section 'Content Validation of Nutrition Diagnoses' questionnaire and a reply-paid addressed envelope. Participation was voluntary with questionnaire completion indicating consent.

4.3.4 Response rates

Of the 420 questionnaires mailed to clinical dietetics practitioners in Australia, Canada, the United Kingdom, the United States, New Zealand and Malaysia, 85 were returned completed; a breakdown of response rates by country is provided in Table 4.3. More than half of the participant practitioners (55.3%) were based in Australia, which was expected as the largest number of questionnaires was distributed in this country (n=216). The remaining practitioners were based in Canada (25.9%), Malaysia (9.4%), New Zealand (4.7%), the United States (3.5%) and the United Kingdom (1.2%).

Consistent with this study's convenience sampling method, as outlined in Section 4.3.2, additional effort was made to elicit responses from practitioners in Australia. In contrast, practitioners in other countries were contacted solely through their respective dietetics associations; consequently, the number of surveys sent to potential participants in these countries was much lower, ranging from 24-65.

Table 4.3 Percentage of questionnaires returned completed and response rates by country

Country	Surveys distributed (n)	Surveys returned (n)	Response rate[a] (%)	Percent returned[c] (%)
Australia	216	47	21.8	55.3
Canada	54	22	40.7	25.9
United Kingdom	28	1	3.6	1.2
United States	33	3	9.1	3.5
New Zealand	24	4	16.7	4.7
Malaysia	65	8	12.3	9.4
Total	420	85	20.0[b]	100.0

[a]Response rate calculated based on total number of surveys distributed in each country
[b]Overall response rate calculated by total number of returned surveys regardless of country origin
[c]Percentage of practitioners calculated by total number of returned survey (n=85)

Practitioners from Canada demonstrated the highest response rate (40.7%) compared to those from Australia (21.3%) and all other countries combined (less than 20%). Many factors could have impacted on this response rate variation. For example, it could suggest that practitioners in Canada were more interested in the study, that they were more confident in their ability to participate or that they were more effectively motivated to participate by their dietetics association representative.

The overall response rate was low (20%); this may indicate that many of the practitioners initially interested in participating found the questions too difficult, complicated and/or time consuming. Nevertheless, the low response rate did not affect the quality of the data provided by participants, and the sample was not intended to be representative of the study population. The quality of the data refers to the accuracy of the answers provided by the participants and therefore it is independent of the response rate. In addition, practitioners who returned completed questionnaires were more likely to be familiar with and interested in the new concept of SND.

Of the 72 questionnaires distributed to Australian dietetics students, 37 were completed and returned; the remainder were returned blank. Most of the completed questionnaires were returned by students from one university where the

researcher was able to personally explain the survey, the students completed the questionnaire in a session directly following their allocated class time, and the lecturer was a member of the research advisory team; in contrast, very few questionnaires were returned completed from the other university where the researcher was not on hand to explain the survey and encourage completion. Overall, the student sample yielded a 51% response rate.

4.3.5 Questionnaire administration

A self-administered questionnaire was considered to best suit the format of the questions. Survey participants were instructed to read the Section A background material on Nutrition Diagnosis and to apply this material to the Section B case study. Participants were asked to make one or more nutrition diagnoses from the Section C list provided and to prioritise these diagnoses if more than one was made, then to provide a definition of the diagnosis in their own words. This involved application of the first two NCP steps – Nutrition Assessment followed by the diagnostic reasoning requirements of Nutrition Diagnosis.

The dietetics student participants at one university completed the questionnaire during a one-hour session after a scheduled lecture. This removed the potential for students to discuss the case study and confer on their responses. The students were given a brief explanation of the research objectives and instructions on how to respond to the hypothetical case scenario. The students were not required to answer Section E questions relating to dietetics practice setting and experience level. There was less control over the manner in which students at the other university completed the questionnaire; although questionnaires were distributed, no class time could be scheduled for their completion.

4.4 DATA MANAGEMENT

Data management involved defining variables in the dataset, data entry, data back up, missing data management, data editing and data archival (Hulley et al., 2001). The questionnaires were coded with a unique identifier (ID) to ensure consistency in data entry. Data were entered into Microsoft Office Excel 2003 spreadsheet and SPSS for Windows (Version 16.0, 2008, SPSS Inc. Chicago) software. Data were

backed up regularly and stored in more than one location, and kept on file in a secure password-protected location in the School of Health Sciences, University of Newcastle. All hard copy data were stored in a metal filing cabinet in the School of Health Sciences, University of Newcastle. Access to the data was, and will continue to be, restricted to the researcher and members of the research advisory team.

4.5 DATA ANALYSIS

It was expected that this study would produce more qualitative data than quantitative data. Quantitative data, including the number and ranking of NDTs and participant demographics, were analysed using SPSS software. Approaches to quantitative data analysis included frequency distributions, measures of central tendency and bivariate analysis. Descriptive statistics were used to identify and rank the most common diagnoses made. Qualitative data, including participants' definitions of and justifications for the NDTs they selected in response to the case study were entered into a Microsoft Office Excel 2003 spreadsheet in preparation for content analysis. Phase 2 data analysis procedures are summarised in Figure 4.1.

For the purpose of statistical analysis, practitioners from Malaysia, New Zealand, the United States and the United Kingdom were grouped as 'Other Countries' due to the very low response rate from these countries, and were compared with practitioners from Australia and Canada.

Results of dietetics students' identification, definition, justification and ranking of NDTs were compared with those of Australian practitioners. One-way ANOVA was performed to test mean difference. Chi square analysis was conducted to test differences of categorical results between practitioners and students.

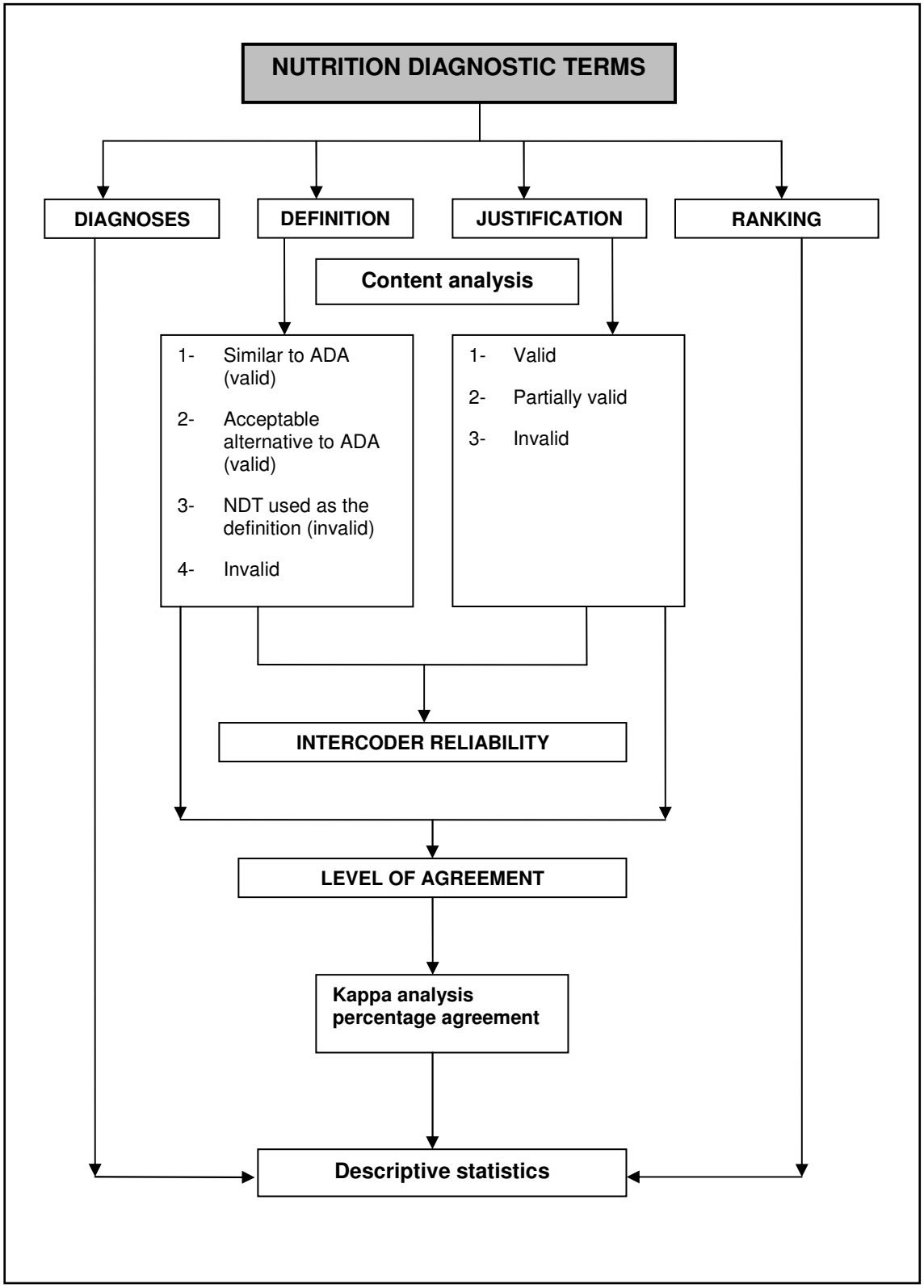


Figure 4.1 Flow chart of Phase 2 data analysis procedures

4.5.1 Content analysis

The definitions provided by participants were analysed using content analysis, which involved a systematic review of all the definitions with the aim of pattern identification (Neuendorf, 2002). The definitions were sorted according to related NDT and compared with the definitions provided by the ADA in the *International Dietetics and Nutrition Terminology Reference Manual* (ADA, 2009). Concordance and discordance were noted. Participants' definitions that did not match IDNT definitions were further reviewed and patterns were identified. Rigorous review revealed that all definitions of NDTs provided by participants could be classified into one of four categories: (1) definitions that were similar to ADA definitions, (2) definitions that were acceptable alternatives to ADA definitions, (3) definitions that merely reproduced the nutrition diagnostic terminology and were therefore deemed invalid, and (4) definitions that were deemed invalid for other reasons (Table 4.4). To facilitate manual coding, a codebook that listed characteristics of each code was developed.

Table 4.4 Coding criteria for categories of NDT definitions provided by participants

Code	Category of definition	Criteria
1	Similar to ADA (valid)	The definition provided is similar to an ADA IDNT definition.
2	Acceptable alternative to ADA (valid)	The definition provided is acceptable, but uses different words that have similar meaning to an ADA IDNT definition.
3	NDT used as the definition (invalid)	The definition provided is exactly the same as the nutrition diagnostic term(s).
4	Invalid	The definition provided is unrelated to the NDT; participant uses own assumptions rather than case study evidence; too much unrelated information provided; inaccurate and/or incorrect definition.

The justifications provided by participants for each NDT they selected were sorted by diagnostic term, analysed using content analysis and compared with the information provided in the malnutrition case scenario. The justifications consisted of a list of related etiologies and signs/symptoms for each NDT. The coding system

for justifications was developed using evidence provided in the case study and the *International Dietetics and Nutrition Terminology Reference Manual* (ADA, 2009). Three categories of justifications were identified: valid, partially valid and invalid (Table 4.5). Justifications provided for NDTs that were not case-study-component NDTs (and, therefore, were selected by participants based on assumptions rather than case-study evidence) were considered partially valid if the etiologies and defining characteristics were similar to those listed in the IDNT reference manual. Coded justifications were entered into SPSS software for further descriptive analysis.

Table 4.5 Coding criteria for categories of NDT justifications provided by participants

Code	Category of justification	Criteria
1	Valid	Must come from information provided in the case study and symptoms must match those in the IDNT list
2	Partially valid	Provides valid justification for a non-case-component NDT
3	Invalid	Includes none of the information provided in the case study and no symptoms that match those in the IDNT list

4.5.2 Intercoder reliability

Intercoder reliability, which is essential for valid and credible content analysis (Neuendorf, 2002; Burla et al., 2008), was assessed to determine the extent of agreement among different coders. Two widely used indices of intercoder reliability were selected – percentage agreement and Cohen's kappa (Banerjee & Fieldiing, 1997; Burla et al., 2008). The percentage agreement is a simple calculation that represents the number of agreements divided by the total number of definitions. A high percentage indicates a high level of agreement (Lombard, Snyder-Duch, & Bracken, 2002). Cohen's kappa is a measure of agreement which takes into consideration the removal of agreement that could be expected to happen by chance (Landis & Koch, 1977). A kappa value of 1 indicates complete agreement, while a kappa value of zero indicates no agreement (Landis & Koch, 1977). The

kappa values can be interpreted using the strength of agreement proposed by Landis and Koch (1977) (Table 4.6).

Table 4.6 Interpretation of kappa values

Kappa statistic	Strength of agreement
<0.00	Poor
0.00-0.20	Slight
0.21-0.40	Fair
0.41-0.60	Moderate
0.61-0.80	Substantial
0.81-1.00	Almost perfect

Source: Landis & Koch (1977, p. 165)

The reliability assessment was conducted on a randomly selected subset of 130 of the total of 502 definitions provided by participant practitioners; all 32 NDTs selected by practitioners in response to the case study (see Section 5.2) were included in the 130-definition subset. Five members of the research advisory team were asked to code the definitions using their professional judgment and independent of each other, at the time and location of their choice. Brief guidelines were provided by the researcher. The resulting coded data was entered into SPSS for comparison with the researcher's coding for calculation of reliability.

The kappa value and percentage agreement of all coders are shown in Table 4.7. The kappa analysis demonstrated that all coders achieved a moderate (0.41-0.60) to almost perfect (0.81-1.00) agreement with the researcher. According to Landis and Koch (1977), this constituted an adequate level of reliability. Significantly, coder 1 demonstrated almost perfect agreement with the researcher as she was the coder most familiar with SND. The percentage agreement for all coders was greater than 59%, which according to Lombard et al. (2002), suggested the reliability of the coding system. Further evidence of the reliability of the coding system is provided in Appendix 3, which details the results of Cohen's kappa and percentage agreement conducted for coding of individual NDTs by all coders.

Table 4.7 Kappa values and percentage agreement for coding of NDT definitions

Measure of agreement	Coder				
	1	2	3	4	5
Kappa value	0.942	0.434	NA[a]	0.509	0.479
% agreement	96.2	59.2	69.5	70.5	65.4

[a]Not available as the kappa value is not computable

4.6 SUMMARY

This chapter outlined the materials and methods used in Phase 2 of this research project. It included details of the development of a five-section 'Content Validation of Nutrition Diagnoses' questionnaire that employed a hypothetical case scenario, and data collection and analysis procedures. Chapter 5 will focus on the Phase 2 results.

Chapter 5

Standardised Nutrition Diagnosis Survey (Phase 2): Results

This chapter presents the results of the Phase 2 'Content Validation of Nutrition Diagnoses' survey. Section 5.1 provides a profile of participant clinical dietetics practitioners. Participant practitioners' case study responses pertaining to selection of NDTs, provision of definitions for the selected NDTs, provision of justifications for their selection, and ranking of selected NDTs are presented in Sections 5.2, 5.3, 5.4 and 5.5, respectively. The influence of participant practitioners' level of experience in medical nutrition therapy (MNT) on various characteristics of the NDTs they selected is explored in Section 5.6. Finally, responses from a sample of Australian dietetics students are compared with an Australian subsample of practitioner participants in Section 5.7. The chapter concludes with a brief summary.

5.1 PROFILE OF CLINICAL DIETETICS PRACTITIONERS

Completed survey questionnaires were returned by 85 clinical dietetics practitioners from Australia (n=47), Canada (n=22), Malaysia (n=8), New Zealand (n=4), the United States (n=3) and the United Kingdom (n=1). Response rates were presented in Section 4.3.4.

5.1.1 Practice settings

Details of participants' practice settings are summarised in Table 5.1. Most practitioners (75%) worked in urban areas. The majority (59%) described their facility type as 'Inpatient care, acute-care facility;' 'Ambulatory/outpatient care' was nominated by 16% of participants, 'Inpatient care, long-term-care facility' by 15%, 'Self-employed, individual client counselling' by 6% and 'Community/public health program' by 5%. Consequently, 74% of participants practiced in inpatient-care settings.

The majority of practitioners (74%) assessed/counselled 1-10 patients per day; 18% assessed/counselled 11-15 patients daily, and 4% assessed/counselled 16-20 patients per day. The remaining four practitioners (5%) either conducted research, performed a leadership role and/or were involved in administrative work.

Table 5.1 Practitioners' facility settings, type of facility and number of patients they assessed/counselled per day by country

Practice setting details	Country[a] [n (%)]						Total
	AU	CA	UK	US	NZ	MY	
Facility setting[c]							
Urban	32(68)	16 (76)	1(100)	3(100)	4(100)	7 (88)	63 (75)
Rural	15 (32)	5 (24)	0 (0)	0 (0)	0 (0)	1 (12)	21 (25)
Type of facility[b, c]							
Inpatient care, acute-care facility	27 (59)	11 (52)	0 (0)	2 (67)	4(100)	5 (63)	49(59)
Inpatient care, long-term-care facility	5 (11)	4 (19)	0 (0)	1 (33)	0 (0)	2 (25)	12(15)
Ambulatory/outpatient care	6 (13)	5 (24)	1(100)	0 (0)	0 (0)	1 (12)	13 (16)
Community/public health program	3 (7)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	4 (5)
Self-employed, individual client counselling	5 (11)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5 (6)
No. patients assessed/counselled per day[c]							
1-10	34 (72)	16 (76)	1(100)	0 (0)	3 (75)	8(100)	62 (74)
11-15	10 (21)	4 (19)	0 (0)	1 (33)	0 (0)	0 (0)	15 (18)
16-20	0 (0)	1 (5)	0 (0)	2 (67)	0 (0)	0 (0)	3 (4)
Other	3 (4)	0 (0)	0 (0)	0 (0)	1 (25)	0 (0)	4 (5)

[a]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia
[b]One practitioner from Australia did not provide type of facility details
[c]One practitioner from Canada did not provide any practice setting details

5.1.2 Level of education

Level of education of the practitioners as indicated by the highest degree held is presented in Table 5.2. A highest level of Bachelor degree was achieved by 70% of practitioners, Masters degree by 28% and Doctorate by 2%. The relatively high prevalence of Masters degrees held by practitioners based in Australia (n=18) compared to practitioners based in all other countries (n=5) is most likely due to the growth in these as entry-level qualifications; eleven of the current 19 Australian entry-level programs in dietetics are at graduate level. There was no statistical difference in level of tertiary qualification held by practitioners in Australia, Canada and Other Countries.

Table 5.2 Highest degree held by dietetics practitioners by country

Highest degree held	Country[a] [n (%)]						Total
	AU	CA[b]	UK	US	NZ	MY	
Bachelor	27 (57)	18 (86)	1(100)	2 (67)	3 (75)	8(100)	59 (70)
Masters	18 (38)	3 (14)	0 (0)	1 (33)	1 (25)	0 (0)	23 (28)
Doctorate	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)

[a]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia
[b]One practitioner from Canada did not provide level of education information

5.1.3 Nutrition care speciality area

Participant practitioners' nutrition care speciality areas are presented in Table 5.3. More than half (54%) nominated 'General;' other areas nominated were 'Geriatrics' (12%), 'Critical care' (7%), 'Oncology' (7%), 'Paediatrics,' (5%), 'Renal' (5%), 'Diabetes' (5%), 'Rehabilitation' (4%) and 'Nutrition support' (2%). There were no statistically significant differences in nutrition care speciality area between practitioners from Australia, Canada and Other Countries.

Table 5.3 Practitioners' nutrition care speciality areas

Nutrition care speciality area	Country[a] [n (%)]						Total
	AU	CA	UK	US	NZ	MY	(%)
General	24 (51)	10 (48)	1 (100)	1 (33)	3 (75)	6 (75)	45 (54)
Geriatrics	6 (13)	3 (14)	0 (0)	0 (0)	1 (25)	0 (0)	10 (12)
Critical care	3 (6)	1 (5)	0 (0)	1 (33)	0 (0)	1 (13)	6 (7)
Oncology	4 (9)	1 (5)	0 (0)	0 (0)	0 (0)	1 (13)	6 (7)
Paediatrics	2 (4)	2 (10)	0 (0)	0 (0)	0 (0)	0 (0)	4 (5)
Renal	2 (4)	1 (5)	0 (0)	1 (33)	0 (0)	0 (0)	4 (5)
Diabetes	3 (6)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	4 (5)
Rehabilitation	2 (4)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	3 (4)
Nutrition support	1 (2)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)

[a]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia

5.1.4 Experience with MNT

The mean, range and median number of years participants had practiced medical nutrition therapy (MNT) are presented in Table 5.4. The overall mean was 10.0 ± 8.9 years and the range was 1-34 years with a median of 7 years of practice. Obviously the study sample included participants with widely differing levels of experience. Despite the very low response rate from the United Kingdom, the United States and New Zealand, participants from these countries were highly experienced and, it can be speculated, capable of providing relatively high quality data.

Table 5.4 Mean, range and median number of years participants had practiced MNT

Country (n)	Mean ± SD	Range	Median
Australia (45)[a]	7.6 ± 6.9[c]	1-26	5.0
Canada (21)[b]	13.7 ± 9.5[c]	1-32	13.0
United Kingdom (1)	17.0 ± NA	NA	17.0
United States (3)	31.0 ± 5.2	25-34	34.0
New Zealand (4)	13.5 ± 8.7	7-26	10.5
Malaysia (8)	3.4 ± 1.5	1-5	3.0
Total (82)	10.0 ± 8.9	1-34	7.0

[a] Two practitioners from Australia did not provide information on experience with MNT
[b] One practitioner from Canada did not provide information on experience with MNT
[c] One-way ANOVA (F=3.554, p=0.033)

A post-hoc test of one-way ANOVA revealed that there was a significant difference in mean number of years experience in MNT between practitioners from Australia and Canada. Practitioners from Canada (13.7 ± 9.5 years) were more experienced than Australian practitioners (7.6 ± 6.9 years) (F=3.554, p=0.033). This result is in accordance with the relatively high response rate of practitioners from Canada who completed and returned the survey (Table 4.3), suggesting a higher level of confidence in answering the questions and/or more interest in the focus of the study.

5.1.5 Experience with Nutrition Diagnosis

Practitioners were asked to report whether they had any experience with Nutrition Diagnosis and whether making a formal Nutrition Diagnosis in the medical record was part of their current practice (Table 5.5). More than three-quarters (77%) of practitioners reported that they had some experience with Nutrition Diagnosis; this was somewhat surprising as Nutrition Diagnosis was introduced as the second NCP step in 2003 (Lacey & Pritchett, 2003), and standardised language for Nutrition Diagnosis was published two years later (ADA, 2005). Furthermore, 73% of practitioners declared that making formal Nutrition Diagnosis in the medical record was, at least occasionally, part of their current practice. Only 19% declared that they did not use formal Nutrition Diagnosis in the medical record, while six practitioners (7%), who selected the 'Other' category, reported that Nutrition Diagnosis was not practiced in their country.

Table 5.5 Practitioners' experience with Nutrition Diagnosis

	Country[a] [n (%)]						Total
	AU	CA[b]	UK	US	NZ	MY	
Experience with Nutrition Diagnosis:							
Some experience	35 (74)	18 (86)	1(100)	3(100)	1 (25)	7 (87)	65(77)
No experience	12 (26)	3 (14)	0 (0)	0 (0)	3 (75)	1 (13)	19 (23)
Make formal Nutrition Diagnosis in the medical record as part of current practice:							
Yes, at least occasionally	38 (81)	14 (64)	1(100)	3(100)	2 (50)	4 (50)	62 (73)
No	5 (11)	5 (24)	0 (0)	0 (0)	2 (50)	4 (50)	16 (19)
Other	4 (9)	2 (10)	0 (0)	0 (0)	0 (0)	0 (0)	6 (7)

[a]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia
[b]One practitioner from Canada did not provide information on experience with Nutrition Diagnosis

As the questions about experience with Nutrition Diagnosis were included in Section E of the questionnaire, it was assumed that participants had read and understood the details about Nutrition Diagnosis provided in Sections A and B. The level of experience with Nutrition Diagnosis reported by participants could reflect that most practitioners were previously aware of this concept and had indeed begun to implement it in their practice; it could also suggest that practitioners did

not understand the concept and/or were uncertain about its inclusion in their practice. It is also possible that some practitioners perceived Nutrition Diagnosis as a generic concept, rather than the specific Step 2 of the ADA's NCP.

5.2 SELECTION OF NDTS BY PRACTITIONERS

5.2.1 Number of NDTs selected

The total number of nutrition diagnostic terms (NDTs) selected by all participant practitioners was 502; of the 62 ADA terms provided in Section C of the questionnaire, 32 were nominated by one or more participants. The mean, range and median number of NDTs provided by practitioners are summarised in Table 5.6. Overall, the mean number of NDTs selected was 5.91 ± 2.31, with a median of 6 terms. The wide range (1-12) of numbers of NDTs selected indicates inconsistency and lack of agreement in identification of the NDTs using evidence provided in the case study. Thirty-five percent of practitioners selected more than six NDTs.

Table 5.6 Mean, range and median number of NDTs selected by practitioners in response to a case study

Country (n)	Mean ± SD[a]	Range	Median
Australia (47)	6.32 ± 2.30	1-11	6
Canada (22)	5.77 ± 1.90	4-12	5
United Kingdom (1)	3.00 ± NA	NA	3
United States (3)	2.00 ± 1.73	1-4	1
New Zealand (4)	6.75 ± 2.22	5-10	6
Malaysia (8)	5.25 ± 2.32	3-8	4
Total (85)	5.91 ± 2.31	1-12	6

[a]One-way ANOVA (F=2.545, p=0.085)

No significant differences were found in the average number of NDTs selected by practitioners from Australia, Canada and Other Countries (F=2.545, p=0.085). However, the three participants from the United States selected fewer NDTs (range of 1-4) than participants from any other country; this is indicative of greater familiarity with SND as would be expected of practitioners based in the country responsible for introducing the concept.

5.2.2 NDTs selected

The six NDTs most commonly selected by participating practitioners are listed in Table 5.7. 'Involuntary weight loss' was selected by 66% of practitioners, 'Inadequate energy intake' by 60%, 'Inadequate oral food/beverages intake' by 56%, 'Underweight' by 54%, 'Impaired ability to prepare food/meals' by 47% and 'Inadequate mineral intake' by 38%.

Table 5.7 Six NDTs most commonly selected by practitioners in response to a case study

NDT [code]	Practitioners[b] [n (%)]						Total (%)
	AU n=47	CA n=22	UK n=1	US n=3	NZ N=4	MY n=8	N=85
Involuntary weight loss [NC-3.2]	35 (74)	14 (64)	0 (.0)	1 (33)	3 (75)	3 (38)	56 (66)
[c]Inadequate energy intake [NI-1.4]	27 (57)	14 (64)	0 (.0)	0 (.0)	3 (75)	7 (88)	51 (60)
Inadequate oral food/beverages intake [NI-2.1]	32 (68)	11 (50)	1 (100)	2 (67)	1 (25)	1 (13)	48 (56)
Underweight [NC-3.1]	28 (60)	11 (50)	1 (100)	0 (.0)	3 (75)	3 (38)	46 (54)
Impaired ability to prepare foods/meals [NB-2.4]	25 (53)	9 (41)	0 (.0)	1 (33)	4 (100)	1 (13)	40 (47)
Inadequate mineral intake (specify) [NI-55.1]	23 (49)	4 (18)	0 (.0)	0 (.0)	1 (25)	4 (50)	32 (38)

[a]Percentage agreement calculated as the total number of participants who chose each NDT divided by the total number of participants (N=85)
[b]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia
[c]One of the four case-study-component NDTs

Among these six most commonly selected terms, only one – 'Inadequate energy intake' – was a case-study-component NDT (Table 4.1). Participants' selection of the other five NDTs was not based solely on evidence provided in the case study. All other NDTs selected by participants are presented in Appendix 4.

The differences between 'Inadequate energy intake' and 'Inadequate food/beverage intake' are very subtle. It appears that practitioners perceived these NDTs as very similar and, indeed, interchangeable; of the 85 practitioners surveyed, 84 selected either 'Inadequate energy intake' or 'Inadequate food/beverage intake,' but no practitioners selected both of these NDTs.

Table 5.8 shows the frequency and percentage agreement for participant selection of the four NDTs used to construct the case study. 'Inadequate energy intake' was the only term that achieved more than 50% agreement. Nineteen percent of practitioners selected 'Chewing difficulty,' 11% selected 'Increased nutrient needs' and only 5% selected 'Food medication interaction' as nutrition diagnoses for the case study.

Table 5.8 Frequency and percentage agreement[a] of the four case-study-component NDTs correctly identified by practitioners

NDT [code]	Practitioners[b] [n (%)]						Total (%)
	AU n=47	CA n=22	UK n=1	US n=3	NZ n=4	MY n=8	N=85
Inadequate energy intake [NI-1.4]	27 (57)	14 (64)	0 (0)	0 (0)	3 (75)	7 (88)	51 (60)
Increased nutrient needs [NI-5.1]	5 (11)	4 (18)	0 (0)	0 (0)	0 (0)	0 (0)	9 (11)
Chewing difficulty [NC-1.2]	15 (32)	0 (0)	0 (0)	0 (0)	0 (0)	1 (13)	16 (19)
Food medication interaction [NC-2.3]	3 (6)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)	4 (5)

[a]Percentage agreement calculated as the total number of practitioners who chose each NDT divided by the total number of practitioners in each country
[b]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia

With a total of 32 NDTs selected by practitioners, further results presentation will focus on the six NDTs most commonly selected (Table 5.7) and the four case-study-component NDTs (Table 5.8). With only one case study component in the participants' top six, presentation of results will focus on a total of nine NDTs.

5.2.3 Participant-selected NDTs versus case-study-component NDTs

Table 5.9 shows the frequency and percentage of correct and incorrect NDTs identified by practitioners across countries. Of the 502 NDTs provided by all practitioners, only 16% (n=81 terms) were correctly identified case-study-component NDTs. There was no significant difference in identification of correct or incorrect terms between practitioners from Australia, Canada and Other Countries (χ^2=3.172, p=0.787). All NDTs selected by practitioners from the United Kingdom and the United States, and more than 80% of the NDTs selected by practitioners from Australia, Canada, New Zealand and Malaysia were incorrect. Most practitioners selected nutrition diagnoses for which no evidence had been provided in the case study.

Table 5.9 Frequency and percentage of correct and incorrect NDTs selected by practitioners by country

Diagnosis	Practitioners[a] [n (%)]						Total (%)
	AU	CA	UK	US	NZ	MY	
Correct[b]	50 (17)	20 (16)	0 (0)	0 (0)	3 (11)	8 (19)	81 (16)
Incorrect[c]	247 (83)	107 (84)	3 (100)	6 (100)	24 (89)	34 (81)	421 (84)
Total	297 (59)	127 (25)	3 (0.6)	6 (1)	27 (5)	42 (8)	502 (100)

[a]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia
[b]One of the four case-study-component NDTs
[c]Not one of the four case-study-component NDTs

Figure 5.1 illustrates the total number of correct NDTs identified by practitioners from Australia, Canada and Other Countries (Malaysia, New Zealand, the United States and the United Kingdom). One correct NDT was selected by 32% of participants from Australia, 38% from Canada and 56% from Other Countries. Two correct NDTs were selected by 27% of practitioners from Australia, 24% from Canada and 6% from Other Countries. Three correct NDTs were selected by only 6% of practitioners, all from Australia. No practitioners correctly identified all four NDTs. More than a third of practitioners from Australia (34%), Canada (38%) and Other Countries (37%) selected no correct NDTs

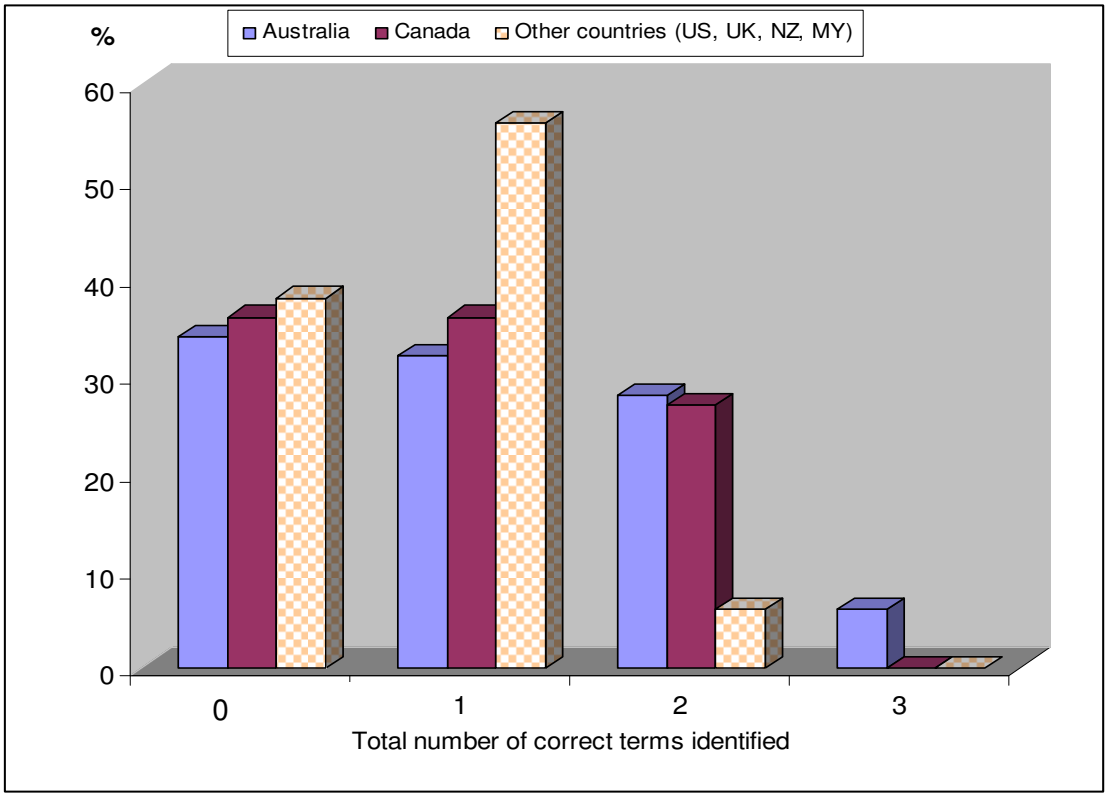


Figure 5.1 Percentage of practitioners who selected 0, 1, 2 and 3 correct NDTs

5.3 PRACTITIONERS' DEFINITIONS OF NDTS

Definitions of NDTs provided by all participant practitioners were classified into one of four categories as described in Section 4.5.1. Table 5.10 presents the validity of practitioners' NDT definitions in the context of these categories across countries. Of the 502 definitions provided by all practitioners, 31% (n=156) were similar to ADA definitions and therefore deemed valid, 11% were alternative definitions also deemed valid, 30% reproduced the nutrition diagnostic terminology as the definition (for example, 'Involuntary weight loss' was defined as 'involuntary weight loss') and were therefore deemed invalid, and 28% were deemed invalid for other reasons. No significant differences in definition categories were found between practitioners from Australia, Canada and Other Countries.

Table 5.10 Validity of NDT definitions provided by practitioners by country

Definition categories	Country[a] [n (%)]						Total
	AU	CA	UK	US	NZ	MY	(%)
Similar to ADA (valid)	84 (28)	42 (33)	0 (0)	2 (33)	13 (48)	15 (36)	156 (31)
Acceptable alternative to ADA (valid)	28 (9)	13 (10)	0 (0)	3 (50)	1 (4)	12 (29)	57 (11)
NDT used as the definition (invalid)	96 (32)	39 (31)	3 (100)	0 (0)	7 (26)	3 (7)	148 (30)
Invalid[c]	89 (30)	33 (26)	0 (0)	1 (17)	6 (22)	12 (29)	141 (28)
Total	297 (59)	127 (25)	3 (0.6)	6 (1.2)	27 (5)	42 (8)	502 (100)

[a]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia
[c]The definition provided is unrelated to the NDT; participant uses own assumptions rather than case study evidence; too much unrelated information provided; inaccurate and/or incorrect definition.

Table 5.11 presents all definitions provided by the practitioners for nine NDTs – the six most commonly selected NDTs and the four case-study-component NDTs (shaded) – compared with the IDNT definition. Some invalid definitions included evidence of participants confusing definitions with justifications by using signs and symptoms to define the NDTs. Some were incomplete, and some were so brief that they failed to impart the meaning of the NDT. On the other hand, despite the complexity of IDNT definitions such as 'Food medication interaction', some practitioners succeeded in providing valid alternative definitions. Appendix 5 provides a complete list of all definitions for all NDTs provided by all practitioners.

Table 5.11 Practitioners' definitions of nine NTDs (six most commonly selected by practitioners and four case study components[a]) compared with the IDNT definition

NDT[b] [code]	[c]IDNT definition	Valid alternative definitions	Invalid definitions
• Inadequate energy intake [NI-1.4]	• Energy intake that is less than energy expenditure, established reference standards, or recommendations based on physiological needs. Exception: when the goal is weight loss or during end of life care.	• Energy intake not meet the requirement compared to established reference standard • Ingestion of kcals less than the requirement amount according to weight loss and needs • Insufficient calorie intake compared to actual calorie requirement • Kcal taken in are lower than the kcal body needs	• Change in oral intake now inadequate to maintain weight within healthy weight range for height, AEB clothing now loose compared to a few months ago and weight down 10kg from usual weight and few years ago • Intake of macronutrient are not sufficient for daily requirement • Low body weight (current BMI=17.3) even at 65 kg, he was slightly 'built' with a BMI 20.5 • Oral food/beverage intake inadequate to maintain body weight at levels prior to diagnosis and illness
• Increased nutrient needs (specify) [NI-5.1]	• Increased need for a specific nutrient compared to established reference standards or recommendations based on physiological needs	• Increased nutrient needs of protein and energy - body requires more nutrients to achieve optimal health / recovery from medical condition • Increased caloric and protein requirements compared to healthy person, his age, weight and height	• Patient requires supplementation secondary to diagnosed deficiency in iron • Requires increased protein, energy and iron
• Chewing (masticatory) difficulty [NC-1.2]	• Impaired ability to bite or chew food in preparation for swallowing	• Difficulty chewing, moistening, 'breaking down' and orally managing food bolus. • Difficulty in adequately breaking down food by mouth for transfer to stomach • Not able to chew food properly	• Difficulty consuming adequate oral intake due to oral problems • Impaired saliva production (dry mouth) could make chewing prolonged and difficult

NDT[b] [code]	[c]IDNT definition	Valid alternative definitions	Invalid definitions
• Food medication interaction • [NC-2.3]	• Undesirable/harmful interaction (s) between food and over the counter (OTC) medications, prescribed medications, herbals, botanicals, and/or dietary supplements that diminishes, enhances, or alters effect of nutrients and/or medications	• Food intake or absorption affected adversely by one or more medications • Side effect or interaction from a treatment or medication that influences food intake	• NA
• Involuntary weight loss • [NC-3.2]	• Decrease in body weight that is not planned or desired	• Loss of body weight without a conscious effort to do so • Reduced body weight resulting from undesired side effects, environmental factors or idiopathic reasons, but which was undesired or unrequired • The patient has not been actively trying to lose weight through conscious calorie restriction or conscious increased energy expenditure • Unintentional loss of weight of more than 5% • Unintentional or unplanned weight loss usually over a specified time period • Unplanned or unintended weight loss • Weight loss has occurred independent of person consciously trying to lose weight	• Involuntary weight loss > 7.5% over several months • Involuntary weight loss with low body weight compared with usual or desired weight loss • Large weight loss with weight loss greater than recommended levels • Losing weight rapidly in very short time period as compared to established reference recommendation • Loss of body weight without or lack of lifestyle intervention • Loss of weight more than 6 kg in 3 months • Loss of weight unintentionally by decreased intake / cancer • Unintentional weight loss related to anorexia, xerostomia, cancer cachexia, dysgeusia, polypharmacy, lack of desire and skills to obtain and prepare meals leading to low energy protein intake
		• Weight loss that is not due to deliberate primary increase exercise and or reduced intake • Involuntary weight loss: loss of weight	• Weight loss of 10 kg from usual weight of 65kg (>10% of usual weight) • Weight loss over past few months possibly due to increased energy requirement during

NDT[b] [code]	[c]IDNT definition	Valid alternative definitions	Invalid definitions
		as a consequence of unintentional dietary changes or hyper metabolism RT conditions	radiotherapy • Weight loss without intentional nutrient reduced intake
• Underweight • [NC-3.1]	• Low body weight compared to established reference standards or recommendations	• BMI less than recommended reference standard	• Involuntary weight loss • Involuntary weight loss reported • Unintentional weight loss e.g.: ~5% and low body weight
• Impaired ability to prepare foods/meals • [NB-2.4]	• Cognitive or physical impairment that prevents preparation of foods/meals	• Lack of knowledge or low function to prepare meals	• Cannot prepare meals - sick due to treatment • Difficulties to prepare adequate nutritional foods • Food preparation problems • Impaired ability to cook meals that have variety • Impaired ability to prepare foods / meals: has deficient skills or abilities that are required to produce an appropriate diet for his needs • Impaired ability to prepare foods/ meals as observed and documented to meet nutritional requirements each day • Impaired ability to prepare meals then lack of ready access to food, fatigue, loss of interest in food • Inability to prepare suitable and nutritious foods • Lack of preparation skills • Lack of skills or capability to purchase food and cook/ prepare meals • Limited cooking skills • Not able to obtain and or prepare adequate amount or variety of food • Reduced capability to shop for and prepare recommended foods • There are no skill and ability to prepare foods

NDT[b] [code]	[c]IDNT definition	Valid alternative definitions	Invalid definitions
			• Unable or impaired ability to prepare meals due to a disability or lack of cooking skills • Unable to meet requirements of a healthy balanced diet due to poor food preparation skills
• [d]Inadequate mineral intake (specify) • [NI-55.1]/[NI-5.10.1]	• Lower intake of mineral-containing foods or substances compared to established reference standards or recommendations based on physiological needs	• Consumption of mineral does not meet requirements • Reduced ingestion of food containing iron	• Current oral intake provides inadequate amount of iron to maintain serum iron level within normal range • inadequate intake of iron due to inadequate intake of sufficient food as supplemental sources of the mineral • Patient is anaemic (non-illness related) or has low iron as diagnosed by iron-studies pathology • Poor food intake and lack of interest in selection, preparation and cooking may lead to anaemia • Suboptimal intake of a mineral needed to perform essential bodily functions

[a]Case study components in shaded area, [b]Nutrition diagnostic term [c](ADA, 2008) [d]The code for this Nutrition Diagnosis has changed from [NI-55.1] (ADA, 2006) to [NI-5.10.1] (ADA, 2008)

5.4 PRACTITIONERS' JUSTIFICATIONS FOR NDTS

Practitioners were asked to justify their NDT selections. Justifications were analysed thematically and classified as either valid (25%), partially valid (45%) or invalid (30%) (Table 5.12).

Table 5.12 Validity of practitioners' justifications for their selected NDTs

Category of justification	Country[a] [n (%)]						Total
	AU	CA	UK	US	NZ	MY	(%)
Valid[b]	76 (26)	38 (30)	0 (0)	2 (33)	6 (22)	16 (38)	168 (25)
Partially valid[c]	142 (48)	48 (38)	2 (67)	4 (67)	9 (33)	8 (19)	300 (45)
Invalid[d]	78 (26)	41 (32)	1 (33)	0 (0)	12 (44)	18 (43)	203 (30)
Total	296 (44.1)	127 (18.9)	3 (0.4)	6 (0.9)	27 (4)	42 (6.3)	671 (100)

[a]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia
[b]Must come from information provided in the case study and symptoms must match those in the IDNT list
[c] Provides valid justification for a non-case-component NDT
Mixed symptoms and information from case study and making own assumption which similar to.
[d]Includes none of the information provided in the case study and no symptoms that match those in the IDNT list

Table 5.13 presents all justifications provided by practitioners for nine NDTs. Valid justifications showed evidence of application of etiology and signs and symptoms to support the selection of NDTs. Partially valid justifications may have used only etiology or signs or symptoms to support the NDTs, or may have referred to NDTs other than case study components. The perceived similarity between 'Inadequate energy intake' and 'Inadequate food/beverage intake' was again evident in that practitioners who selected either of these NDTs tended to use the same signs and symptoms to justify them. Invalid justifications did not demonstrate application of evidence from etiology and defining characteristics. Appendix 5 provides a complete list of all justifications for all NDTs selected by all participants.

Table 5.13 Valid, partially valid and invalid justifications provided by participants for nine NDTs (six most commonly selected by practitioners and four case study components[a])

NDT[b] [code]	Valid	Partially valid	Invalid
• Inadequate energy intake [NI-1.4]	• Decreased calorie intake RT increased requirements (cancer), and impaired ability to shop for and prepare food AEB weight loss, infrequent shopping and preparation of only quick, simple meals • Inadequate energy intake related to reduce appetite, GI symptoms and poor health AEB estimated intake 4000-6000kJ vs estimated needs 6500-8500kJ • Inadequate energy intake related to poor taste, dry mouth, poor cooking skills, fatigue and constipation, AEB diet history results of 4000-6000 KJ/day and reported weight loss • Inadequate energy intake RT low appetite from XRT side effects AEB estimated energy intake (4-6MJ) compared to estimated requirements (7-8MJ) and recent weight loss	• Evidenced by 4000-6000 kJ intake, combined with recent weight loss • Inadequate energy intake RT loss of appetite / taste and nausea, AEB loss of weight • Intake of 4000-6000 kJ /day is less than calculated requirements resulting unplanned weight loss • related to eating difficulties AEB diet history, lack of energy, anaemia • Low energy intake related to lack of interest and not adept at cooking AEB low intake	• In this patient's case, appropriate energy intake is important for the disease treatment & ultimately optimal health outcomes • Inadequate intake related to loss of appetite and decreased food preparation • Related to xerostomia, limited cooking skills and lack of interest to eat, appetite and constipation affecting appetite • Usual weight 65kg, patient reports his clothes feel looser, scales indicate 10 kg loss over past few years

[a]Case study components in shaded area, [b]Nutrition diagnostic term, *RT = related to, AEB = as evidenced by

NDT[b] [code]	Valid	Partially valid	Invalid
• Increased nutrient needs (specify) [NI-5.1]	• Doctor said he was anaemic, started iron supplements. Low calorie diet = low bioavailability, cancer = increased nutrient needs • Increase nutrient as evidenced by anaemia	• Has cancer and undergoing radiotherapy, therefore body requires more protein and energy for recovery	• Due to therapy for pharyngeal cancer, poor appetite • Increased caloric and protein requirements RT cancer AEB Harris-Benedict x Activity Factor X Stress Factor
	• Increased nutrient needs for iron related to chemotherapy AEB presence of anaemia • Weight loss due to cancer radiation treatment, suggested diagnosed anaemic by doctor. Iron supplements, poor food intake and perhaps lack of fluid lead to constipation	• Patient's body is fighting cancer, therefore the patients body is in increase state and metabolic requirements, have increase, [sic] burning more energy and using protein in immune process • Related to weight loss (calculated TBW past few months)	• Increased nutrient needs to recovery from illness AEB ongoing medical treatments • Insufficient food intake, losing appetite, went through cancer and radiation therapy, need more different nutrients • Intake of 4000-6000 KJ/day would likely not be adequate enough to meet recommendations
• Chewing (masticatory) difficulty [NC-1.2]	• Chewing difficulty related to radiation therapy AEB symptoms of tastelessness, 'like eating cardboard' and dryness in his mouth • Chewing difficulty RT dry mouth AEB difficulties reported with eating • Dryness in mouth related to radiation treatment as evidenced by food being tasteless. • Reported difficulties in eating as indicated by reported dry mouth • Patient reported of food being 'tasteless' and 'like cardboard' due to mouth dryness	• Chewing difficulties related to dry mouth and fatigue AEB varied intake dependent on how he is feeling • Due to radiation therapy • Patient reports dry mouth and difficulty chewing food • States foods are tasteless and 'like eating cardboard' • Provided in case history and diagnosis of pharyngeal cancer and radiotherapy side effects	• No desire to eat secondary to poor taste

[a]Case study components in shaded area, [b]Nutrition diagnostic term, *RT = related to, AEB = as evidenced by

NDT[b] [code]	Valid	Partially valid	Invalid
• Food medication interaction [NC-2.3]	• Food-drug interactions, related to polypharmacy AEB possible side effects of nausea, dry mouth decreased appetite, constipation • Reports constipation, dry mouth, has anaemia / fatigue, polypharmacy (6 meds), loss of taste for food	• 6 types of medication, combined with radiation therapy side effects from treatment may impair intake • Evidence by polypharmacy (6 types of medications) • Food medication interaction related to oral medications and radiation therapy AEB decreased taste ability / perceptions • Increased or reduce appetite due to medication, increase or decreased need of certain nutrient due to malabsorption after medication • Number of medications - 6 types per day and radiation therapy causing nausea & perhaps loss of appetite, deceased sensory - i.e. taste	• Mouth dryness
• Involuntary weight loss [NC-3.2]	• Involuntary weight loss related to decreased oral intake AEB loose clothing and 10kg weight loss over past few years • Involuntary weight loss related to low food intake AEB weight loss of >15 over several months • Involuntary weight loss related to difficulty in eating and general loss of appetite AEB several kg weight loss in the last few months	• 10 kg weight loss caused by low interest in food and by his inability to manage this aspect of self care • 15 (10kg) weight loss from usual body weight • 15 loss of body weight (not just due to cancer) • 15 kg weight loss from usual body weight last few years. More severe weight loss / cloth [sic] sizes reduce last few months	• Continues to lose weight (vs. stabilisation) • Doesn't try to lose weight but has just noticed occurrence • Related to low oral intake and poor appetite AEB low caloric intake and gradual weight loss • Related to physical difficulties with eating and lack of motivation

aCase study components in shaded area, bNutrition diagnostic term, *RT = related to, AEB = as evidenced by

NDT[b] [code]	Valid	Partially valid	Invalid
	• Involuntary weight loss RT inadequate energy intake AEB significantly reduced body weight and looser clothing • Weight loss related to inadequate oral intake AEB weight loss of several kg over several months / or by 10 kg weight loss over past few years	• AEB weight loss of 10kg and lack of interest in eating and finds food tasteless	• Underweight as evidenced by BMI • Underweight related to loss of appetite, loss of motivation to eat, to limited access to food AEB BMI <18.5kgm-2
• Inadequate oral food/beverage intake [NI-2.1]	• Inadequate oral food / beverage intake due to nausea, general loss of appetite, no motivation to eat, fatigue and dryness in his mouth AEB weight loss 10kg • Inadequate oral food / beverage intake related to nausea from cancer treatment AEB a diet history of 4000-6000 KJ • Inadequate oral food / beverage intake RT impaired ability to prepare foods / meals/ limited access to food and food and nutrition related knowledge deficit AEB underweight • Inadequate oral food/beverage intake related to decreased taste and appetite AEB stated tasteless foods/like cardboard, only shops once per weeks, live alone, limited cooking skills, weight loss, BMI<19,energy intake < than calculated bodily needs, nausea	• Inadequate intake of food related to decrease taste, nausea and appetite as evidenced by estimated oral intake 4000-6000kJ /day • Inadequate oral intake RT loss of appetite/ taste and nausea, AEB loss of weight • Inadequate oral intake RT low motivation to eat AEB estimated reported energy intake • Intake is inadequate as evidence by weight loss and difficulties with intake • Limited oral intake related to reduced appetite AEB 4000-6000kJ daily intake	• Contribute to weight loss and fatigue and constipation due to low energy intake that the body has low metabolic rate • Difficulties in eating, lost appetite • Evidenced by low kJ intake 4000-6000 kJ/day • Inadequate intake of fluid relates to the dryness of his mouth and lack of taste in food • Polypharmacy, patient description and self-monitoring weight loss • Whilst patient is unable to cook/consume food, nutrient needs will not be met

[a]Case study components in shaded area, [b]Nutrition diagnostic term, *RT = related to, AEB = as evidenced by

NDT[b] [code]	Valid	Partially valid	Invalid
• Underweight [NC-3.1]	• 5% unintentional weight loss related to inadequate intake not meeting elevated requirement AEB loss few kgs 9~5) and BMI < 18.5) • Below ideal weight and usual weight with low energy intake and BMI 17.5 and unplanned weight loss • Underweight related to long term low kJ intake as evidence by BMI 17kgm-2 • Underweight related to decreased energy intake AEB BMI < 18.5kgm-2 • Underweight related to inadequate dietary intake AEB recent weight loss and a BMI of 17.36 kgm^{-2}	• BMI < 18kg/m2 • BMI 15.45 reports not feeling like eating • BMI of 17.4 kgm-2 compared to reference of 22-27 kgm-2 • Current BMI is 17.3 which is less than recommended range of BMI 18.5 - 24.9 kg-2 • Underweight as BMI is 17.3 kgm-2 when compared to 18.5 cut off	• 10 kg weight loss and eating difficulties reported • BMI was shown to be lower range • Provided by history symptoms of nausea, vomiting during radiotherapy treatment • A result of cancer, increase energy demands but low energy intake • Inadequate energy intake, reduce appetite, nausea, constipation, fatigue, lack of interest for food, taste changes
• Impaired ability to prepare foods/meals [NB-2.4]	• Impaired ability to prepare food/meals related to functional deficits AEB fatigue and general poor health • Impaired ability to prepare foods / meals RT lack of skills, interest and energy AEB mainly eating simple quick meals and inadequate oral intake. • Limited skills and ability to prepare meals AEB reduced kJ intake • RT living alone and fatigue AEB weight loss and low energy intake	• Does not do his own shopping AEB him being tired and fatigued and due to his general poor health • Impaired ability to prepare meals due to fatigue and lack of cooking skills • Impaired food preparation RT loss of spouse, poor skills, lack of interest and lack of energy • Inability to prepare / get foods RT fatigue, lack of knowledge and lack of motivation • Poor health limit shopping, lack of interest / experience	• Before his wife passed away, she is the one doing all the cooking • Can only prepare simple meals secondary to poor skills and motivation • He has lack of interest in cooking and really not adept at it • His wife looked after the food preparation before she passed away. Not adept to cooking and lack of interest • Client has poor cooking skills as evidenced by his self reports

[a]Case study components in shaded area, [b]Nutrition diagnostic term, *RT = related to, AEB = as evidenced by

NDT[b] [code]	Valid	Partially valid	Invalid
• [c]Inadequate mineral intake (specify) • [NI-55.1/ NI-5.10.1]	• Inadequate ferum intake related to decreased food intake AEB anaemia • Inadequate iron intake RT overall poor oral intake AEB anaemia and fatigue • Inadequate mineral intake RT inadequate oral food / beverage intake and food medication interaction & AEB anaemia / nausea • low iron intake related to overall inadequate food intake AEB prescription of iron supplements (assuming that physician did full anaemia work-up) • Related to poor p.o and possibly disease state AEB diagnosis of anemia	• AEB diagnosis of anaemia and physician prescribed iron supplements • Client has low iron levels as evidenced by report from GP • Iron deficiency related to limited iron-rich foods AEB anaemia • On ferum supplements, poor oral intake, quick simple meals. Fatigue • Start to take iron supplement due to insufficient iron intake in his current diet	• Evidenced by weight loss, low appetite secondary to taste changes and dryness in mouth. Dietary intake only 4000-6000kJ /day • Requires support of iron rich foods, thus could also be achieved by dietary intake and nutritional supplements. Iron carries O2 around body and will omit with increase energy level

[a]Case study components in shaded area, [b]Nutrition diagnostic term, [c]The code for this Nutrition Diagnosis has changed from [NI-55.1] (ADA, 2006) to [NI-5.10.1] (ADA, 2008)
*RT = related to, AEB = as evidenced by

5.5 PRACTITIONERS' RANKINGS OF NDTS

Practitioners who selected more than one NDT were required to rank the diagnoses based on nutrition management priority. Table 5.14 presents the four NDTs most commonly ranked first, second or third in order of nutritional management priority.

Table 5.14 Participant-selected NDTs most commonly ranked 1-3 in nutritional management priority

	Ranking [n (%)]			
NDT	1	2	3	(%agreement)
Inadequate energy intake [NI-1.4]	28 (33)	10 (12)	10 (12)	48 (57)
Inadequate oral food/beverage intake [NI-2.1]	11 (13)	18 (21)	8 (10)	37 (44)
Involuntary weight loss [NC-3.2]	16 (19)	10 (12)	11 (13)	37 (44)
Underweight [NC-3.1]	10 (12)	12 (14)	3 (4)	25 (29)

The three NDTs most commonly ranked 1-3 were 'Inadequate energy intake,' 'Inadequate oral food/beverage intake' and 'Involuntary weight loss.' The only case-study-component NDT in this list – 'Inadequate energy intake' – was ranked as first priority by 33% of practitioners, as second priority by 12% and as third priority by 12%.

5.6 EFFECT OF EXPERIENCE

Whether or not practitioners' declared they had experience with Nutrition Diagnosis (Table 5.5) was cross-tabulated with correct/incorrect NDT identification (Table 5.15). More than 80% of NDTs identified by practitioners who reported that they had some experience and those who reported had no experience with Nutrition Diagnosis were incorrect. However, when compared within those practitioners who identified correct NDTs, it was evident that participants who claimed to have some experience with Nutrition Diagnosis were no more likely to correctly identify NDTs

than those with no experience (χ^2=0.045, p=0.831). Also, there was no significant difference in correctness of NDT identification between those practitioners who reported making formal Nutrition Diagnosis in the medical record as part of their current practice and those who did not (χ^2=3.034, p=0.386). These findings indicate that the self-reporting of experience with Nutrition Diagnosis did not reflect understanding of the concept and was therefore not a reliable indicator of current practice of Nutrition Diagnosis.

Table 5.15 Cross-tabulation of practitioners' nominated level of experience with Nutrition Diagnosis and correct[a]/incorrect[b] NDT identification

	NDT Identification [n (%)]	
	Correct (n=80)	Incorrect (n=418)
[c]Experience with Nutrition Diagnosis:		
Some experience (n=372)	59 (16)	313 (84)
No experience (n=126)	21 (17)	105 (83)
[d]Make formal Nutrition Diagnosis in the medical record as part of current practice:		
Yes, at least occasionally (n=357)	58 (16)	299 (84)
No (n=103)	18 (17)	85 (83)
Other (n=38)	4 (11)	34 (89)

[a]At least one of the four case-study-component NDTs was selected
[b]No case-study-component NDTs were selected
[c]χ^2=0.045, p=0.831
[d]χ^2=3.034, p=0.386

Table 5.16 presents a comparison of various characteristics of the NDTs selected by practitioners cross-tabulated with three categories of years of experience with MNT. The mean (± SD) numbers of NDTs identified by practitioners with ≤10 years, 11-20 years and more than 20 years of experience were 5.94 ± 2.05, 6.32 ± 2.54 and 5.50 ± 2.94, respectively. There was no significant difference between practitioners with different levels of experience from Australia, Canada and Other Countries (one-way ANOVA, F=0.464, p=0.630), indicating that years of experience did not influence the number of NDTs identified.

Table 5.16 Characteristics of NDTs selected by practitioners of three levels of MNT experience

NDT characteristics	Level of experience		
	≤10 years (n=51)	11-20 years (n=19)	>20 years (n=12)
Mean total number of NDT identified:			
Mean[a] (±SD)	5.94 ± 2.05	6.32 ± 2.54	5.50 ± 2.94
Classification of NDT[b] [n (%)]:			
Correct	49 (16)	19 (16)	10 (15)
Incorrect	254 (84)	101 (84)	56 (85)
Total	303 (100)	120 (100)	66 (100)
Category of definition[c] [n (%[d])]:			
Similar to ADA (n=151)	111 (37)	23 (19)	17 (26)
Acceptable alternative to ADA (n=57)	41(14)	11 (9)	5 (8)
NDT used as the definition (n=141)	64 (21)	49 (41)	28 (42)
Invalid[e] (n=140)	87 (29)	37 (31)	16 (24)
Total (N=489)	303 (100)	120 (100)	66 (100)
Category of justification[f] [n (%[g])]:			
Valid[h] (n=132)	91 (30)	21 (18)	20 (30)
Partially valid[i] (n=210)	127 (42)	55 (46)	28 (43)
Invalid[j] (n=146)	84 (28)	44 (37)	18 (27)
Total (N=488)	302 (100)	120 (100)	66 (100)
Ranking: Based on domain of NDTs most commonly ranked 1-3[k] [n (%[l])]:			
Intake (n=124)	77 (51)	31 (54)	16 (50)
Clinical & Behavioral-Environmental (n=116)	74 (49)	26(46)	16(50)
Total (N=240)	151 (100)	57 (100)	32 (100)

[a]One-way ANOVA: (F=0.464, p=0.630), [b]χ2=0.044, df=2, p=0.978, [c]χ2=28.753, df=6, p=0.000,
[d] % calculated based on total number of definitions provided from each level of experience category
[e]The definition provided is unrelated to the NDT; participant uses own assumptions rather than case study evidence; too much unrelated information provided; inaccurate and/or incorrect definition
[f]χ2=8.085, df=4, p=0.089,
[g]% calculated based on total number of justifications provided from each level of experience category
[h]Must come from information provided in the case study and symptoms must match those in the IDNT list
[i] Provides valid justification for a non-case-component NDT
[j]Includes none of the information provided in the case study and no symptoms that match those in the IDNT list
[k]χ2=0.232, df=2, p=0.891
[l]% calculated based on total number of top three NDTs from each level of experience category

More than 80% of the NDTs identified by practitioners from all levels of experience were incorrect. Chi square analysis revealed no significant difference between identification of correct NDTs and the three experience levels (χ^2=0.044, df=2, p=0.978), suggesting that the nutrition diagnostic process is highly theoretical and not influenced by years of experience.

An association between level of experience and categories of definitions provided was found (χ^2=28.753, df=6, p=0.000). Thirty-seven percent of valid similar-to-IDNT definitions were provided by practitioners with 10 or fewer years of experience; practitioners with 11-20 years experience and more than 20 years experience provided 19% and 26% of similar-to-IDNT definitions, respectively. Similarly, 14% of valid alternative definitions were provided by practitioners with 10

or fewer years of experience; practitioners with 11-20 years and more than 20 years experience provided only 9% and 8% of valid alternative definitions, respectively. Thus less-experienced participant practitioners (≤10 years) were more likely to define NDTs correctly than those with more experience (>10 years) whereas the more-experienced practitioners were more likely to use the NDT as the definition.

Thirty percent of all justifications provided by practitioners with 10 or fewer years of experience and more than 20 years experience were valid, compared to only 18% of justifications provided by practitioners with 11-20 years experience. More than 40% of the justifications provided by practitioners from all experience levels were deemed partially valid. There were no significant differences in categories of justifications provided by practitioners from different levels of experience (χ^2=8.085, df=4, p=0.089), suggesting that practitioners at all levels of experience made assumptions about the case study rather than rely solely on the evidence provided to justify NDTs selected.

Half of the participant-selected NDTs that were ranked 1-3 in priority of nutrition management were from the Intake domain. There was no significant difference in ranking of NDTs based on any particular domain by practitioners with different levels of experience (χ^2=0.232, df=2, p=0.891).

5.7 COMPARISON OF AUSTRALIAN PRACTITIONERS AND STUDENTS

The mean, range and median number of NDTs selected by the Australian subsample of practitioner participants and the sample of dietetics students are presented in Table 5.17. Practitioners identified a higher number of NDTs (6.32 ± 2.30) than students (4.76 ± 1.57) (one-way ANOVA, F=12.443, p=0.001), but the ranges and medians were similar.

Table 5.17 Mean, range and median number of NDTs selected by Australian practitioners and students

Results	Practitioners (n=47)	Students (n=37)	Total
Number of NDTs:			
[a]Mean (±SD)	6.32 ± 2.30	4.76 ± 1.57	5.63 ± 2.15
Range	1-11	2-10	1-11
Median	6	5	5

[a]One-way ANOVA: F=12.443, p=0.001

Table 5.18 presents the six NDTs most commonly selected by Australian dietetics practitioners and students. While the same NDTs featured in both samples' top six, there were differences in percentage agreement for each NDT. The majority of practitioners (74%) selected 'Involuntary weight loss' and/or 'Inadequate oral food/beverage intake' (68%). The students selected 'Inadequate energy intake' (51%), 'Inadequate oral food/beverage intake' (51%) and/or 'Underweight' (49%) as the NDTs most relevant to the case study. One of the NDTs most commonly selected by students (51%) was a case-study-component NDT – 'Inadequate energy intake'. In contrast, 'Inadequate energy intake' was the practitioners' fourth most commonly selected NDT.

Table 5.18 Six NDTs most commonly selected by Australian practitioners and students

	[n (% agreement[a])]		
NDT [code]	Practitioners	Students	Total
Involuntary weight loss [NC-3.2]	35 (74)	16 (43)	51 (61)
Inadequate oral food/beverage intake [NI-2.1]	32 (68)	19 (51)	51 (61)
Underweight [NC-3.1]	28 (60)	18 (49)	46 (55)
[b]Inadequate energy intake [NI-1.4]	27 (57)	19 (51)	43 (51)
Impaired ability to prepare foods/meals [NB-2.4]	25 (53)	13 (35)	38 (45)
Inadequate mineral intake (specify) [NI-55.1]	23 (49)	9 (24)	32 (38)

[a]Percentage agreement calculated as the total number of participants who chose each NDT divided by the total number of practitioners (n=47) and students (n=37)
[b]One of the four case-study-component NDTs

Table 5.19 shows the frequency and percentage agreement of the four case-study-component NDTs correctly identified by Australian practitioners and students. More than 80% of the NDTs selected by practitioners and students were not case-study-component NDTs. Thirty-two percent of practitioners and only 5% of students selected 'Chewing difficulty,' while 24% of students and only 6% of practitioners selected 'Food medication interaction.' Overall, these results indicate that practitioners were no more or less adept than students at identifying correct NDTs using the evidence provided.

Table 5.19 The four case-study-component NDTs correctly identified by Australian practitioners and students

	[n (% agreement[a])]		
NDT[a] [code]	Practitioners	Students	Total
Inadequate energy intake [NI-1.4]	27 (57)	19 (51)	46 (55)
Increased nutrient needs [NI-5.1]	5 (11)	3 (8)	8 (10)
Chewing difficulty [NC-1.2]	15 (32)	2 (5)	17 (20)
Food medication interaction [NC-2.3]	3 (6)	9 (24)	12 (14)
Other diagnoses	249 (83)	143 (81)	417 (84)

[a]Case-study-component NDTs in shaded area

Table 5.20 presents various characteristics of the NDTs selected by Australian practitioners and students. There was no significant difference in selection of correct and incorrect NDTs between Australian practitioners and students (χ^2=0.280, p=0.597).

Table 5.20 Characteristics of NDTs selected by Australian practitioners and students

	[n (%)]		
NDT characteristics	Practitioners (n=47)	Students (n=37)	Total[d] (n=84)
Classification of NDT[a]:			
Correct[b]	50 (17)	33 (19)	83 (18)
Incorrect[c]	247 (83)	143 (81)	390 (82)
Total	297 (100)	176 (100)	473 (100)
Category of definition[d]:			
Similar to ADA	84 (28)	47 (27)	131 (28)
Acceptable alternative to ADA	28 (9)	26 (15)	54 (11)
NDT used as the definition	96 (32)	26 (15)	122 (26)
Invalid[f]	89 (30)	77 (44)	166 (35)
Total	297 (100)	176 (100)	473 (100)
Category of justifications[e]:			
Valid	76(26)	30 (18)	106(23)
Partially valid	142(48)	87 (51)	229 (49)
Invalid[g]	78(26)	53 (31)	131(28)
Total	*296 (100)	**170 (100)	466 (100)

[a]χ^2=0.280, p=0.597, [b]At least one of the four case-study-component NDTs was selected
[c]No case-study-component NDTs were selected, [d]χ^2=22.045, df=3, p=0.000
[e]χ^2=4.180, df=2, p=0.0124, *1 missing case, **6 missing case
[f]The definition provided is unrelated to the NDT; participant uses own assumptions rather than case study evidence; too much unrelated information provided; inaccurate and/or incorrect definition
[g]Includes none of the information provided in the case study and no symptoms that match those in the IDNT list

Twenty percent of definitions provided by practitioners and 27% of definitions provided by students were valid similar-to-IDNT definitions. Nine percent of practitioners' definitions were valid acceptable alternatives compared to 15% of students' definitions. More practitioners than students used diagnostic terms as definitions, whereas students were more likely to provide other types of invalid definitions (χ^2=22.045, df=3, p=0.000).

Twenty-six percent of justifications provided by practitioners and 18% provided by students were valid. Forty-eight percent of justifications provided by practitioners and 51% of justifications provided by students were partially valid. None of these differences were statistically significant (χ^2=4.180, df=2, p=0.0124).

Table 5.21 compares the NDTs ranked as first, second or third in order of nutritional management priority by practitioners and students. The NDT most commonly ranked 1-3 was the case-study-component NDT, 'Inadequate energy intake,' by 53% of practitioners and 46% of students. Nearly half of the practitioners (49%) ranked 'Inadequate oral food/beverage intake' as first, second or third priority and 46% of students ranked 'Underweight' in the top three. More

practitioners (45%) than students (27%) gave priority to 'Involuntary weight loss,' while more students (46%) than practitioners (36%) gave priority to 'Underweight.' Two NDTs from the Intake domain – 'Inadequate energy intake' and 'Inadequate oral food/beverage intake' – were ranked 1-3.

Table 5.21 NDTs most commonly ranked 1-3 in nutrition management priority by Australian practitioners and students

NDT [code]	Practitioners	Students
Inadequate energy intake [NI-1.4]	25 (53)	17(46)
Inadequate oral food/beverage intake [NI-2.1]	23 (49)	16 (43)
Involuntary weight loss [NC-3.2]	21 (45)	10 (27)
Underweight [NC-3.1]	17 (36)	17 (46)

5.8 SUMMARY

This chapter presented the results of the 'Content Validation of Nutrition Diagnoses' survey. The findings suggest that, regardless of country of practice or years of experience, practitioner participants were unable to accurately identify, define and justify NDTs in response to a hypothetical case study constructed around four NDTs. Experienced clinical dietetics practitioners were no more or less adept at correct NDT identification than students who had received instruction on NCP and standardised Nutrition Diagnosis. The following chapter will discuss these results in the context of the study's research questions and with reference to the body of literature.

Chapter 6

Standardised Nutrition Diagnosis Survey (Phase 2): Discussion

This chapter discusses the findings of the Phase 2 'Content Validation of Nutrition Diagnoses' survey, and examines the results in relation to other relevant studies. Section 6.1 reflects on the profile of the survey participants. Section 6.2 focuses on participants' proficiency with SND in the context of the Phase 2 research questions posed in Chapter 1. Section 6.3 addresses the study's aim in considering issues that impact on the potential for international implementation of SND. Strengths and limitations of Phase 2 are outlined in Sections 6.4 and 6.5, respectively. The chapter concludes with a brief summary.

6.1 SURVEY PARTICIPANTS

Most of the survey's 85 clinical dietetics practitioner participants – from Australia, Canada, Malaysia, New Zealand, the United States and the United Kingdom – worked in urban inpatient practice settings with 'general' nutrition care responsibilities. Most held a Bachelor degree as their highest-level qualification, and most were highly experienced in clinical dietetics. By ADA's standards, most participant practitioners would be categorised as either 'beyond entry level' (3-7 years experience) or 'expert' practitioners with an advanced level of dietetics education and experience (O'Sullivan-Maillet & Howell, 2007).

The survey response rate was low (20%), suggesting that many practitioners found the questionnaire too difficult, complicated and/or time consuming. Indeed, some potential participants may have been intimidated or frustrated by the questionnaire; fifteen practitioners returned blank questionnaires, and five made comments about the complexity of the task. It can be speculated that the 85 practitioners who returned completed questionnaires were more confident in their ability to respond to the case study and were capable of providing responses of relatively high quality.

The relatively high Canadian response rate (40.7%) could indicate that the Dietitians of Canada representative who passed on information about the study was more successful in motivating practitioners to participate than her counterparts in the other countries. It could also reflect greater interest in, or perceived relevance of, the study among Canadian practitioners and/or greater confidence in

their ability to participate. The fact that participants from Canada were more experienced in MNT than Australian participants (Table 5.4) lends support to the latter explanation. It is possible that geographic proximity to the United States has resulted in more exposure to the NCP and the concept of standardised language for Canadian practitioners than Australian practitioners, and that this has influenced perceptions of relevance and confidence levels.

The 51% response rate for the dietetics student sample was also lower than expected. Even allowing for the different questionnaire administration circumstances at the two universities included in the sample, the fact that half of the potential student participants returned the questionnaires blank indicated that students also perceived the task as difficult. Although the students had received some instruction on the NCP and Nutrition Diagnosis, the concept of SND was not a formal component of the dietetics education program when this study was conducted.

6.2 PARTICIPANTS' PROFICIENCY WITH SND

6.2.1 Are clinical dietetics practitioners able to apply the Nutrition Diagnosis step of the NCP to correctly identify NDTs?

The first Phase 2 objective was *To compare the NDTs selected by clinical dietetics practitioners in response to a hypothetical case scenario with the ADA-standardised NDTs used to construct the case scenario*. Results revealed that the majority of participant practitioners were unable to identify the case-study-component NDTs (Tables 5.8 and 5.9). Of the 62 ADA terms available for selection by participants, 32 were chosen at least once, with no participants correctly identifying all four NDTs that applied to the case study.

The NDT most commonly selected by practitioners in response to the case study was 'Involuntary weight loss,' which was not one of the four case-study-component NDTs. Presumably, selection of this NDT was based on information in the case study relating to the patient's cancer diagnosis, his loose clothes and his weight loss over a few years. That more practitioners selected 'Involuntary weight loss' than 'Inadequate energy intake' draws attention to how the subtle differences

between NDTs can be overlooked. In this instance, correct NDT selection would require a participant to be cognisant that 'Inadequate energy intake' referred to a person losing weight due to low caloric intake, as expressed in the case study, and not due to a catabolic illness such as pharyngeal cancer resulting in weight loss despite an adequate intake of food. It is likely that the sheer number of NDT options (62) hampered this level of distinction between NDTs.

In dietetics practice, identification of the most relevant nutrition-related problem is crucial (Sandrick, 2002). Research in other health professions has emphasised how important making the correct diagnosis is for determining the therapy that will lead to better outcomes (Balint, Buchanan, & Dequeker, 2006; Carpenito-Moyet, 2008; Doenges & Moorhouse, 2008; Hamers, Abu-Saad, & Halfens, 1994; Hasegawa, Ogasawara, & Katz, 2007) Typically in medicine, physicians make a single diagnosis; similarly, in dietetics practice, dietitians generally treat only one diagnosis at any one time. While, in some circumstances, two or three diagnoses could be relevant for a patient, six or more would be impractical. The fact that 35% of participant practitioners selected more than six NDTs in response to the case study suggests that they had difficulty deciding on the most relevant diagnoses. Another factor to consider is that the number of NDTs selected could have been influenced by the questionnaire design. The case study instructions stated that more than one diagnosis could be provided; indeed, space was made available for ten NDTs with the option to attach an additional sheet if space was inadequate. Furthermore, participants were confronted, possibly for the first time, with 62 NDTs; this large number of options could have influenced a tendency to select diagnoses with no supporting evidence. Significantly, practitioners who selected more than six NDTs tended to use similar definitions and justifications to support different terms.

Practitioners' level of experience with MNT was demonstrated to have no impact on whether they correctly identified NDTs or on the number of terms they selected. This perhaps is not surprising as, during the period of data collection (November 2006 – December 2007), the concept of SND was new to dietetics practice. Similarly, Charney (2006), who investigated the reliability of the NDTs among registered dietitians at three levels of practice, found no difference in the total

number of NDTs selected and similar NDT-selection capability across all levels of practice.

Phase 2 hypothesis 1 – *Country of practice will have no effect on the number of NDTs practitioners nominate in response to the case study* was supported; no significant differences were found in the average number of NDTs selected by practitioners from different countries. Hypothesis 2 – *The majority of clinical dietetics practitioners from all surveyed countries will correctly identify NDTs relevant to the case study* – was rejected on the basis that most practitioners did not identify the case-study-component NDTs. Furthermore, no country's practitioners were any more proficient at correct NDT identification that any other. This resonates with the results of a study by Meyer and Gates (1993), who concluded that many dietitians have difficulty identifying nutrition-related problems.

Despite the general inability of participants to correctly identify the case-study-component NDTs and the large total number of NDTs nominated, there was some selection consistency evident in that 'Involuntary weight loss,' 'Inadequate energy intake,' 'Inadequate oral food/beverage intake' and 'Underweight' were each chosen by more than half of the practitioners as nutrition diagnoses relevant to the case study. However, only one of these diagnoses was accurate, suggesting insufficient reliance on case study evidence in the diagnostic process. This is consistent with research by Hutcheson et al. (2007) that found the three most frequently used NDTs were 'Inadequate oral food/beverage intake,' 'Underweight' and 'Involuntary weight loss.' Although the Hutcheson et al. (2007) study involved retrospective analysis of medical charts, the common identification of these three terms could indicate a tendency for some practitioners to diagnose nutrition-related problems based on routine practice and assumptions rather than evidence.

6.2.2 Are clinical dietetics practitioners able to define NDTs in language that is congruent with the ADA's standardised terminology?

The second Phase 2 objective was *to compare clinical dietetics practitioners' definitions of NDTs with the ADA's standardised definitions*. When participant practitioners were presented with the case study, but presumably were unfamiliar

with the ADA's NDT definitions, 31% of the NDT definitions they provided were written in a language congruent with the IDNT. A further 11% were acceptable alternative definitions. Therefore, the majority (58%) of definitions provided by participants were, for various reasons, deemed invalid. Consequently, hypothesis 3 – *The majority of clinical dietetics practitioners from all countries will be capable of defining NDTs in language that is congruent with the ADA's standardised terminology* – was rejected. Also, no country's practitioners were any more proficient at defining NDTs than any other.

Despite the rejection of hypothesis 3, the fact remains that more than a quarter of the NDT definitions provided by practitioners were similar to the ADA's. Assuming the practitioners did not refer to reference manual (ADA, 2005) while responding to the case study, this bodes well for implementation of SND beyond the United States. As the reference manual was first published in 2005 and was not easily obtainable in countries other than the USA, it was unlikely that many practitioners had access to it during the data collection phase of this study.

Many participants defined NDTs by referring to the diagnosis itself; for example, defining 'Underweight' as 'underweight.' Indeed, this was the most common type of invalid definition; more than 30% of NDTs were defined in this manner. Also, imprecision was responsible for considerable ambiguity and lack of differentiation between, for example, 'Malnutrition,' 'Underweight' and 'Inadequate energy intake'. Such inability to define NDTs can lead to misunderstanding of the terms, which can adversely affect diagnostic decision-making. Conversely, practitioners who understand the NDTs and their definitions are able to distinguish one diagnosis from another and reduce the incidence of misdiagnosis.

Level of experience in MNT was demonstrated to have an impact on whether participants provided valid or invalid definitions for the NDTs they selected. Practitioners with 10 or fewer years experience were more likely to provide valid NDT definitions than practitioners with more than 10 years experience. Explanations for this outcome include the possibility that relatively new practitioners were more open to the new concept of SND whereas the more-experienced practitioners were more resistant to change; also, it is possible that the more-

experienced practitioners were more unfamiliar with and intimidated by the examination-style of the questionnaire than practitioners who graduated relatively recently. The demonstrated difference is consistent with Mathieu et al. (2005), who found that less-experienced dietetics practitioners took less time to understand the Nutrition Diagnosis concept.

6.2.3 To what extent do clinical dietetics practitioners use evidence to justify their process of Nutrition Diagnosis?

The third Phase 2 objective was *To assess the extent of evidence-based practice in clinical dietetics practitioners' nutrition diagnostic process*. Analysis of the PES-format justifications participants provided for their selected NDTs revealed that most practitioners did not base their diagnostic decisions solely on evidence provided in the case study. Most practitioners made their own assumptions about the case, provided additional unrelated information and/or over-interpreted the information that was provided. Many practitioners did not demonstrate an ability to differentiate between the etiologies and the signs/symptoms for different NDTs. This is not surprising, considering the similarity of meaning, and overlapping of etiologies, signs and symptoms for some NDTs. For example, differences between the IDNT defining characteristics and etiologies for 'Inadequate energy intake' and 'Inadequate oral food/beverage intake' (ADA, 2009) are very subtle. Distinguishing between these two NDTs proved difficult for participants. In fact, the results demonstrated a tendency for practitioners to perceive these NDTs as interchangeable; while 84 of the 85 practitioners selected one of these NDTs, no practitioners selected both, and the same signs and symptoms were used to justify both. Hence the necessity for evaluation and validation of the ADA's NDTs, a position supported by Charney (2006), who also found that dietitians could not distinguish between these two terms.

Practitioners' level of experience in MNT was demonstrated to have no impact on whether they provided valid or invalid justifications for the NDTs they selected. This result conflicts with the finding of Byham-Gray et al. (2005) that more-experienced dietetics professionals were more likely to have negative attitudes to evidence-based practice. Evidence-based practice in Nutrition Diagnosis decision

making involves a systematic and analytical process of evaluating information (Byham-Gray et al., 2005; Laramee, 2005). It is likely that unfamiliarity with the PES statement format is largely responsible for the very limited amount of evidence-based practice demonstrated by this study's survey participants.

6.2.4 Are clinical dietetics practitioners able to appropriately rank NDTs based on priority in nutritional management?

The ability to prioritise NDTs requires application of critical thinking processes. To respond correctly to the case study, practitioners who selected NDTs from more than one domain needed to prioritise the Intake domain rather than the Clinical and Behavioural-Environmental domains (ADA, 2009). Most participant practitioners were able to correctly rank an NDT from the Intake domain as their first priority in response to the case study. However, the fact that some practitioners gave first-priority ranking to NDTs from other domains (e.g. 'Impaired ability to prepare foods/meals,' 'Involuntary weight loss' and 'Altered GI function') indicates that the ability to identify the most urgent nutrition-related problem is far from universal. This could have serious implications for dietetic practice. If, for example, a patient needs energy and a practitioner chooses to tackle a less urgent Nutrition Diagnosis, the outcome will be compromised.

Practitioners' level of experience in MNT was demonstrated to have no impact on their ability to appropriately rank NDTs. It appears that the concept of SND is difficult for practitioners of all experience levels to understand. Practitioners with vast experience were no more adept at implementing SND than their novice counterparts. Hypothesis 4 stated that *Level of MNT experience will have no effect on practitioners' ability to correctly identify, define, justify and rank NDTs.* Indeed, level of experience was found to have no effect on ability to correctly identify, justify and rank NDTs, but it did have an effect on their ability to define NDTs. Overall, it is likely that, as reported by Mathieu et al. (2005), whether a practitioner has a personality that is receptive to change will have more impact on the time they take to master the concept of Nutrition Diagnosis than their level of experience. Nevertheless, in the professions of medicine and nursing, research has demonstrated that length of experience in clinical practice does have a positive

influence on clinical reasoning and diagnostic skills (Doenges & Moorhouse, 2008; Groves, 2008; Hasegawa et al., 2007; Woolley, 1990).

6.2.5 Are Australian dietetics students who have been taught about the NCP and Nutrition Diagnosis more adept at identifying, defining, justifying and ranking NDTs than Australian clinical dietetics practitioners?

Survey results revealed that, overall, students were no more or less adept at identifying, defining, justifying and ranking NDTs using evidence provided in a case study than practitioners. However, practitioners did identify a higher number of NDTs than students, suggesting a greater tendency on the part of practitioners to use their own assumptions rather than evidence to support the selected NDTs. A case-study-component NDT – 'Inadequate energy intake' – was the NDT most commonly selected by students, whereas a non-case-study-component – 'Involuntary weight loss' – was the NDT most commonly selected by practitioners. Once again, this suggests that students were more likely to use evidence from the case study to support their NDT selection. Also, students were more likely to provide valid alternative definitions for NDTs. However, these differences were not statistically significant and, therefore, hypothesis 5 – *There is no difference between Australian dietetics students' and Australian clinical dietetics practitioners' ability to correctly identify, define, justify and rank NDTs* – was accepted.

This result implies that introducing SND through a series of university lectures and providing background material is inadequate to facilitate understanding and mastery of the concept. It is apparent that the concept is highly theoretical and that grasp of it is unlikely to be influenced by years of MNT experience. Even so, students with some theoretical exposure to Nutrition Diagnosis still struggled with correct application of it. This concurs with the results of research conducted in the United States where incorporation of SND has required a comprehensive approach involving lectures, case studies, assessment-diagnosis-intervention charts, mock counselling sessions (Campbell, Anderson, Larson, & Petty, 2007) and intensive in-service training (Mathieu et al., 2005; McCarthy, Pavlinac, & Ryan-Borchers, 2008; Mueller et al., 2008).

6.2.6 How can understanding of SND be facilitated for clinical dietetics practitioners and dietetics students?

The fourth Phase 2 objective was *to identify issues pertaining to improving clinical dietetics practitioners' and dietetics students' understanding of the concept of SND*. It is obvious from the survey results that most participant practitioners and students did not demonstrate a clear understanding of SND. The perceived difficulty of the task was reflected in, not only a general inability to accurately identify, define and justify NDTs, but also in the lack of response from practitioners who had previously indicated their interest in the study.

Introducing this new paradigm of dietetics practice in Australia and other countries will not be a simple process; provision of background reading material is obviously inadequate. Nearly five years after the ADA endorsed the NCP for incorporation into dietetics practice in the United States, there was evidence that dietetics practitioners still could not implement it (Jones & Danis, 2007). Since then, American research has indicated that registered dietitians do understand IDNT terminology and have validated the defining characteristics (Enrione, 2008). Nevertheless, American efforts to adopt Nutrition Diagnosis in dietetics practice have not been uniformly successful (see Table 2.3).

Clearly, it is imperative that issues that hamper practitioner understanding of SND terminology warrant urgent attention if the concept is to be adopted by the dietetics profession outside the United States. For example, the survey results indicate ambiguity surrounds some NDTs such as 'Inadequate energy intake' and 'Inadequate oral food/beverage intake,' which feature overlapping etiologies and defining characteristics. Further research is necessary to establish the major defining characteristics for these nutrition diagnoses and thereby remove ambiguity.

Some of the issues emerging from the findings of this study relate specifically to the way that dietetics education is structured. For many years, a 'cook book mentality' approach to outlining protocols in nutrition care has characterised dietetics education programs, where students are encouraged to follow a pre-determined set of actions in response to a set of issues. This was related to the

introduction of evidence-based practice, and was thought to be more rigorous by some educators. Moving from protocol-driven instruction to a method of instruction that foregrounds the nutrition diagnostic process of information gathering and evaluation, clinical judgement, critical thinking and clinical reasoning (Lacey, 2006; Oakland, 1997) involves significant adjustment. It is a new paradigm for many. This study has demonstrated that critical thinking and clinical reasoning, in terms of interpreting signs and symptoms, were inadequately applied in the process of identifying the most relevant NDTs. Clinical reasoning is the process of thinking and decision-making required to reach a diagnosis (Higgs, 2008). While not currently part of dietetics curricula, clinical reasoning is included in the curricula of medicine, nursing and occupational therapy (Banning, 2008; Higgs, 2008; Neistadt, 1996; Schell & Schell, 2008; van der Vleuten & Newbie, 1995). With the incorporation of Nutrition Diagnosis in the NCP, there is an opportunity and, indeed, an imperative to explore the clinical reasoning and critical thinking skills that need to be incorporated in dietetics education. Successful incorporation of SND in education will promote logical thinking processes and improve the critical thinking skills of students (Lacey, 2006). The dietetics curriculum should be continuously updated to keep pace with the evolution of dietetic knowledge (Lacey, 2006; Winterfeldt, Bogle, & Ebro, 2005)), and a systematic program of professional development should be implemented for dietetics practitioners.

6.3 POTENTIAL FOR INTERNATIONAL IMPLEMENTATION OF SND

Based on the answers to the research questions provided by the survey results, can the standardised language of Nutrition Diagnosis that was developed in the United States be incorporated into dietetics practice in Australia and other countries? It is apparent that several factors impact on the potential for international implementation of SND beyond America. These include lack of awareness and understanding of the NCP and SND, and the complexity of SND terminology. Phase 1 of this study revealed substantial inconsistency in the documentation of nutritional care by Australian clinical dietetics practitioners. Phase 2 demonstrated that practitioners with varying levels of MNT experience struggled with the complexity of SND terminology. Without doubt, the potential for successful implementation of SND hinges on the provision of adequate and

appropriate education and training. This is supported by evidence from the United States, where it has been reported that a series of SND training sessions has resulted in positive outcomes (Suen, 2008). Significantly, even dietitians practicing in the country responsible for the NCP and SND need to be familiar with the concept and how to apply it before they can implement it.

Collectively, survey participants, who were mostly from Australia and Canada, with small numbers from other countries (New Zealand, Malaysia, the United Kingdom and the United States), found the application of SND to a case study difficult and most did not demonstrate their ability to do it with any accuracy. No country's participant practitioners were any more adept at identifying, defining, justifying or ranking NDTs than any other, suggesting that the problem is universal and that no country is more prepared to incorporate SND in clinical practice than any other. Of relevance here is the nursing profession's experience that international differences in cultures and healthcare systems are confounding factors in the introduction of standardised language (Clark, Craft-Rosenberg, & Delaney, 2000; M. Müller-Staub, Lavin, Needham, & van Achterberg, 2007; Simpson, 2007; von Krogh, Dale, & Naden, 2005). In Japan, for example, the concept of nutrition diagnosis has been introduced with less emphasis on the word 'diagnosis' as this word is perceived as medically-related (Nakamura, 2008).

6.3.1 Challenges

The development of standardised language for Nutrition Diagnosis represents a paradigm shift for the dietetics profession. It requires change to current dietetics practice, including specific application of diagnostic reasoning and critical thinking skills during the provision of nutrition care. Consequently, there are likely to be obstacles to its acceptance. Turning the concept of SND into a reality of international dietetics practice presents huge challenges for the profession. It will be necessary for every dietetics practitioner to be at the forefront of dietetics practice and to embrace the new concept of SND. While willingness to change is one of the indicators for positive professional growth (Vaughan & Manning, 2004), undoubtedly there will be resistance to change from both inside and outside the profession. Such resistance is not uncommon in other health professions; some

nurses, for example, continue to resist using the standardised nursing diagnoses after more than 20 years of incorporation in practice (Carpenito-Moyet, 2008).

Change theory has identified stages of change as precontemplation, contemplation, preparation, action and maintenance (Molaison, 2002; Prochaska & DiClemente, 1982; Prochaska, DiClemente, & Norcross, 1992). From the results of this study, it can be speculated that most of the participant practitioners were at either the precontemplation or contemplation stage. Some practitioners were unaware of the concept of SND and, therefore, were unaware of a need to change their practice. Others may have recognised a need to change, but were unsure how to implement it.

In the United States, Mathieu et al. (2005) provided insight into the challenges of implementing Nutrition Diagnosis in acute-care hospitals. They identified challenges relating to the change in documentation style; dietitians struggled with changes to traditional practice and experienced difficulty in identifying the most accurate Nutrition Diagnosis and creating PES statements. Also, experienced clinical dietetics practitioners in the preliminary stages of integrating the Nutrition Diagnosis step into their practice were scared of making mistakes (Mathieu et al., 2005), In Australia, at professional development meetings where the NCP and Nutrition Diagnosis were discussed, some of the issues raised related to the use of the term ‘diagnosis,’ which made some practitioners uncomfortable. This reflects the difference between the NCP and traditional practice, where the focus may have been more on the medical diagnosis (e.g. ‘diabetic diet’) rather than on the nutrition diagnostic process itself.

In Australia, clinical dietetics practitioners are not using standardised nutritional terms to describe the NCP. As discussed in Section 2.8.4, the development of the IFI and potential for enforcement of the use of standard codes by all health professionals could prove a challenge to implementation of the standardised dietetics language. The IFI codes (NAHCC, 2008) were constructed using the ICF framework (WHO, 2002), which has been proposed by dietetics representatives from some countries, such as The Netherlands, as a more appropriate alternative standardised language for dietetics. However, the ICF classification system is not a

viable alternative to the ADA's standardised terminology as it focuses on body functioning and disability, and is not directly relevant to dietetics. In contrast, the IDNT caters for all aspects of dietetic practice. A national allied health trial of the IFI using the ICF system in Australia indicated that all dietetic interventions related to body weight management issues (Australian Psychological Society, 2008). This perpetuates a misconception about dietetics practice whereby various nutrition interventions in acute and chronic diseases are concealed. The allied health coalition has been forced by the Australian Government Department of Health and Ageing to use the IFI codes as part of the move towards implementation of the electronic health record. If the dietetics profession is also required to use these codes, which are unrelated to dietetics practice, the profession would be placed in a vulnerable position. Of particular concern is that the IFI codes cluster disparate interventions; in this taxonomy, for example, 'malnutrition' and 'obesity' are grouped into a single 'body changes' category. Dietetic interventions can then appear to be ineffective (Professor Sandra Capra, personal communication, 11 August 2008).

Concurrent implementation of the IFI and the IDNT would compromise dietetic practice and impact negatively on the profession. The development of SND terminology as part of the IDNT reflects the reasons for dietitians to intervene in patient care. Application of the IFI codes could demean MNT due to oversimplification of coding groups and lead to difficulty in Nutrition Intervention determination. Standardised Nutrition Diagnosis terminology codes, on the other hand, exhibit a clear link between Nutrition Diagnosis and Nutrition Intervention. In countries with reimbursement systems, these codes will enable realistic assessments of the costs incurred as a result of specific interventions (Professor Sandra Capra, personal communication, 11 August 2008).

Other challenges to international implementation of standardised language for the NCP include the various stages of growth of dietetics associations in different countries, and differences in healthcare systems and the use of electronic health records. Consequently, it is anticipated that individual countries will proceed with implementation at their own pace. Reeves (2005) estimated that, in the United States, full implementation of the concept of standardised language for the NCP

will take about 10 years. Significantly, Gordon (1987) found that it is not unusual for the timeline for full implementation of any new concept in medicine or nursing to be delayed by more than five years.

6.3.2 Opportunities

Despite the challenges, the introduction of standardised language in dietetics presents opportunities for dietetics practice, research and education, and for healthcare systems generally. The emergence of standardised language is timely and, arguably, inevitable considering the advent of electronic health records. Consistency in documentation is associated with better outcomes of patient care (Lacey & Pritchett, 2003; Splett, 1996); it will promote the use of evidence-based practice and highlight dietetics professionals as the core nutrition care providers (Laramee, 2005). Furthermore, it is expected that the standardised nutrition terminology and coding system will result in higher reimbursement and greater respect for dietetians (Meerschaert, 2007). Use of standardised languages in the medical and nursing professions has been demonstrated to increase the visibility of their core responsibilities (Balint et al., 2006; Carpenito-Moyet, 2008; King, 1967; Lunney, 2008; Maria Müller-Staub, Needham, Odenbreit, Lavin, & van Achterberg, 2008; Saranto & Kinnunen, 2009).

6.4 STRENGTHS

The impetus for this research was the introduction of the Nutrition Diagnosis step in the ADA's NCP and the development of standardised nutrition diagnostic terminology. This is the first study to focus on the potential for implementing SND outside the United States. The research took an international perspective and included the responses of many highly experienced clinical dietetics practitioners. It has responded to the swiftly evolving nature of the field of SND research, and kept abreast of changes in the development of standardised language for dietetics. At each research stage, the most up-to-date version of the ADA's standardised terminology was consulted.

The survey questionnaire was pre-tested and piloted among practicing clinical dietitians, and the case study component simulated a real patient scenario that

could be encountered in clinical practice. The vast quantity of largely qualitative data was collected, coded and analysed following the study protocol and standardised methods. Data coding was undertaken only by the researcher to ensure consistency and minimise error; intercoder reliability assessment confirmed that the coding system had an acceptable level of reliability.

6.5 LIMITATIONS

The limitations of this study provide opportunities for future research. It is acknowledged that the use of convenience sampling has the potential to bias results. The clinical dietetics practitioners who participated in the survey are not representative of all clinical dietetics practitioners. The response rate, particularly from the United Kingdom, the United States, New Zealand and Malaysia, was very low; consequently, it was necessary to group data from these countries as 'Other Countries' for comparison with Australian and Canadian data for hypothesis testing. Further research with larger, more representative samples from individual countries is warranted.

The use of a hypothetical case scenario rather than an actual patient in a clinical setting can be construed as a limitation as the case study contained only some of the information that would be present in practice. Further research could focus on clinical validation using actual patient data. Also, it may have proved more fruitful to incorporate various types of cases, rather than focus on a single case scenario. Nevertheless, cases of malnutrition are common in dietetics practice.

Despite rigorous pre-testing and a pilot study, the complexity of the questionnaire and the tendency for some practitioners to perceive it as a test had an adverse effect on response rate. Any comparable future study should address the perceived difficulty of the task and take steps to improve the 'user-friendliness' of the survey instrument. Also, it is possible that the number of spaces provided for nomination of NDTs in the questionnaire could have encouraged participants to select more nutrition diagnoses than they may have otherwise. Although intercoder assessment indicated moderate to strong reliability, the coding system used to classify definitions and justifications relied on the researcher's judgment.

6.6 SUMMARY

Phase 2 of this research project employed a cross-sectional mail survey questionnaire to investigate the extent of, and potential for, international implementation of SND. Most of the clinical dietetics practitioners surveyed were unable to accurately identify, define and justify NDTs relevant to a case study. Similar results were observed across countries. Level of experience with MNT was demonstrated to have no impact on whether participants correctly identified, justified or ranked NDTs; however, less-experienced practitioners were more likely to provide valid definitions for NDTs than practitioners with more than 10 years experience. A comparison sample of Australian dietetics students, who had received instruction in the NCP and Nutrition Diagnosis, were no more or less adept at identifying, defining, justifying or ranking NDTs than the participant practitioners. This research highlighted lack of awareness and understanding of the NCP and SND, the complexity of the standardised language of the IDNT, a need for further validation of SND outside the United States, and a need for systematic training and professional development.

Chapter 7

Conclusion

This research project included two phases of research: (1) a case study of Australian dietetics practice and (2) a cross-sectional mail survey designed to investigate the extent of, and potential for, international implementation of SND. Section 7.1 provides a synopsis of research outcomes. Section 7.2 revisits the theoretical framework. Section 7.3 considers the implications of these outcomes for dietetics practice, education and policy, and Section 7.4 presents recommendations for dietetics associations, professionals and educators, and for future research.

7.1 SYNOPSIS OF OUTCOMES

This research project represents the first investigation of the potential for the ADA's standardised language for Nutrition Diagnosis to be implemented beyond the United States. The Phase 1 case study revealed incomplete documentation of NCP in Australian dietetics practice, lack of understanding of the Nutrition Diagnosis step and use of non-standardised nutritional terms in documentation of nutrition care. From the results of Phase 2, it appears that these difficulties may be universal; most survey participants, regardless of country of practice, did not demonstrate ability to accurately apply SND. It is apparent that the concept is highly theoretical, involves application of advanced critical thinking and critical reasoning skills, and proficiency is unlikely to be influenced by years of MNT experience. A series of lectures on the NCP and Nutrition Diagnosis was inadequate to facilitate understanding and mastery of the concept among dietetics students. Consequently, this research provides a strong case for rigorous educational programs and systematic ongoing professional training to support the introduction of the new concept of SND.

A low survey response rate, influenced by the perceived difficulty of the SND task, meant that this research has been unable to demonstrate whether any particular country is more prepared to incorporate SND in clinical practice than any other. While the viability of SND beyond the United States remains inconclusive, this research flags the complexity of the ADA's list of NDTs as a potential obstacle to successful implementation. It appears that the ability of dietetics practitioners and students to accurately perform SND was hampered by the complexity of the NDT

list, which harbours subtle differences between terms and some overlapping defining characteristics. Also, this research has identified a need for great care to be taken with change management; to be successful, the SND implementation process will need to foster a readiness for change and overcome resistance to change. Nevertheless, the anticipated challenges to SND implementation are far outweighed by the opportunities it presents. The concept of SND has much to offer the dietetics profession, including improved practice that delivers better outcomes. Existing classification systems do not reflect the breadth and depth of nutrition care provided by dietetics professionals, and evidence from the medical and nursing research literature lends strong support to the idea that profession-specific vocabularies that distinguish health professionals as unique care providers are of paramount importance. This study's review of literature and Phase 1 and 2 research results provide convincing support for Reeves' (2005) statement that the ADA's NCP and standardised language are "nothing less than the structure upon which we must build all future dietetics practice." To this end, a full international trial of SND implementation is warranted.

7.2 THEORETICAL FRAMEWORK REVISITED

In Chapter 2 (see Section 2.10), a theoretical framework was developed based on the review of the literature. Following the data collection and interpretation of the research findings in Chapter 5, prominent research outcomes have emerged that necessitate a review of this framework. Figure 7.1 presents the revised theoretical framework that brings the key findings of Phase 1 and Phase 2 study together. The outcomes of this research contribute to the understanding of issues and challenges surrounding implementation of SND. The universal perceived difficulty and inability to accurately apply the SND by most participants flags the complexity of SND. Therefore, a rigorous educational program and systematic ongoing professional training is necessary to support a full trial of its application at national and international level.

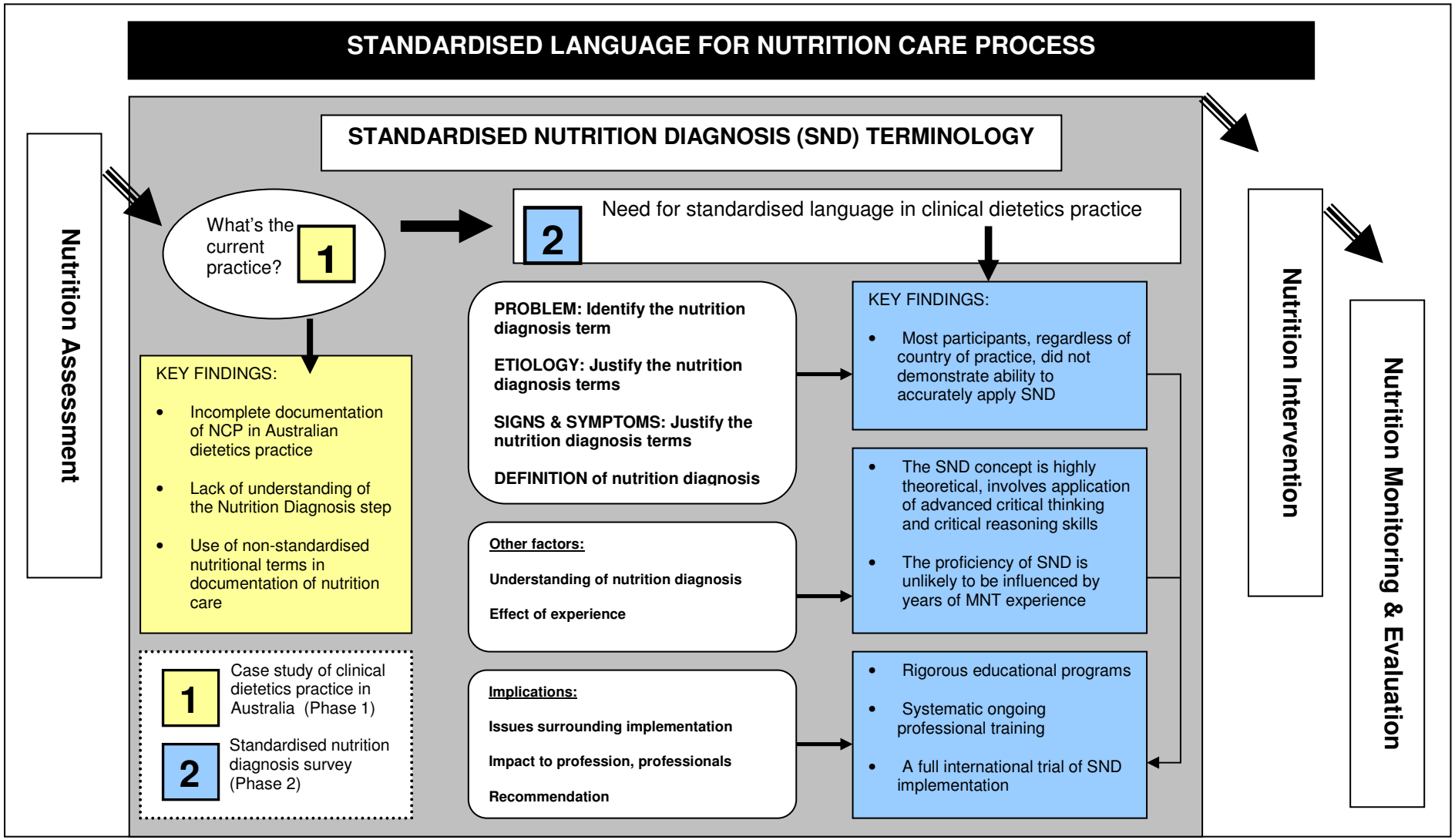


Figure 7.1 Theoretical framework revisited

7.3 IMPLICATIONS

The outcomes of this research hold implications for dietetics practice, education and policy.

7.3.1 Dietetics practice

Standardised Nutrition Diagnosis needs to become an integral part of the evolution of dietetics profession to ensure that practitioners are able to effectively and convincingly communicate their distinct role in improving patient outcomes. The current tendency for dietitians to make informal notes in patient records and to use a wide range of terminologies to describe nutritional care processes, contributes to the concealment of the nature and extent of their role. In contrast, standardised terminology that exposes the dietitian's role in healthcare will increase the visibility of the profession. In addition, employing a consistent documentation system using the SND terminologies will improve communication with other healthcare professionals, positively impact on continuity of care, promote the use of evidence-based practice, facilitate claims for higher reimbursement, and strengthen the profession's capacity for research. With the advent of electronic health records, implementation of SND terminology is timely and, arguably, inevitable.

Because application of SND terminology is perceived by dietetics practitioners and students as difficult and complex, it should not be assumed that all dietetics professionals will be able to incorporate this concept in their practice after reading a journal article, accessing the IDNT reference manual and applying commonsense. Furthermore, the ability of dietetics practitioners to put the SND concept into practice is not determined by how long they have been practicing MNT. Resistance to change, particularly among highly experienced practitioners, is a serious threat to effective implementation.

7.3.2 Dietetics education

Effective integration of SND in dietetics education programs is necessary for the concept to be embraced by students in a manner than enables them to translate it into practice, thus narrowing the theory-practice gap. It is anticipated that inclusion

of SND in dietetics education programs will enhance students' critical thinking, critical reasoning and problem-solving skills.

7.3.3 Policy

International implementation of SND will require changes to policies and procedures at institutional, national and international levels. However, adoption of a unique language will facilitate communication and research collaboration among dietetics professionals globally.

7.4 RECOMMENDATIONS

Integrating SND into practice will require collective and individual effort. Dietetics associations and dietetics educators will need to translate the concept into practice. Individual dietetics professionals will need to embrace the concept and commit to applying it in their practice.

7.4.1 Dietetics associations

The findings of this research project suggest the following recommendations for dietetics associations:

1. That dietetics associations take leadership roles in enforcing the incorporation of SND into dietetics practice
2. That nutrition diagnostic terminology be reviewed and, if deemed necessary, simplified and/or customised for individual countries
3. That clear procedures and protocols for SND implementation be developed
4. That the concepts of SND be included in continuing professional development (CPD) activities
5. That the concept of SND become a component of professional accreditation programs such as Registered Dietitian (RD) in the United States and the United Kingdom, and Accredited Practising Dietitian (APD) in Australia

6. That each dietetics association form a taskforce to facilitate SND implementation

7.4.2 Dietetics educators

The following recommendations for dietetics educators are proposed:

7. That the dietetics curriculum be evaluated and restructured to incorporate sufficient emphasis on the NCP and its standardised language
8. That teaching models capable of foregrounding critical thinking, clinical reasoning and problem-solving skills be adopted
9. That the dietetics curriculum be continuously updated to keep pace with the evolution of dietetic knowledge

7.4.3 Dietetics professionals

The following recommendations for dietetics professionals are proposed:

1. That knowledge, skills and competency be enhanced through engagement in CPD activities related to SND
2. That the new Nutrition Diagnosis skills be practiced to improve competency
3. That particular attention be paid to correct etiology identification to optimise the effectiveness of interventions
4. That dietetics professionals accept responsibility for implementing SND in their practice

7.4.4 Future research

The findings of this research project suggest the following recommendations for future research:

1. That further SND terminology content validation studies be conducted to confirm the major defining characteristics for specific NDTs;

2. That a multi-country Delphi study may prove an effective methodology for garnering the international dietetics perspective, and assessing the possibility of consensus on the major and minor defining characteristics of the NDTs

3. That further investigation of the implementation of SND terminology include measurement of the outcomes of Nutrition Intervention; this would provide evidence of the impact of SND on clinical, patient and cost outcomes

7.5 SUMMARY

The findings of this research project have elucidated current Australian dietetics practice and identified issues relating to the international implementation of SND. This concluding chapter has considered the implications of the research outcomes for dietetics practice, education and policy. Recommendations have been made for dietetics associations, professionals and educators, and for future research. Successful implementation of SND is unlikely to prove a simple task for either individual practitioners or the profession as a whole. However, if the care of patients does not translate within and across settings, clinical dietetics' unique body of knowledge will remain undistinguished and invisible.

References

Ackley, B. J., & Ladwig, G. B. (2008). *Nursing diagnosis handbook : An evidence-based guide to planning care* (8th ed.). St. Louis: Mosby Elsevier.

Alfaro-LeFevre, R. (2002). *Applying nursing process : Promoting collaborative care* (5th ed.). Philadelphia, PA: Lippincott.

American Dietetic Association (ADA). (2003). Ethics opinion: Dietetics professionals are ethically obligated to maintain personal competence in practice. *Journal of the American Dietetic Association, 103*(5), 633-635.

American Dietetic Association (ADA). (2005). *Nutrition diagnosis: A critical step in the Nutrition Care Process*. Chicago IL: American Dietetic Association.

American Dietetic Association (ADA). (2006a). *Nutrition Care Process/Standardized Language Committee Report Spring 2006*. Retrieved March 6, 2009, from http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/governance_8450_ENU_HTML.htm

American Dietetic Association (ADA). (2006b). *Nutrition diagnosis: A critical step in the Nutrition Care Process*. Chicago, IL: American Dietetic Association.

American Dietetic Association (ADA). (2006c). Understanding and using the scope of dietetics practice framework: A step-wise approach. *Journal of the American Dietetic Association, 106*(3), 459-463.

American Dietetic Association (ADA). (2007a). *Nutrition diagnosis and intervention: Standardized language for the Nutrition Care Process*. Chicago, IL: American Dietetic Association.

American Dietetic Association (ADA). (2007b). *Priorities for research: Agenda to support the future of dietetics* Retrieved March 11, 2008, from http://www.eatright.org/ada/files/ADA_Priority_for_Research.2007.pdf

American Dietetic Association (ADA). (2008). *International dietetics & nutrition terminology (IDNT) reference manual: Standardized language for the Nutrition Care Process* (1st ed.). Chicago,IL: American Dietetic Association.

American Dietetic Association (ADA). (2009). *International dietetics & nutrition terminology (IDNT) reference manual: Standardized language for the Nutrition Care Process* (2nd ed.). Chicago,IL: American Dietetic Association.

ADA Committee on Goals of Education for Dietetics. (1969). Goals of the lifetime education of the dietitian *Journal of the American Dietetic Association, 54*, 91-93.

ADA Nutrition Care Process Task Force. (2004). *ADA's Nutrition care process and model-Providing quality nutrition care in a variety of settings*. Retrieved 18 April 2008, from http://www.eatright.org/ada/files/ncp-ppt-final-3.18.04.pdf

American Medical Association (AMA). (2008). *CPT process - how a code becomes a code*. Retrieved November 13, 2008, from http://www.ama-assn.org/ama/no-index/physician-resources/3882.shtml

Anthony, P. S. (2007). Global dietetics issues. In A. S. Bloch, J. O'Sullivan-Maillet, W. H. Howell & M. F. Winkler (Eds.), *Issues and choices in clinical nutrition practice* (pp. 133-145). Philadeplhia, PA: Lippincott Williams & Wilkins.

Aquilino, M. L., & Keenan, G. (2000). Having our say: Nursing's standardized nomenclatures. *The American Journal of Nursing, 100*(7), 33-38.

Ash, J. S., & Bates, D. W. (2005). Factors and forces affecting EHR system adoption: Report of a 2004 ACMI discussion. *Journal of the American Medical Informatics Association, 12*(1), 8-12.

Australian Institute of Health and Welfare (AIHW). (2007). *National health data dictionary*. Retrieved April 19, 2008, from http://www.aihw.gov.au/datadevelopment/data_standards/data_dictionaries.cfm

Australian Digital Thesis Program. (2008). Retrieved 1 February 2008, from http://adt.caul.edu.au/

Australian Psychological Society. (2008). *Indicator for intervention*. Retrieved January 15, 2009, from http://www.psychology.org.au/about/projects/ifi/

Balint, G. P., Buchanan, W. W., & Dequeker, J. (2006). A brief history of medical taxonomy and diagnosis. *Clinical Rheumatology, 25*(2), 132-135.

Banerjee, M., & Fieldiing, J. (1997). Interpreting Kappa values for two-observer nursing diagnosis data. *Research in Nursing & Health, 20*, 465-470.

Banning, M. (2008). Clinical reasoning and its application to nursing: Concepts and research studies. *Nurse Education in Practice, 8*(3), 177-183.

Barr, J. T., Schumacher, G., & Myers, E. F. (2001). Case problem: Quality of life outcomes assessment how can you use it in Medical Nutrition Therapy. *Journal of the American Dietetic Association 101*(9), 1064-1066.

Becker, P. J., Lusk, B., Walker, F., & Wills-Gallagher, J. (2009). The design and implementation of an electronic medical record template using standardized language and the Nutrition Care Process. *Journal of the American Dietetic Association, 109*(9, Supplement), A9.

Beyea, S. C. (1999). Standardized language: Making nursing practice count. *AORN Journal, 70*(5), 831-838.

Biesemeier, C., & Chima, C. S. (1997). Computerized patient record: Are we prepared for our future practice? *Journal of the American Dietetic Association, 97*(10), 1099-1104.

Brewer, W. J., & Heinzl, J. (2006). Clinical nutrition practice evolves. *Diagnostic Nutrition Network, 15*(1), 2-6.

Brylinsky, C. (1996). The Nutrition Care Process. In L. K. Mahan & S. Escott-Stump (Eds.), *Krause's food, nutrition, & diet therapy* (9th ed., pp. 403-423). Philadelphia, PA: WB Saunders Company

Burla, L., Knierim, B., Barth, J., Liewald, K., Duetz, M., & Abel, T. (2008). From text to codings: Intercoder reliability assessment in qualitative content analysis. *Nursing Research, 57*(2), 113-117.

Buzek, B., & Priest, A. (2009). Implementing the Nutrition Care Process in the hospital setting using electronic health records. *Journal of the American Dietetic Association, 109*(9, Supplement), A9.

Byham-Gray, L. D., Gilbride, J. A., Dixon, L. B., & Stage, F. K. (2005). Evidence-based practice: What are dietitians' perceptions, attitudes, and knowledge? *Journal of the American Dietetic Association, 105*(10), 1574-1581.

Byron, A. L., & McCathie, H. C. F. (1998). Casemix: The allied health response. *The Medical Journal of Australia, 169*, S46-S47.

Calabro, K. S., Bright, K. A., & Bahl, S. (2001). International perspectives: The profession of dietetics. *Nutrition, 17*(7-8), 594-599.

Campbell, C. G., Anderson, J. A., Larson, K., & Petty, H. (2007). The future of dietetics practice: Teaching the Nutrition Care Process and standardized language. *Journal of the American Dietetic Association, 107*(8, Supplement 1), A64.

Carpenito-Moyet, L. J. (2008). *Nursing diagnosis : Application to clinical practice* (12th ed.). Philadelphia PA: Lippincott Williams & Wilkins.

Carroll-Johnson, R. M. (2001). Learning to think. *Nursing Diagnosis, 12*(2), 43.

Chambers, W. (1962). Nursing diagnosis. *The American Journal of Nursing, 62*(11), 102-104.

Charney, P. (2006). *Reliability of nutrition diagnostic codes and their defining characteristics [electronic version].* Unpublished doctoral dissertation, University of Medicine and Dentistry of New Jersey.

Charney, P. (2007). Advanced technological applications in dietetics practice *Topics in Clinical Nutrition, 22*(2), 108-114.

Charney, P., O'Sullivan-Maillet, J. K., Touger-Decker, R., Splett, E., Myers, E., & Haque, S. (2006). Reliability of nutrition diagnostic labels when used by registered dietitians at three levels of practice. *Journal of the American Dietetic Association, 106*(8, Supplement), A12.

Cheevakasemsook, A., Chapman, Y., Francis, K., & Davies, C. (2006). The study of nursing documentation complexities *International Journal of Nursing Practice, 12*(6), 366-374.

Chernoff, R. (1993). Advances in dietetics and impact on the development of specialty practice areas. *Nutrition, 9*(3), 203-205.

Clark. (1999). A language for nursing *Nursing Standard, 13*(31), 42-47.

Clark, Craft-Rosenberg, M., & Delaney, C. (2000). An international methodology to describe clinical nursing phenomena: A team approach. *International Journal of Nursing Studies, 37*(6), 541-553.

Clark, & Lang, N. (1997). The International Classification for Nursing Practice (ICNP): Nursing outcomes. *International Nursing Review, 44*(4), 121-124.

Clark, J., & Lang, N. (1992). Nursing's next advance: An internal [international] classification for nursing practice. *International Nursing Review, 39*(4), 109-112.

Connell, C., & Molaison, E. F. (2008). Internship preceptors perceptions and use of the Nutrition Care Process. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A20-A20.

Corado, L., & Pascual, R. (2008). Successes in implementing the Nutrition Care Process and standardized language in clinical practice. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A42-A42.

Culbertson, V. L., Larson, R. A., Cady, P. S., Kale, M., & Force, R. W. (1997). A conceptual framework for defining pharmaceutical diagnosis. *American Journal of Pharmaceutical Education 61*(1), 12-18.

de Lusignan, S. (2005). Codes, classifications, terminologies and nomenclatures:Definition,development and application in practice. *Informatics in Primary Care, 13*(1), 65-69.

DeChicco, R. S., & Matarese, L. E. (2007). An overview of the dietetics professional's training and opportunities in healthcare In A. S. Bloch, J. O'Sullivan-Maillet, W. H. Howell & M. F. Winkler (Eds.), *Issues and choices in clinical nutrition practice* (pp. 3-16). Philadephia PA: Lippincott Williams & Wilkins.

Delaney, C., Mehmert, P. A., Prophet, C., Rose Bellinger, S. L., Huber, D. G., & Ellerbe, S. (1992). Standardized nursing language for healthcare information systems. *Journal of Medical Systems, 16*(4), 145-159.

Delaney, C., & Moorhead, S. (1995). The nursing minimum data set, standardized language, and health care quality. *Journal of Nursing Care Quality, 10*(1), 16-30.

Doenges, M. E., & Moorhouse, M. F. (2008). *Application of Nursing Process and Nursing Diagnosis: An interactive text for diagnostic reasoning* (5th ed.). Philadelphia PA: F.A Davis Company

Elfrink, V., Bakken, S., Coenen, A., McNeil, B., & Bickford, C. (2001). Standardized Nursing vocabularies: A foundation for quality care. *Seminars in Oncology Nursing, 17*(1), 18-23.

Elkin, P. L., Brown, S. H., Husser, C. S., Bauer, B. A., Wahner-Roedler, D., Rosenbloom, S. T., et al. (2006). Evaluation of the content coverage of SNOMED CT: Ability of SNOMED clinical terms to represent clinical problem lists. *Mayo Clinic Proceedings, 81*(6), 741-748.

Emery, E. A. (2007). Nutrition diagnosis and intervention: A case report. *Journal of the American Dietetic Association, 107*(8, Supplement. 3), A22.

Enrione, E. B. (2008). Content validation of nutrition diagnoses. *Topics in Clinical Nutrition, 23*(4), 306-319.

Erickson-Weerts, S. (1999). Past, present, and future perspectives of dietetics practice. *Journal of the American Dietetic Association, 99*(3), 291-293.

Faugier, J., & Sargeant, M. (1997). Sampling hard to reach populations. *Journal of Advanced Nursing, 26*, 790-797.

Forrey, A. W., McDonald, C. J., DeMoor, G., Huff, S. M., Leavelle, D., Leland, D., et al. (1996). Logical observation identifier names and codes (LOINC) database: A public use set of codes and names for electronic reporting of clinical laboratory test results. *Clinical Chemistry, 42*(1), 81-90.

Frederick, J., Scherb, C. A., Smith-Foreman, K., Sharon, W., Quiram, J., Wagenaar, J., et al. (2001). Speaking a common language. *The American Journal of Nursing, 101*(3), 24OO-24TT.

Fuhrman, M. P. (2002). Issues facing dietetics professionals: Challenges and opportunities. *Journal of the American Dietetic Association, 102*(11), 1618-1620.

Gardner-Cardani, J., Faut, C., & Yonkoski, D. (2007). Nutrition Care Process continuous improvement. *Journal of the American Dietetic Association, 107*(8, Supplement 1), A65-A65.

Gardner-Cardani, J., Yonkoski, D., & Kerestes, J. (2007). Nutrition Care Process implementation: A change management perspective. *Journal of the American Dietetic Association, 107*(8), 1429-1433.

Gardner, P. (2003). *Nursing process in action*. Clifton Park, NY: Thomson/Delmar Learning.

Gates, G. E. (1992). Clinical reasoning: An essential component of dietetic practice *Topics in Clinical Nutrition 7*(3), 74-80.

Gilboy, M. R. (2008). Incorporating the Nutrition Care Process into nutrition education and community nutrition courses. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A65-A65.

Gordon, M. (1976). Nursing diagnoses and diagnostic process. *The American Journal of Nursing, 76*(8), 1298-1300.

Gordon, M. (1987). *Nursing diagnosis : Process and application* (2nd ed.). New York: McGraw-Hill.

Gordon, M. (1998). Nursing nomenclature and classification system development. *Online Journal of Issues in Nursing*, 3. Retrieved 30 September from http://www.nursingworld.org/ojin/tpc7/tpc7_1.htm

Gourley, J. L. (2007). *Assessing perceptions toward implementation of the Nutrition Care Process among Registered Dietitians in northeast Tennessee [Electronic version].* Unpublished MSc. thesis, East Tennessee State University.

Groves, M. (2008). *The diagnostic process in medical practice* New York: Nova Biomedical Books.

Hagedorn, R. (2001). *Foundations for practice in occupational therapy* (3rd ed.). Edinburgh: Churchill Livingstone.

Hakel-Smith, N., & Lewis, N. M. (2004). A standardized Nutrition Care Process and language are essential components of a conceptual model to guide and document nutrition care and patient outcomes. *Journal of the American Dietetic Association, 104*(12), 1878-1884.

Hakel-Smith, N., Lewis, N. M., & Eskridge, K. M. (2005). Orientation to Nutrition Care Process standards improves nutrition care documentation by nutrition practitioners. *Journal of The American Dietetic Association, 105*(10), 1582-1589.

Hardiker, N. (2004). An international standard for nursing terminologies. *Healthcare Computing*, 212-219.

Haws Rice, W. J., Olsen, M. L., & Randall, M. M. (2007). Application of the ADA's Nutrition Care Process and model in the electronic medical record. *Journal of the American Dietetic Association, 107*(8, Supplement 1), A87-A87.

Health Data Standards Committee. (2006). *National health data dictionary. Version 13* Canberra: Australian Institute of Health and Welfare.

Heinen, M. M., van Achterberg, T., Roodbol, G., & Frederiks, C. M. A. (2005). Applying ICF in nursing practice: Classifying elements of nursing diagnoses. *International Nursing Review, 52*(4), 304-312.

Higgs, J. (2008). *Clinical reasoning in the health professions* (3rd ed.). Amsterdam ; Sydney: Butterworth Heinemann.

Holben, D. H., & Murray, D. H. (2008). Incorporating the Nutrition Care Process and standardized language into a didactic program in dietetics curriculum. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A21-A21.

Hutcheson, D. A., Touger-Decker, R., O'Sullivan-Maillet, J. K., Byham-Gray, L., & Wien, M. (2007). Utilization of the standardized language of dietetics in clinical practice. *Journal of the American Dietetic Association, 107*(8, Supplement 1), A21.

IHTSDO (n.d.). (2009). *International Health Terminology Standards Development Organisation*. Retrieved May 1, 2009, from http://www.ihtsdo.org/

Iyer, P. W., Taptich, B. J., & Bernocchi-Losey, D. (1995). *Nursing process and nursing diagnosis* (3rd ed.). Philadelphia PA: W.B. Saunders.

Jenkins, M., Myers, E., Charney, P., & Escott-Stump, S. (2006). American Dietetics Association's standardized nutrition language: Project logic model and current status *Studies in Health Technology & Informatics, 122*, 710-714.

Jones, S. L., & Danis, K. A. (2007). Implementation strategies for nutrition diagnosis in an acute care university hospital setting- the University of Pittsburgh Medical Center - A sample action plan and toolkit for success. *Journal of the American Dietetic Association, 107*(8, Supplement), A20.

Kautz, D. D., & Van Horn, E. R. (2008). An exampler of the use of NNN language in developing evidence-based practice guidelines. *International Journal of Nursing Terminologies & Classifications, 19*(1), 14-19.

Kieselhorst, K. J., Skates, J., & Pritchett, E. (2005). American Dietetic Association: Standards of practice in nutrition care and updated standards of professional performance. *Journal of the American Dietetic Association, 105*(4), 641-645.

Kight, M. A. (1993). A dietetic-specific diagnostic reasoning approach to communicating in code *Diagnostic Nutrition Network, 2*(2), 2-5.

Kight, M. A. (2003). Notice of change of nutritional diagnostic classification system title. *Diagnostic Nutrition Network, 12*(1), 7.

Kight, M. A., & Gammon, M. (1994a). Start up characterizations/diagnostic criteria for using dietetic-specific nutritional diagnostic codes (D-S NDCs) in adult care situations. *Diagnostic Nutrition Network, 3*(2), 2-8.

Kight, M. A., & Gammon, M. (1994b). Start up characterizations/diagnostic criteria for using dietetic-specific nutritional diagnostic codes (D-S NDCs) in adult care situations. *Diagnostic Nutrition Network, 3*(1), 2-8.

King, L. S. (1967). What is a diagnosis? . *Journal of the American Medical Association, 202*(8), 714-717.

Komorita, N. I. (1963). Nursing diagnosis. *The American Journal of Nursing, 63*(12), 83-86.

Lacey. (2006). Teaching ADA's Nutrition Care Process and nutrition diagnoses: One educator's story of a work in progress. *Topics in Clinical Nutrition, 21*(3), 169-175.

Lacey, & Cross, N. (2002). A problem-based nutrition care model that is diagnostic driven and allows for monitoring and managing outcomes. *Journal of The American Dietetic Association, 102*(4), 578-589.

Lacey, & Pritchett, E. (2003). Nutrition Care Process and model: ADA adopts road map to quality care and outcomes management. *Journal of the American Dietetic Association, 103*(8), 1061-1072.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*(1), 159-174.

Laramee, S. H. (2005). Evidence-based practice: A core competency for dietetics *Journal of the American Dietetic Association, 105*(3).

Lathrop, S. L., Davis, W. L., & Nolte, K. B. (2009). Medical terminology coding systems and medicolegal death investigation data: Searching for a standardized method of electronic coding at a statewide medical examiner's office. *Journal of Forensic Sciences, 54*(1), 207-211.

Leonberg, B. (2007). Development of the dietetics professional's role as a member of a healthcare team In A. S. Bloch, J. O'Sullivan-Maillet, W. H. Howell & M. F. Winkler (Eds.), *Issues and choices in clinical nutrition practice* (pp. 87-108). Philadelphia PA: Lippincott Williams & Wilkins.

Leyse, R. (1996). Clinical dietetics theory needed to complement nutritional science theory. *Diagnostic Nutrition Network, 5*(2), 6-7.

Leyse, R., & Kight, M. A. (1993). A metaparadigm of clinical dietetics: The template (1) for building our unique body of knowledge. *Diagnostic Nutrition Network, 2*(1), 2-5.

LOINC. (2007). *Logical observation identifiers names and codes*. Retrieved June 9, 2007, from http://loinc.org/

Lombard, M., Snyder-Duch, J., & Bracken, C. C. (2002). Content Analysis in Mass Communication: Assessment and Reporting of Intercoder Reliability. *Human Communication Research, 28*(4), 587-604.

Lunney, M. (2003). Critical thinking and accuracy of nurses' diagnoses. *International Journal of Nursing Terminologies & Classifications, 14*(3), 96-107.

Lunney, M. (2008). The need for international nursing diagnosis research and a theoretical framework. *International Journal of Nursing Terminologies & Classifications, 19*(1), 28-34.

Maas, M. L., & Delaney, C. (2004). Nursing process outcome linkage: Research issues, current status, and health policy implications. *Medical Care 42*(2 Supplement), II-40-II-48.

Mason, & Attree, M. (1997). The relationship between research and the nursing process in clinical practice. *Journal of Advanced Nursing 26*(5), 1045-1049.

Mason, Wenberg, B. G., & Welsch, P. K. (1982). *The dynamics of clinical dietetics* (2nd ed.). New York: Wiley.

Mathieu, J., Foust, M., & Ouellette, P. (2005). Implementing Nutrition Diagnosis, step two in the Nutrition Care Process and model: Challenges and lessons learned in two health care facilities. *Journal of the American Dietetic Association, 105*(10), 1636-1640.

McCarthy, M., Pavlinac, J., & Ryan-Borchers, T. (2008). Implementation of standardized language by clinical preceptors at a large dietetic internship program. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A42-A42.

Meerschaert, C. M. (2007). A good-bye SOAP, hello PESS - nutrition diagnosis and the new process for nutritional care. *Today's Dietitian, 9,* 46.

Meyer, G. R., & Gates, G. E. (1993). Evaluation and comparison of the Nutrition Care Process for persons with diabetes among inpatient and outpatient dietitians. *The Diabetes Educator 19*(5), 403-408.

Mittrach, R., Grill, E., Walchner-Bonjean, M., Scheuringer, M., Boldt, C., Huber, E. O., et al. (2008). Goals of physiotherapy interventions can be described using the international classification of functioning, disability and health. *Physiotherapy, 94*(2), 150-157.

Molaison, E. F. (2002). Stages of change in clinical nutrition practice. *Nutrition in Clinical Care, 5*(5), 251-257.

Morales-Asencio, J. M., Morilla-Herrera, J. C., Martín-Santos, F. J., Gonzalo-Jiménez, E., Cuevas-Fernández-Gallego, M., Bonill de las Nieves, C., et al. (2009). The association between nursing diagnoses, resource utilisation and patient and caregiver outcomes in a nurse-led home care service: Longitudinal study. *International Journal of Nursing Studies, 46*(2), 189-196.

Mueller, D. C., Hancock, C. R., Ewalt, G. E., Hoskins, C. L., Simper, A. L., Gentry, B. M., et al. (2008). Progressive implementation of the Nutrition Care Process and standardized language into Medical Nutrition Therapy documentation. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A43-A43.

Müller-Staub. (2009). Evaluation of the implementation of nursing diagnoses, interventions, and outcomes. *International Journal of Nursing Terminologies & Classifications, 20*(1), 9-15.

Müller-Staub, Lavin, M. A., Needham, I., & van Achterberg, T. (2006). Nursing diagnoses, interventions and outcomes - application and impact on nursing practice: Systematic review. *Journal of Advanced Nursing, 56*(5), 514-531.

Müller-Staub, Needham, I., Odenbreit, M., Lavin, M. A., & van Achterberg, T. (2007). Improved quality of nursing documentation: Results of a nursing diagnoses, interventions, and outcomes implementation study. *International Journal of Nursing Terminologies & Classifications, 18*(1), 5-17.

Müller-Staub, Needham, I., Odenbreit, M., Lavin, M. A., & van Achterberg, T. (2008). Implementing nursing diagnostics effectively: Cluster randomized trial. *Journal of Advanced Nursing, 63*(3), 291-301.

Myers, E. F. (2007). Conducting research in a clinical practice setting. In A. S. Bloch, J. O'Sullivan-Maillet, W. H. Howell & M. F. Winkler (Eds.), *Issues and choices in clinical nutrition practice* (pp. 219-238). Philadeplhia PA: Lippincott Williams & Wilkins.

NAHCC. (2008). *Indicator for intervention (IFI) project. Report to Department of Health and Ageing*. Retrieved December 15, 2008, from http://www.nahcc.org.au/ifiproject.htm#IFIfinalreport

Nakamura, T. (2008). *Use of Nutrition Care Process to advance Dietetic Profession* Paper presented at the 15th International Congress of Dietetics

NANDA International. (2008). *NANDA International*. Retrieved June 9, 2008, from http://www.nanda.org/

Neistadt, M. E. (1996). Teaching strategies for the development of clinical reasoning. *The American Journal of Occupational Therapy, 50*(8), 676-684.

Networked Digital Library of Theses and Dissertations. (2008). Retrieved 10 January 2008, from http://www.ndltd.org

Neuendorf, K. A. (2002). *The content analysis guidebook*. Thousand Oaks, CA: Sage Publications.

O'Sullivan-Maillet, J. (1997). The competencies continuum in nutrition. *Nutrition, 13*(9), 840-841.

O'Sullivan-Maillet, J., & Howell, W. H. (2007). Advanced-level and speciality practice: How necessary or beneficial are they for practitioners? In A. S. Bloch, J. O. Maillet, W. H. Howell & M. F. Winkler (Eds.), *Issues and choices in clinical nutrition practice* (pp. 44-57). Philadeplhia: Lippincott Williams & Wilkins.

O'Sullivan-Maillet, J., Skates, J., & Pritchett, E. (2005). American Dietetic Association: Scope of dietetics practice framework. *Journal of the American Dietetic Association, 105*(4), 634-640.

Oakland, M. J. (1997). Stretching beyond tradition-prescribed teaching: Challenges for clinical dietetic educators. *Diagnostic Nutrition Network, 6*(2), 2-5.

Omaha System. (2007). *The Omaha System*. Retrieved June 11, 2007, from http://www.omahasystem.org/

Paganin, A., Moraes, M. A., Pokorski , S., & Rabelo, E. R. (2008). Factors that inhibit the use of nursing language. *International Journal of Nursing Terminologies & Classifications, 19*(4), 150-157.

Parfitt, J. M. (1993). Application of nursing process and nursing diagnosis: An interactive text. *AORN Journal, 57*(2), 526-526.

Parrington, D. J. (2003). Criteria embraced at the Phoenix VA by selecting a model that challenges the quality of nuritional care and outcomes management: Parrington's theory for optimization of nutrition care quality and registered dietitians' (RDs) potential. *Diagnostic Nutrition Network, 12*(2), 6-7.

Parrington, D. J. (2004). Progressive scientization of language standardization (PSLS) for future data mining and higher practice standards. *Diagnostic Nutrition Network, 13*(1), 2-7.

Picchioni, M. J. (2002). Making explicit the QIC guided nine-step nutritional care process as related to the backgrounder paper on hyperhomocysteinemia. *Diagnostic Nutrition Network, 11*(2), 1-8.

Pope, C., Ziebland, S., & Mays, N. (2000). Qualitative research in health care: Analysing qualitative data. *British Medical Journal, 320*(7227), 114-116.

Powers, M. A., & Wheeler, M. L. (1993). Model for dietetics practice and research: The challenge is here, but the journey was not easy. *Journal of the American Dietetic Association, 93*(7), 755-757.

Price, M. R. (1980). Nursing diagnosis: Making a concept come alive. *The American Journal of Nursing, 80*(4), 668-671.

Prochaska, J. O., & DiClemente, C. C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research and Practice, 19*(3), 276–288.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change:Applications to addictive behaviors. *American Psychologist, 47*(9), 1102–1114.

Rantz, M., Miller, T., & Jacobs, C. (1985). Diagnostics: Nursing diagnosis in long-term care. *The American Journal of Nursing, 85*(8), 916-926.

Reeves, R. S. (2005). Building the structure of dietetics practice. *Journal of the American Dietetic Association, 105*(12), 1849-1849.

Regan, T., O'Sullivan-Maillet, J., Touger-Decker, R., Khan, H., Byham-Gray, L. D., Rigassio Radler, D., et al. (2009). Knowledge, perceptions and practices of registered dietitians in the dietetic practice group, consultant dietitians in health care facilities, regarding the American Dietetic Association's standardized language to document the Nutrition Care Process. *Journal of the American Dietetic Association, 109*(9, Supplement), A10.

Richesson, R. L., & Krischer, J. (2007). Data standards in clinical research: Gaps, overlaps, challenges and future directions. *Journal of the American Medical Informatics Association, 14*(6), 687-696.

Ritter-Gooder, P., & Lewis, N. M. (2009). Content validity of nutrition diagnostic term involuntary weight loss. *Journal of the American Dietetic Association, 109*(9. Supplement), A22.

Roberts, Innes, K. C., & Walker, S. M. (1998). Introducing ICD-10-AM in Australian hospitals. *The Medical Journal of Australian, 169*, S32-S35.

Roberts, S. R., & Shiner, R. (2009). Nutrition Care Process in a tertiary teaching hospital: Implementation strategies and impact on clinical productivity. *Journal of the American Dietetic Association, 109*(9, Supplement), A10.

Rose, J. S., Fisch, B. J., Hogan, W. R., Levy, B., Marshall, P., Thomas, D. R., et al. (2001). Common medical terminology comes of age, part two: Current code and terminology sets - Strengths and weaknesses *Journal of Healthcare Information Management, 15*(3), 319-330.

Sandrick, K. (2002). Is nutritional diagnosing a critical step in the Nutrition Care Process? *Journal of the American Dietetic Association, 102*(3), 427-431.

Saranto, K., & Kinnunen, U.-M. (2009). Evaluating nursing documentation - research designs and methods: Systematic review. *Journal of Advanced Nursing, 65*(3), 464-476.

Schell, B. A. B., & Schell, J. W. (2008). *Clinical and professional reasoning in occupational therapy*. Baltimore, MD: Lippincott Williams & Wilkins.

Shronts, E. P. (1996). Defining dietetics practice for today and tomorrow: An international perspective. *Nutrition, 12*(2), 141-142.

Simpson, R. L. (2007). ICNP: The language of worldwide nursing. *Nursing Management, 38*(2), 15-18.

Skipper, A., & Winkler, M. F. (1992). The changing role of the dietitian in clinical practice *Nutrition in Clinical Practice 7*(3, Supplement), S5-S8.

Spackman, K. (2007). *SNOMED clinical terms fundamentals*. Retrieved April 4, 2009, from http://www.ihtsdo.org/fileadmin/user_upload/Docs_01/SNOMED_Clinical_Terms_Fundamentals.pdf

Splett. (1996). *Cost outcomes of nutrition intervention. Part 1 of a 3 part monograph*. New York: Mead Johnson & Company.

Splett, & Myers, E. F. (2001). A proposed model for effective nutrition care. *Journal of the American Dietetic Association, 101*(3), 357-363.

Suen, L. F. (2008). Challenges in implementing the nutrition diagnosis statement in acute care hospitals. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A20-A20.

Suen, L. F. (2009). Implementing electronic health records with standardized language for the Nutrition Care Process in acute care hospital. *Journal of the American Dietetic Association, 109*(9, Supplement), A18.

Sumsion, T. (2006). *Client-centred practice in occupational therapy : A guide to implementation* (2nd ed.). Edinburgh: Churchill Livingstone Elsevier.

Swan. (2007). Standardized nutrition language used in an electronic health record. *Journal of the American Dietetic Association, 107*(8 Supplement 1), A17.

Swan, Lang, N. M., & McGinley, A. M. (2004). Access to quality health care: Links between evidence, nursing language, and informatics *Nursing Economics, 22*(6), 325-332.

Thomas, B., & Bishop, J. (2007). *Manual of dietetic practice* (4th ed.). Oxford, UK ; Ames, Iowa: Blackwell Publishing.

Trombley, L. E., & Rodrigues, L. M. (2008). Implementation of the Nutrition Care Process in the affinity patient charting system. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A9.

UMLS. (2006). *Unified medical language system*. Retrieved January 2, 2007, from http://www.nlm.nih.gov/research/umls/

University of Iowa. (2006). *Centre for nursing classification & clinical effectiveness. Overview of NIC/NOC*. Retrieved June 10, 2007, from http://www.nursing.uiowa.edu/excellence/nursing_knowledge/clinical_effectiveness/index.htm

van der Vleuten, C. P. M., & Newbie, D. I. (1995). How can we test clinical reasoning? *The Lancet, 345*, 1032-1034.

Vardy, D. A., Gill, R. P., & Israeli, A. (1998). Coding medical information: Classification versus nomenclature and implications to the Israeli medical system *Journal of Medical Systems, 22*(4), 203-210.

Vaughan, L. A., & Manning, C. K. (2004). Meeting the challenges of dietetics practice with evidence-based decisions. *Journal of the American Dietetic Association, 104*(2), 282-284.

Weis, M. (2008). Nutrition Care Process in the electronic medical record. *Journal of the American Dietetic Association, 108*(9, Supplement 1), A9.

Welton, J. M., & Halloran, E. J. (2005). Nursing diagnoses, diagnosis-related group, and hospital outcomes. *Journal of Nursing Administration, 35*(12), 541-549.

Wilkinson, J. M. (2007). *Nursing process and critical thinking* (4th ed.). New Jersey: Pearson Prentice Hall.

Winkler, M. F., & Touger-Decker, R. (2007). Nutrition assessment In A. S. Bloch, J. O'Sullivan-Maillet, W. H. Howell & M. F. Winkler (Eds.), *Issues and choices in clinical nutrition practice* (pp. 163-177). Philadelphia PA: Lippincott Williams & Wilkins.

Winterfeldt, E. A., Bogle, M. L., & Ebro, L. L. (2005). *Dietetics practice and future trends* (2nd ed.). Boston: Jones & Bartlett Publishers.

World Health Organization (WHO). (2002). *Towards a common language for functioning, disability and health ICF*. Geneva: World Health Organization.

World Health Organization (WHO). (2007). *International classification of diseases (ICD)*. Retrieved May 29, 2007, from http://www.who.int/classifications/icd/en/index.html

Writing Group of the Nutrition Care Process/Standardized Language Committee. (2008a). Nutrition Care Process and model part I: The 2008 update. *Journal of the American Dietetic Association 108*(7), 1113-1117.

Writing Group of the Nutrition Care Process/Standardized Language Committee. (2008b). Nutrition Care Process part II: Using the International Dietetics and Nutrition Terminology to document the Nutrition Care Process. *Journal of the American Dietetic Association, 108*(8), 1287-1289, 1291-1293.

Yasunaga, H., Imamura, T., Yamaki, S., & Endo, H. (2008). Computerizing medical records in Japan. *International Journal of Medical Informatics, 77*(10), 708-713.

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

Yonkoski, D., & Gardner-Cardani, J. (2007). Resource utilization for Nutrition Care Process implementation. *Journal of the American Dietetic Association, 107*(8, Supplement 1), A87-A87.

Yura, H., & Walsh, M. B. (1988). *The nursing process: Assessing, planning, implementing, evaluating* (5th ed.). Norwalk: Appleton & Lange

Appendix 1

Information Statement

Professor Sandra Capra
Professor of Nutrition and Dietetics
Head, School of Health Sciences
University of Newcastle
CALLAGHAN NSW 2308
TELEPHONE: 02 4921 5642
FACSIMILE: 02 4921 6984
Email: Sandra.Capra@newcastle.edu.au

INFORMATION STATEMENT

Content Validation of Nutrition Diagnoses

Dear Potential Participant

You are invited to take part in the research project "Content Validation of Nutrition Diagnoses" which is being conducted by Ms Zuriati Ibrahim as part of her Doctorate of Philosophy in Nutrition and Dietetics, under the supervision of Professor Sandra Capra and Dr Surinder Baines from the Faculty of Health at the University of Newcastle.

Why is the research being done?

The purpose of the project is to validate the content of the Nutrition Diagnosis developed by American Dietetic Association (ADA) within the Australian and international context. We are interested in knowing your own definitions and opinions regarding the diagnoses. We hope to help the profession with clarifying terminology and clearly defining diagnoses to enhance dietetic practice. This project is part of an international study on standardized nutrition language and the overall process will have an impact on clinical practice, education, research and dietetic policy.

Who can participate in the research?

We are seeking dietitians who are currently practising in clinical nutrition.

What choice do you have?

Participation in this research is entirely your choice. Only those people who give their informed consent will be included in the project. Whether or not you decide to participate, your decision will not disadvantage you in any way.

What would you be asked to do?

Participation involves completing and returning the enclosed anonymous survey.

What are the risk and benefits of participating?

There is no known risk and no direct benefit to you during this study. Your participation in the study will assist in clarifying the nutrition diagnoses for the practice setting which will enhance dietetic practice and nutritional outcomes for patients/clients.

How will your privacy be protected?

You will not be identified and all data will be reported as a group.

How will the information collected be used?

The definitions provided by participants will be thematically analysed and compared with the materials provided by the American Dietetic Association. We hope that once we determine outcomes from our study, other countries will attempt similar studies to gauge the level of agreement with the language and therefore support its universal adoption.

The responses will be qualitatively reviewed to determine if the Nutrition Diagnosis step is usually included as part of normal practice. A report of the specific outcomes and recommendations for practice will be provided to the DAA for dissemination to members.

What do you need to do to participate?

Please read this Information Statement and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have questions, please contact one of the researchers as detailed below.

If you would like to participate, please complete and return the questionnaire in the reply paid envelope provided. This will be taken as your informed consent to participate.

Further information:

Please contact Zuriati Ibrahim on (02) 4921 5690, or Professor Sandra Capra (02) 4921 5642, or Dr Surinder Baines (02) 4921 5643.

Thank you for your interest.

Yours sincerely

Zuriati Ibrahim
Research Student

Professor Sandra Capra
Research Supervisor

The Research Team:

- *Ms Zuriati Ibrahim from the Faculty of Health at the University of Newcastle (Phone: 02 4921 5690)*
- *Email: Zuriati.Ibrahim@studentmail.newcastle.edu.au*
- *Professor Sandra Capra from the Faculty of Health at the University of Newcastle (Phone: 02 4921 5642)*
- *Email: Sandra.Capra@newcastle.edu.au*
- *Dr Surinder Baines from the Faculty of Health at the University of Newcastle (Phone: 02 4921 5643)*
- *Email: Surinder.Baines@newcastle.edu.au*

This project has been approved by the University's Human Research Ethics Committee, Approval No. [H-289-0906]
Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone (02) 49216333, email Human-Ethics@newcastle.edu.au.

Appendix 2

Survey questionnaire

Professor Sandra Capra
Professor of Nutrition and Dietetics
Head, School of Health Sciences
University of Newcastle
CALLAGHAN NSW 2308
TELEPHONE: 02 4921 5642
FACSIMILE: 02 4921 6984
Email: Sandra.Capra@newcastle.edu.au

The University of Newcastle
AUSTRALIA

CONTENT VALIDATION OF NUTRITION DIAGNOSES

QUESTIONNAIRE GUIDE

This set of questionnaires consist of five sections:

Section A	**Introductory notes on Nutrition Diagnosis**
Section B	**Case Study**
Section C	**Nutrition Diagnostic Terminology**
Section D	**Definitions and justifications of nutrition diagnostic terminology**
Section E	**Demographic data**

Please read the introductory notes in Section A to get overview information on Nutrition Diagnosis.

Please answer the case study as instructed in Section B to Section D and fill in the demographic details in Section E.

The Research Team:

- Ms Zuriati Ibrahim from the Faculty of Health at the University of Newcastle. (Phone: 02 4921 5690, email: Zuriati.Ibrahim@studentmail.newcastle.edu.au)
- Professor Sandra Capra from the Faculty of Health at the University of Newcastle. (Phone: 02 4921 5642, email: Sandra.Capra@newcastle.edu.au)
- Dr Surinder Baines from the Faculty of Health at the University of Newcastle. (Phone: 02 4921 5643, email: Surinder.Baines@newcastle.edu.au)

SECTION A
INTRODUCTORY NOTES TO NUTRITION DIAGNOSIS*

STEP 2. NUTRITION DIAGNOSIS	
Basic Definition & Purpose	"**Nutrition Diagnosis**" is the second step of the Nutrition Care Process, and is the identification and labeling that describes an actual occurrence, risk of, or potential for developing a nutritional problem that dietetics professionals are responsible for treating independently. At the end of the assessment step, data are clustered, analyzed, and synthesized. This will reveal a nutrition diagnostic category from which to formulate a specific nutrition diagnostic statement. Nutrition diagnosis should not be confused with medical diagnosis, which can be defined as a disease or pathology of specific organs or body systems that can be treated or prevented. A nutrition diagnosis changes as the patient/client/group's response changes. A medical diagnosis does not change as long as the disease or condition exists. A patient/client/group may have the medical diagnosis of "Type 2 diabetes mellitus"; however, after performing a nutrition assessment, dietetics professionals may diagnose, for example, "undesirable overweight status" or "excessive carbohydrate intake." Analyzing assessment data and naming the nutrition diagnosis(es) provide a link to setting realistic and measurable expected outcomes, selecting appropriate interventions, and tracking progress in attaining those expected outcomes.
Data Sources/Tools for Diagnosis	■ Organized and clustered assessment data ■ List(s) of nutrition diagnostic categories and nutrition diagnostic labels ■ Currently the profession does not have a standardized list of nutrition diagnoses. However ADA has appointed a Standardized Language Work Group to begin development of standardized language for nutrition diagnoses and intervention. (June 2003)
Nutrition Diagnosis Components (3 distinct parts) *FIG 2 cont'd.*	**1. Problem (Diagnostic Label)** The nutrition diagnostic statement describes alterations in the patient/client/group's nutritional status. A diagnostic label (qualifier) is an adjective that describes/qualifies the human response such as: ■ Altered, impaired, ineffective, increased/decreased, risk of, acute or chronic. **2. Etiology (Cause/Contributing Risk Factors)** The related factors (etiologies) are those factors contributing to the existence of, or maintenance of pathophysiological, psychosocial, situational, developmental, cultural, and/or environmental problems. ■ Linked to the problem diagnostic label by words "related to" (RT) ■ It is important not only to state the problem, but to also identify the cause of the problem. □ This helps determine whether or not nutritional intervention will improve the condition or correct the problem. □ It will also identify who is responsible for addressing the problem. Nutrition problems are either caused directly by inadequate intake (primary) or as a result of other medical, genetic, or environmental factors (secondary). □ It is also possible that a nutrition problem can be the cause of another problem. For example, excessive caloric intake may result in unintended weight gain. Understanding the cascade of events helps to determine how to prioritize the interventions. □ It is desirable to target interventions at correcting the cause of the problem whenever possible; however, in some cases treating the signs and symptoms (consequences) of the problem may also be justified. ■ The ranking of nutrition diagnoses permits dietetics professionals to arrange the problems in order of their importance and urgency for the patient/client/group. **3. Signs/Symptoms (Defining Characteristics)** The defining characteristics are a cluster of subjective and objective signs and symptoms established for each nutrition diagnostic category. The defining characteristics, gathered during the assessment phase, provide evidence that a nutrition related problem exists and that the problem identified belongs in the selected diagnostic category. They also quantify the problem and describe its severity: ■ Linked to etiology by words "as evidenced by" (AEB); ■ The symptoms (subjective data) are changes that the patient/client/group feels and expresses verbally to dietetics professionals; and ■ The signs (objective data) are observable changes in the patient/client/group's health

Please open →

	status.
Nutrition Diagnostic Statement (PES)	Whenever possible, a nutrition diagnostic statement is written in a PES format that states the Problem (P), the Etiology (E), and the Signs & Symptoms (S). However, if the problem is either a risk (potential) or wellness problem, the nutrition diagnostic statement may have only two elements, Problem (P), and the Etiology (E), since Signs & Symptoms (S) will not yet be exhibited in the patient. A well-written Nutrition Diagnostic Statement should be: 1. Clear and concise 2. Specific: patient/client/group-centered 3. Related to one client problem 4. Accurate: relate to one etiology 5. Based on reliable and accurate assessment data **Examples of Nutrition Diagnosis Statements (PES or PE)** ■ Excessive caloric intake (problem) "related to" frequent consumption of large portions of high fat meals (etiology) "as evidenced by" average daily intake of calories exceeding recommended amount by 500 kcal and 12-pound weight gain during the past 18 months (signs) ■ Inappropriate infant feeding practice RT lack of knowledge AEB infant receiving bedtime juice in a bottle ■ Unintended weight loss RT inadequate provision of energy by enteral products AEB 6-Pound weight loss over past month ■ Risk of weight gain RT a recent decrease in daily physical activity following sports injury
Critical Thinking	The following types of critical thinking skills are especially needed in the diagnosis step: ■ Finding patterns and relationships among the data and possible causes; ■ Making inferences ("if this continues to occur, then this is likely to happen"); ■ Stating the problem clearly and singularly; ■ Suspending judgment (be objective and factual); ■ Making interdisciplinary connections; ■ Ruling in/ruling out specific diagnoses; and ■ Prioritizing the relative importance of problems for patient/client/group safety.
Documentation of Diagnosis	Documentation is an on-going process that supports all of the steps in the Nutrition Care Process. Quality documentation of the diagnosis step should be relevant, accurate, and timely. A nutrition diagnosis is the impression of dietetics professionals at a given point in time. Therefore, as more assessment data become available, the documentation of the diagnosis may need to be revised and updated. Inclusion of the following information would further describe quality documentation of this step: ■ Date and time; and ■ Written statement of nutrition diagnosis.
Determination for Continuation of Care	Since the diagnosis step primarily involves naming and describing the problem, the determination for continuation of care seldom occurs at this step. Determination of the continuation of care is more appropriately made at an earlier or later point in the Nutrition Care Process.

*Adapted from Lacey & Pritchett 2003. Nutrition Care Process and Model: ADA adopts road map to quality care and outcomes management. *Journal of The American Dietetic Association*. Vol. 103 (8): 1061-1072.

← **Please open**

SECTION B

CASE STUDY

Mr Vegetable was diagnosed with pharyngeal cancer 2 months ago. He is 65 yrs old and has been living alone in his own home since his wife died about 2 years ago. His treatment includes a number of medications (he cannot name them all but he takes 6 types a day) as well as radiation therapy – he completed his first cycle last month. On interview he provides you with the following information.

- He has experienced difficulties with eating for some time now, as he finds that some foods no longer have any appeal – he calls them "tasteless" and "like eating cardboard" because of the dryness in his mouth.
- His wife used to look after the food preparation and since she passed away, he only prepares simple quick meals, firstly because he really is not adept at cooking and secondly due to lack of interest.
- A diet history indicates his intake is in the order of 4000-6000kJ depending on how he is feeling.
- He has some nausea although this is getting a little better since the radiation treatment has stopped for the moment.
- His current weight is 55kg (his height is 178cm) and his usual weight was over 65kg a few years ago – in the last few months his clothes seem looser and he thinks he has lost several kg.
- He is not always motivated to eat, partly because he complains of fatigue and general loss of appetite as well as constipation.
- His GP suggested he was anaemic so he has started iron supplements in the last month.
- He tries to do his own shopping but only gets to the shops about once a week due to his general poor health.

Case study instructions:

STEP 1 Based on the information given in this case study, please identify the nutrition diagnosis terminology (can be more than one diagnosis) from the list of Nutrition Diagnostic Terminology in Section C. Please choose a specific code from the list.

STEP 2 Please rank the selected nutrition diagnosis based on priority in your nutritional management in Section D

STEP 3 Please give a definition based on your interpretation and your understanding for the chosen nutrition diagnostic terminology in Section D.

STEP 4 Please give justification for the answer in Section D.

Example of nutrition diagnosis definition and justification as follow:

Please refer Section C, Domain CLINICAL – NC (Defined as "nutritional findings/problems identified as related to medical or physical conditions" and class Functional (1))

Step 1	**NC-1.1 Swallowing difficulties**	
Step 2	**1**	
Step 3	**Definition**	: Impaired movement of food and liquid from the mouth to the stomach
Step 4	**Justification**	: Swallowing difficulties related to stroke as evidenced by coughing following drinking of thin liquids.

SECTION C

NUTRITION DIAGNOSTIC TERMINOLOGY

INTAKE **NI**

Defined as "actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support"

Caloric Energy Balance (1)

Defined as "actual or estimated changes in energy (kcal)

- ❑ Hypermetabolism (Increased energy needs) NI-1.1
- ❑ Increased energy expenditure NI-1.2
- ❑ Hypometabolism (Decreased energy needs) NI-1.3
- ❑ Inadequate energy intake NI-1.4
- ❑ Excessive energy intake NI-1.5

Oral or Nutrition Support Intake (2)

Defined as "actual or estimated food and beverage intake from oral diet or nutrition support compared with patient goal"

- ❑ Inadequate oral food/ beverage intake NI-2.1
- ❑ Excessive oral food/ beverage intake NI-2.2
- ❑ Inadequate intake from enteral/parenteral nutrition infusion NI-2.3
- ❑ Excessive intake from enteral/parenteral nutrition NI-2.4
- ❑ Inappropriate infusion of enteral/parenteral nutrition (use with caution) NI-2.5

Fluid Intake (3)

Defined as "actual or estimated fluid intake compared against patient goal"

- ❑ Inadequate fluid intake NI-3.1
- ❑ Excessive fluid intake NI-3.2

Bioactive Substances (4)

Defined as "actual or observed intake of bioactive substances, including single or multiple functional food componets, ingredients, dietary supplements, alcohol"

- ❑ Inadequate bioactive substance intake NI-4.1
- ❑ Excessive bioactive substance intake NI-4.2
- ❑ Excessive alcohol intake NI-4.3

Nutrient (5)

Defined as "actual or estimated intake of specific nutrient groups or single nutrients as compared with desired levels"

- ❑ Increased nutrient needs (specify) _____ NI-5.1
- ❑ Evident protein-energy malnutrition NI-5.2
- ❑ Inadequate protein energy intake NI-5.3
- ❑ Decreased nutrient needs (specify) _____ NI-5.4
- ❑ Imbalance of nutrients NI-5.5

Fat and Cholesterol (51)

- ❑ Inadequate fat intake NI-51.1
- ❑ Excessive fat intake NI-51.2
- ❑ Inappropriate intake of food fats (specify)_____ NI-51.3

Protein (52)

- ❑ Inadequate protein intake NI-52.1
- ❑ Excessive protein intake NI-52.2
- ❑ Inappropriate intake of amino acids (specify)_____ NI-52.3

Carbohydrate and Fiber Intake (53)

- ❑ Inadequate carbohydrate intake NI-53.1
- ❑ Excessive carbohydrate intake NI-53.2
- ❑ Inappropriate intake of types of carbohydrate (specify)_____ NI-53.3
- ❑ Inconsistent carbohydrate intake NI-53.4
- ❑ Inadequate fiber intake NI-53.5
- ❑ Excessive fiber intake NI-53.6

Vitamin Intake (54)

- ❑ Inadequate vitamin intake (specify)_____ NI-54.1
- ❑ Excessive vitamin intake (specify)_____ NI-54.2

❑ A	❑ C
❑ Thiamin	❑ D
❑ Riboflavin	❑ E
❑ Niacin	❑ K
❑ Folate	❑ Other_____

Mineral Intake (55)

- ❑ Inadequate mineral intake (specify) NI-55.1
  - ❑ Calcium ❑ Iron
  - ❑ Potassium ❑ Zinc
  - ❑ Other _____
- ❑ Excessive mineral intake (specify) NI-55.2
  - ❑ Calcium ❑ Iron
  - ❑ Potassium ❑ Zinc
  - ❑ Other _____

CLINICAL **NC**

Defined as "nutritional findings/problems identified as related to medical or physical conditions"

Functional (1)

Defined as "change in physical or mechanical functioning that interferes with or prevents desired nutritional consequences"

- ❑ Swallowing difficulty NC-1.1
- ❑ Chewing (masticatory) difficulty NC-1.2
- ❑ Breastfeeding difficulty NC-1.3
- ❑ Altered GI function NC-1.4

Biochemical (2)

Defined as "change in capacity to metabolize nutrients as a result of medications, surgery, or as indicated by altered lab values"

- ❑ Impaired nutrient utilization NC-2.1
- ❑ Altered nutrition-related laboratory values NC-2.2
- ❑ Food medication interaction NC-2.3

Weight (3)

Defined as "chronic weight or changed weight status when compared with usual or desired body weight"

- ❑ Underweight NC-3.1
- ❑ Involuntary weight loss NC-3.2
- ❑ Overweight/obesity NC-3.3
- ❑ Involuntary weight gain NC-3.4

BEHAVIORAL-ENVIRONMENTAL **NB**

Defined as "nutritional findings/problems identified as related to knowledge, attitude/beliefs, physical environment, or food supply and safety"

Knowledge and Beliefs (1)

Defined as "actual knowledge and beliefs as observed or documented"

- ❑ Food and nutrition-related knowledge deficit NB-1.1
- ❑ Harmful beliefs/attitudes about food or nutrition-related topics (use with caution) NB-1.2
- ❑ Not ready for diet/ lifestyle change NB-1.3
- ❑ Self-monitoring deficit NB-1.4
- ❑ Disordered eating pattern NB-1.5
- ❑ Limited adherence to nutrition-related recommendations NB-1.6
- ❑ Undesirable food choices NB-1.7

Physical Activity and Function (2)

Defined as "actual physical activity, self-care, and quality of life problems as reported, observed or documented"

- ❑ Physical inactivity NB-2.1
- ❑ Excessive exercise NB-2.2
- ❑ Inability or lack of desire to manage self care NB-2.3
- ❑ Impaired ability to prepare foods/meals NB-2.4
- ❑ Poor nutrition quality of life NB-2.5
- ❑ Self-feeding difficulty NB-2.6

Food Safety and Access (3)

Defined as "actual problems with food access or food safety"

- ❑ Intake of unsafe food NB-3.1
- ❑ Limited access to food NB-3.2

Date Identified	Date Resolved

Adapted from: American Dietetic Association. 2006. Nutrition Diagnosis: A critical step in the nutrition care process. Chicago: American Dietetic Association;

SECTION D

DEFINITIONS AND JUSTIFICATIONS OF NUTRITION DIAGNOSTIC TERMINOLOGY

Example of nutrition diagnosis definition and justification:

1 NC-3.1 Underweight
Definitions : Low body weight compared to established reference standards or recommendation

Justification : Underweight related to limited access to food as evidence by BMI < 18.5 kg/m2

Rank

_____
Definition :
_____
_____
Justification:
_____
_____

_____
Definition :
_____
_____
Justification:
_____
_____

_____
Definition :
_____
_____
Justification:
_____
_____

_____
Definition :
_____
_____
Justification:
_____
_____

_____
Definition :
_____
_____
Justification:
_____
_____

If more space required, please turn over →

SECTION D (cont'd.)

DEFINITIONS AND JUSTIFICATIONS OF NUTRITION DIAGNOSTIC TERMINOLOGY

Example of nutrition diagnosis definition and justification:

1 NC-3.1 Underweight

Definitions : Low body weight compared to established reference standards or recommendation

Justification : Underweight related to limited access to food as evidence by BMI < 18.5 kg/m2

Rank

_____
Definition :
_____
_____
Justification:
_____
_____

_____
Definition :
_____
_____
Justification:
_____
_____

_____
Definition :
_____
_____
Justification:
_____
_____

_____
Definition :
_____
_____
Justification:
_____
_____

_____
Definition :
_____
_____
Justification:
_____
_____

(You may use additional sheet, if inadequate space)

SECTION E

DEMOGRAPHIC DATA

Please answer question by either filling in the blank or circling the most appropriate answer.

1. The State where you practice _____

2. Facility setting where you practice
   a. Urban
   b. Rural

3. Type of facility
   a. Inpatient care, acute-care facility
   b. Inpatient care, long term care facility
   c. Ambulatory / outpatient care
   d. Community / public health program
   e. Self-employed, individual client counseling

4. How many patients / clients do you assess and / or counsel per day ?
   a. 1-10
   b. 11-15
   c. 15-20
   d. Other _____ (please specify)

5. What is the highest degree you were awarded ?
   a. Bachelor
   b. Master's
   c. Doctorate

6. Have you earned Accredited Practising Dietitian (APD) ?
   a. Yes
   b. No

7. Nutrition Care Speciality Area (general, pediatrics, diabetes, etc)
   _____

8. How many year (s) have you been qualified ? _____ years

9. How many year (s) have you been practicing medical nutrition therapy for individuals?
   _____ year (s)

10. Experience with nutrition diagnoses
    a. Some experience
    b. No experience

11. Is making a formal nutrition diagnosis in the medical record part of your current practice ?
    a. Yes
    b. No
    c. Occasionally
    d. Other _____(please specify)

Thank you for completing this survey.

Appendix 3

Kappa values and percentage agreement for coding of NDTs

Appendix 3 Kappa values and percentage agreement for coding of NDTs

NDT [code]	**Coder**									
	1		2		3		4		**5**	
	Kappa	%	Kappa	%	Kappa	%	Kappa	%	Kappa	**%**
Food and nutrition-related knowledge deficit [NB-1.1]	1.000[a]	100	1.000[a]	100	-	80	1.000[a]	100	1.000[a]	100
Not ready for diet/lifestyle change [NB-1.3]	-	100	-	100	-	100	-	100	-	100
Self-monitoring deficit [NB-1.4]	-	100	-	100	-	100	-	100	-	100
Disordered eating pattern [NB-1.5]	-	80	-	40	-	100	-	60	-	60
Physical inactivity [NB-2.1]	1.000[b]	100	1.000[b]	100	-	100	1.000[b]	100	1.000[b]	100
Inability or lack of desire to manage self care [NB-2.3]	1.000[a]	100	-	40	-	100	-	80	-	60
Impaired ability to prepare foods/meals [NB-2.4]	0.545[c]	80	-	80	1.000[b]	100	-	40	-	40
Poor nutrition quality of life [NB-2.5]	-	100	-	80	-	100	-	80	-	80
Self-feeding difficulty [NB-2.6]	-	100	-	100	-	100	-	100	-	100
Intake of unsafe food [NB-3.1]	-	100	-	100	-	100	-	100	-	100
Limited access to food [NB-3.2]	1.000[d]	100	-	66.7	-	50	-	66.7	-	100
Swallowing difficulty [NC-1.1]	-	100	-	40	-	100	-	100	-	60
Chewing (masticatory) difficulty [NC-1.2]	1.000[a]	100	-	40	-	60	-	20	-	60
Food-medication interaction [NC-2.3]	1.000[e]	100	-	60	-	25	0.545[c]	80	-	40
Underweight [NC-3.1]	1.000[e]	100	1.000[e]	100	-	60	1.000[e]	100	-	80
Involuntary weight loss [NC-3.2]	0.706[g]	80	0.706[g]	80	0.688[h]	80	-	60	0.688[h]	80
[p]Hypermetabolism (*Increased energy needs*) [NI-1.1]	1.000[a]	100	-	40	1.000[a]	100	-	20	-	80
Increased energy expenditure [NI-1.2]	-	100	-	100	-	100	-	100	-	100
[p]Hypometabolism (*Decreased energy needs*) [NI-1.3]	-	100	-	100	-	100	-	100	-	0
Inadequate energy intake [NI-1.4]	1.000[i]	100	0.474[j]	60	-	80	-	60	-	80

NDT [code]	**Coder**									
	1		2		3		4		**5**	
	Kappa	%	Kappa	%	Kappa	%	Kappa	%	Kappa	**%**
Inadequate oral food/beverage intake [NI-2.1]	1.000[e]	100	-	40	-	-	0.545[c]	80	0.167[k]	60
Inadequate fluid intake [NI-3.1]	1.000[a]	100	-	60	-	40	-	80	-	75
Evident protein-energy malnutrition[q] [NI-5.2]	1.000[e]	100	-	60	-	0	-	80	-	40
Inadequate protein-energy intake [NI-5.3]	-	80	-	80	1.000[b]	100	-	80	-	60
Decreased nutrient needs (specify) [NI-5.4]	-	100	-	100	-	-	-	100	-	100
Imbalance of nutrients [NI-5.5]	-	100	-	0	-	50	-	100	-	100
Inadequate fat intake[r] [NI-51.1]	-	100	-	100	-	100	-	100	-	100
Inadequate carbohydrate intake[s] [NI-53.1]	1.000[d]	100	1.000[d]	100	-	0	-	66.6	-	66.7
Inadequate fibre intake[t] [NI-53.5]	1.000[e]	100	-	60	-	60	1.000[e]	100	-	80
Inadequate vitamin intake[u] (specify) [NI-54.1]	1.000[o]	100	1.000[o]	100	1.000[b]	100	1.000[o]	100	1.000[o]	100
Inadequate mineral intake[v] (specify) [NI-55.1]	1.000[a]	100	-	20	-	60	-	60	-	20
Altered GI function [NC-1.4]	1.000[e]	100	-	20	-	40	-	40	0.286[f]	60
Altered nutrition-related laboratory values (specify) [NC-2.2]	-	75	-	75	-	33.3	-	25	-	50
Increased nutrient needs (specify) [NI-5.1]	1.000[e]	100	-	20	-	-	-	60	-	40
Inadequate protein intake[w] [NI-52.1]	1.000[l]	100	-	25	0.636[m]	75	-	50	0.273[n]	50

[a]p=0.002, bp=0.157, cp=0.171, dp=0.083, ep=0.025, fp=0.361, gp=0.16, hp=0.022, ip=0.000, jp=0.051, kp=0.709, lp=0.006, mp=0.046, np=0.391,op=0.014
- Kappa statistics cannot be computed.
[p]This nutrition diagnostic code has been removed and is no longer used (ADA, 2008)
[q]This NDT has been retitled 'Malnutrition' (ADA, 2009)
[r]The code for this NDT has changed from [NI-51.1] (ADA, 2006) to [NI-5.6.1] (ADA, 2008)
[s]The code for this NDT has changed from [NI-53.1] (ADA, 2006) to [NI-5.8.1] (ADA, 2008)
[t]The code for this NDT has changed from [NI-53.5] (ADA, 2006) to [NI-5.8.5] (ADA, 2008)
[u]The code for this NDT has changed from [NI-54.1] (ADA, 2006) to [NI-5.9.1] (ADA, 2008)
[v]The code for this NDT has changed from [NI-55.1] (ADA, 2006) to [NI-5.10.1] (ADA, 2008)
[w]The code for this NDT has changed from [NI-52.1] (ADA, 2006) to [NI-5.7.1] (ADA, 2008)

Appendix 4

All NDTs selected by practitioners

Appendix 4 All NDTs selected by practitioners

Code	NDT	Practitioners[b] [n(%)]						Total (%)
		AU n=47	CA n=22	UK n=1	US n=3	NZ n=4	MY n=8	N=85
NB-1.1	Food and nutrition-related knowledge deficit	6 (13)	2 (9)	0 (.0)	0 (.0)	3 (75)	0 (.0)	11 (13)
NB-1.4	Self-monitoring deficit	1 (2)	1 (5)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	2 (2)
NB-1.5	Disordered eating pattern	2 (4)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	2 (25)	4 (5)
NB-1.6	Limited adherence to nutrition-related recommendations	0 (.0)	1 (5)	0 (.0)	0 (.0)	0 (.0)	1 (13)	2 (2)
NB-2.1	Physical inactivity	1 (2)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	1 (1)
NB-2.3	Inability or lack of desire to manage self care	4 (9)	8 (36)	0 (.0)	0 (.0)	2 (50)	1 (13)	15 (18)
NB-2.4	Impaired ability to prepare foods/meals	25 (53)	9 (41)	0 (.0)	1 (33)	4 (100)	1 (13)	40 (47)
NB-2.5	Poor nutrition quality of life	3 (6)	5 (23)	1 (100)	1 (33)	0 (.0)	1 (13)	11 (13)
NB-2.6	Self-feeding difficulty	1 (2)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	1 (1)
NB-3.2	Limited access to food	11 (23)	6 (27)	0 (.0)	0 (.0)	0 (.0)	2 (25)	22 (26)
NC-1.1	Swallowing difficulty	9 (19)	7 (32)	0 (.0)	0 (.0)	3 (75)	2 (25)	12 (14)
NC-1.2	Chewing (masticatory) difficulty	15 (32)	1 (5)	0 (.0)	0 (.0)	0 (.0)	1 (13)	20 (24)
NC-1.4	Altered GI function	14 (30)	7 (32)	0 (.0)	1 (33)	0 (.0)	0 (.0)	22 (26)
NC-2.1	Impaired nutrient utilization	0 (.0)	0 (.0)	0 (.0)	0 (.0)	1 (25)	0 (.0)	1 (1)
NC-2.2	Altered nutrition-related laboratory values (specify)	2 (4)	2 (9)	0 (.0)	0 (.0)	0 (.0)	1 (13)	5 (6)
NC-2.3	Food-medication interaction	3 (6)	1 (5)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	4 (5)
NC-3.1	Underweight	28 (60)	11 (50)	1 (100)	0 (.0)	3 (75)	3 (38)	46 (54)
NC-3.2	Involuntary weight loss	35 (74)	14 (64)	0 (.0)	1 (33)	3 (75)	3 (38)	56 (66)
NI-1.1	Hypermetabolism (increased energy needs)	11 (23)	2 (9)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	13 (15)
NI-1.2	Increased energy expenditure	1 (2)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	2 (25)	3 (4)

Code	NDT	Practitioners[b] [n(%)]						**Total (%)**
		AU n=47	CA n=22	UK n=1	US n=3	NZ n=4	MY n=8	**N=85**
NI-1.4	[c]Inadequate energy intake	27 (57)	14 (64)	0 (.0)	0 (.0)	3 (75)	7 (88)	51 (60)
NI-2.1	Inadequate oral food/beverages intake	32 (68)	11 (50)	1 (100)	2 (67)	1 (25)	1 (13)	48 (56)
NI-3.1	Inadequate fluid intake	4 (9)	2 (9)	0 (.0)	0 (.0)	1 (25)	3 (38)	10 (12)
NI-5.1	Increased nutrient needs (specify)	5 (11)	4 (18)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	9 (11)
NI-5.2	Evident protein-energy malnutrition	12 (26)	3 (6)	0 (.0)	0 (.0)	0 (.0)	1 (13)	16 (19)
NI-5.3	Inadequate protein-energy intake	6 (13)	6 (13)	0 (.0)	0 (.0)	1 (25)	0 (.0)	13 (15)
NI-52.1	Inadequate protein intake	5 (11)	2 (9)	0 (.0)	0 (.0)	0 (.0)	3 (38)	10 (12)
NI-53.1	Inadequate carbohydrate intake	1 (2)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	1 (1)
NI-53.4	Inconsistent carbohydrate intake	0 (.0)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	1 (13)	1 (1)
NI-53.5	Inadequate fibre intake	8 (17)	4 (18)	0 (.0)	0 (.0)	1 (25)	2 (25)	15 (18)
NI-54.1	Inadequate vitamin intake (specify)	2 (4)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	0 (.0)	2 (2)
NI-55.1	Inadequate mineral intake (specify)	23 (49)	4 (18)	0 (.0)	0 (.0)	1 (25)	4 (50)	32 (38)
Total		297	127	3	6	27	42	502

[a]Percentage agreement calculated as the total number of participants who chose each NDT divided by the total number of participants
[b]AU = Australia, CA = Canada, UK = United Kingdom, US = United States, NZ = New Zealand, MY = Malaysia

Appendix 5

All definitions of NDTs provided by practitioners

Appendix 5 All definitions of NDTs provided by practitioners

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
BEHAVIORAL –ENVIRONMENTAL [NB]	Food and nutrition-related knowledge deficit [NB-1.1]	• Incomplete or inaccurate knowledge about food, nutrition, or nutrition-related information and guidelines, e.g. nutrient requirements, consequences of food behaviors, life stage requirements, nutrition recommendations, diseases and conditions, physiological function, or products	• Inability or decreased ability to understand the role food plays in overall health	• Does acknowledge the importance of food and nutrition in holistic healthcare • Knowledge of food and nutrition is low compared to social norms / expectations • Problems associated with / related to knowledge / beliefs, physical and environment, food safety • Requires diet education on well balanced, high energy, high iron diet and simple recipes to assist in improving adequacy of oral intake
	Self-monitoring deficit [NB-1.4]	• Lack of data recording to track personal progress	• NA	• Ability to keep track of, document or observe any changes in this case weight, and their effect on health, quality of life. • Inability to monitor his own nutrient / daily intake to ensure it remains adequate

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Disordered eating pattern [NB-1.5]	• Beliefs, attitudes, thoughts, and behaviors related to food, eating, and weight management, including classic eating disorders as well as less severe, similar conditions that negatively impact health	• NA	• A non-functional eating pattern, irregular eating patterns • Abnormal eating habit compared to previous normal eating habit • Eating pattern different from pattern prior to diagnosis
	Limited adherence to nutrition-related recommendations [NB-1.6]	• Lack of nutrition-related changes as per intervention agreed on by client or population	• NA	• Knowledge and beliefs that does not follow proper diet intake as recommended • Unwilling to continue with nutritional recommendations made for a period of time
	Physical inactivity [NB-2.1]	• Low level of activity/sedentary behavior to the extent that it reduces energy expenditure and impacts health	• Lack of physical activity	• NA

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Inability or lack of desire to manage self care [NB-2.3]	• Lack of capacity or unwillingness to implement methods to support healthful food and nutrition related behavior	• Inability or lack of desire to manage self-care compared to healthy individual of the same age • Not being able to care for oneself especially in nutritional intake • Unable or no desire to care for self • Unable or not motivated to take care of oneself which may be due to a variety of reasons • Unable to conduct activities of daily living • Unable to tend to 'activity of daily living (ADLs) to remain in a healthy state	• Lack of interest in meal preparation and shopping • Lacking the ability to adequately take care of oneself for one reason or another • Physical activity compared with the established standards for healthy lifestyle • Physical and function

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Impaired ability to prepare foods/meals [NB-2.4]	• Cognitive or physical impairment that prevents preparation of food/meals	• Lack of knowledge or low function to prepare meals	• Cannot prepare meals - sick due to treatment • Difficulties to prepare adequate nutritional foods • Food preparation problems • Impaired ability to cooks meals that have variety • Impaired ability to prepare foods / meals: has deficient skills or abilities that are required to produce an appropriate diet for his needs • Impaired ability to prepare foods/ meals as observed and documented to meet nutritional requirements each day • Impaired ability to prepare meals then lack of ready access to food, fatigue, loss of interest in food • Inability to prepare suitable and nutritious foods • Lack of preparation skills • Lack of skills or capability to purchase food and cook/ prepare meals • Limited cooking skills • Not able to obtain and or prepare adequate amount or variety of food • Reduced capability to shop for and prepare recommended foods • There are no skill and ability to prepare foods • Unable or impaired ability to prepare meals due to a disability or lack of cooking skills • Unable to meet requirements of a healthy balanced diet due to poor food preparation skills

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Poor nutrition quality of life [NB-2.5]	• Diminished patient/client perception of quality of life in response to nutrition problems and recommendations	• Low score of NQOL index or history of related factors	• Lack of interest in preparing meals and general loss of interest in eating • No longer enjoy meals • Nutrition intake was impaired due to several reasons • Poor nutrition quality of life ; lack pleasurable eating experiences • Unable to enjoy food as was done in the past
	Self-feeding difficulty [NB-2.6]	• Impaired actions to place food or beverages in mouth	NA	• Difficulty with food preparation and cooking

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Limited access to food [NB-3.2]	• Diminished ability to acquire a sufficient quality and variety of healthful food based upon the U.S. Dietary Guidelines or MyPyramid. Limitation to food because of concerns about weight or aging	• Limited ability to acquire, prepare and fund adequate amounts and types of food • Limited access to food - not able to get food freely due to physical and social and mental barriers	• Difficulty in getting sufficient food supply • due to various reasons not being able to obtain core food groups easily • Easy / free? access to nutritionally required food and fluids so as to accommodate the recommended dietary intakes for healthy eating • Food or beverages not readily accessible or suitable to provide adequate nutrition • Limited access to food ; food procurement issues • Limited access to food: reduced ability to purchase and/or prepare food • Limited access to food: unable to obtain appropriate food as easily or as frequently as would be preferable • Limited means of getting to food / beverages • Unable to access safe food adequately
CLINICAL [NC]	Swallowing difficulty [NC-1.1]	• Impaired or difficult movement of food and liquid within the oral cavity to the stomach	• Lack of limited ability of movement of food in the mouth and its path to the stomach	• Difficulty chewing/swallowing due to xerostomia, lack of taste and dysphagia RT pharyngeal CA • Dry mouth has led to difficulty eating due to reduced sense of taste and possibly mechanical problems in swallowing • Dysfunctional swallow, secondary to painful swallow or dysphagia • Lack of interest in assuming food containing essential nutrients, (protein, energy, iron, zink) to improve well being

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Chewing (masticatory) difficulty [NC-1.2]	• Impaired ability to bite or chew food in preparation for swallowing	• Difficulty chewing, moistening, 'breaking down' and orally managing food bolus. • Difficulty in adequately breaking down food by mouth for transfer to stomach • Not able to chew food properly	• Difficulty consuming adequate oral intake due to oral problems • Impaired saliva production (dry mouth) could make chewing prolonged and difficult
	Altered GI function [NC-1.4]	• Changes in ability to digest or absorb nutrients	• A change to the normal function of part of the GI tract from what the patient is used to impacting on nutritional intake • Altered GI function - any part of gastrointestinal tract not functioning normally • Any part of GI (mouth to anus) that affects intake, absorption and waste management • Change in gastrointestinal function such as motility, absorption, malabsorption, blockage etc. • One or more parts of the GI tract not fulfilling its main functional	• Altered GI function : constipation • altered GI function resulting in nausea, vomiting, constipation or diarrhea • Altered GI function: including constipation, diarrhea, bloating, abdominal pain • Change in bowel function caused constipation • Changes to patients usual experiences of bowel transit time +/- presence of upper GI issues (nauseas / vomiting, taste ..), dry mouths etc) • Functional findings / mechanical condition • Impairment in GI motility • impairment of food moving through GI track • overt signs and symptoms of altered GI function • Physiologic change in digestive system • undesired GI symptoms included diarrhoea, constipation, altered taste, nausea, vomiting, anorexia

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Altered nutrition-related laboratory values (specify) [NC-2.2]	• Changes due to body composition, medications, body system changes or genetics, or changes in ability to eliminate by products of digestive and metabolic processes	• Altered nutrition-related laboratory values: one or more lab values in abnormal range (compared to reference values) that may be related to nutritional intake or nutritional status • Change in laboratory parameters which could by influenced by nutritional status/food intake	• Biochemical nutrition-related marker outside reference range • Inadequate body stores and /or serum levels of specific nutrients • Mild or severe changes in biochemical data such as micro albumin /albumin level in blood
	Food-medication interaction [NC-2.3]	• Undesirable/harmful interactions(s) between food and over the counter (OTC) medications, prescribed medications, herbals, botanicals, and/or dietary supplements that diminishes, enhances or alters effect of nutrients and/or medications	• Food intake or absorption affected adversely by one or more medications • Side effect or interaction from a treatment or medication that influences food intake	• NA
	Underweight [NC-3.1]	• Low body weight compared to established reference standards or recommendations	• BMI less than recommended reference standard	• Involuntary weight loss • Involuntary weight loss reported • Unintentional weight loss e.g.: ~5% and low body weight

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Involuntary weight loss [NC-3.2]	• Decrease in body weight that is not planned or desired	• Loss of body weight without a conscious effort to do so • Reduced body weight resulting from undesired side effects, environmental factors or idiopathic reasons, but which was undesired or unrequired • The patient has not been actively trying to lose weight through conscious calorie restriction or conscious increased energy expenditure • Unintentional loss of weight of more than 5% • Unintentional or unplanned weight loss usually over a specified time period • Unplanned or unintended weight loss • Weight loss has occurred independent of person consciously trying to lose weight • Weight loss that is not due to deliberate primary increase exercise and or reduce intake • Involuntary weight loss: loss of weight as a consequence of unintentional dietary changes or hyper metabolism RT conditions	• Involuntary weight loss > 7.5% over several months • Involuntary weight loss with low body weight compared with usual or desired weight loss • Large weight loss with weight loss greater than recommended levels • Losing weight rapidly in very short time period as compared to established reference recommendation • Loss of body weight that is not intentional and has detrimental health outcomes • Loss of body weight without or lack of lifestyle intervention • Loss of weight more than 6 kg in 3 months • Loss of weight unintentionally by decreased intake / cancer • Nonintentional weight change (loss) • Unintentional weight loss related to anorexia, xerostomia, cancer cachexia, dysgeusia, polypharmacy, lack of desire and skills to obtain and prepare meals leading to low energy protein intake • Weight loss of 10 kg from usual weight of 65 kg (>10% of usual weight) • Weight loss over past few months possibly due to increased energy requirement during radiotherapy • Weight loss without intentional nutrient reduced intake

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
INTAKE [NI]	[a]Hypermetabolism (increased energy needs) [NI-1.1]	• Resting metabolic rate (RMR) more than predicted requirements due to stress, trauma, injury, sepsis, or disease. Note: RMR is the sum of metabolic processes of active cell mass related to the maintenance of body functions and regulatory balance during rest (ADA, 2006, 2007)	• An injury or disease state in which energy requirements are increased • Increased energy requirements resulting from physiological changes secondary to disease state	• Body requires high calorie and protein to sustain normal body function • Increased energy needs • Increased energy needs compared to healthy individual • Increased energy needs compared to normal • Increased energy requirements, resulting in the need to eat / drink more to meet raised theoretical requirements • Requirements for energy are increased compared to a healthy matched control
	Increased energy expenditure [NI-1.2]	• Resting embolic rate (RMR) more than predicted requirements due to body composition, medications, endocrine, neurologic, or genetic changes. Note: RMR is the sum of metabolic processes of active cell mass related to the maintenance of normal body functions and regulatory balance during rest	NA	• Inadequate oral food/beverage intake as he's having difficulty eating and food is tasteless

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Inadequate energy intake [NI-1.4]	• Energy intake that is less than energy expenditure, established reference standards, or recommendations based on physiological needs. Exception: when the goal is weight loss or during end of life care	• Energy intake not meet the requirement compared to established reference standard • Ingestion of kcals less than the requirement amount according to weight loss and needs • Insufficient calorie intake compared to actual calorie requirement • Kcal taken in are low than the kcal body needs	• Caloric intake appears to be insufficient for needs • Change in oral intake now inadequate to maintain weight within healthy weight range for height, AEB clothing now loose compared to a few months ago and weight down 10kg from usual weight and few years ago • Intake of macronutrient are not sufficient foe daily requirement • Low body weight (current BMI=17.3) even at 65 kg, he was slightly 'built' with a BMI 20.5 • Oral food/beverage intake inadequate to maintain body weight at levels prior to diagnosis and illness

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Inadequate oral food/beverages intake [NI-2.1]	• Oral food/beverage intake that is less than established reference standards or recommendations based on physiological needs. Exception: when the goal is weight loss or during end of life care	• Actual intake below estimated patient needs • Consumption of food and liquids below the required portions • Energy and fluid consumed (kJ/cc) is inadequate to maintain weight and hydration • Not eating and drinking enough to maintain optimal nutritional status • Inadequate oral intake -oral intake is not meeting nutrition requirements for optimal health and medical condition • Not eating and drinking enough to support weight maintenance and hydration status. • Nutritional intake not providing sufficient nutrients when compared with recommendations.	• Actual problems related to intake of energy nutrients, fluids, bioactive substances • Decreased oral intake compared to precious patterns • Diet history revealed not enough food is being consumed • Evidence of inadequate calorie intake compared to established reference standards • Inadequate food intake as shown by lower levels of energy intake then recommended • Insufficient of energy and protein intake orally to maintain or gain body weight • Intake of energy / protein less than estimates requirements • Low energy and likely protein, vitamins and minerals compared to calculated recommendations for height, weight and age • Poor food intake due to loss of taste, appeal and interest in food • Reduced intake of energy nutrients, minerals and vitamins, not conducive to good health

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Inadequate fluid intake [NI-3.1]	• Lower intake of fluid-containing foods or substances compared to established reference standards or recommendations based on physiological needs	• Total fluid consumed less than established standards	• Actual or estimated fluid intake • Fluid intake inadequate possibly causing constipation • Not consuming fluids to meet fluid requirements / hydration status
	Increased nutrient needs (specify) [NI-5.1]	• Increased need for specific nutrient compared to established reference standards or recommendations based on physiological needs	• Increased nutrient needs of protein and energy - body requires more nutrients to achieve optimal health / recovery from medical condition	• Increased caloric and protein requirements compared to healthy person, his age, weight and height • Patient requires supplementation secondary to diagnosed deficiency in iron • Requires increased protein, energy and iron

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	Evident protein-energy malnutrition [NI-5.2]	• Inadequate intake of protein and/or energy over prolonged periods of time resulting in loss of fat stores and/or muscle wasting	• Malnutrition resulting from an inadequate caloric and protein intake	• Evident malnutrition according to reference standards of recent weight loss • Inadequate protein and energy intake compared to estimated requirements • Inadequate protein and energy to enable optimal bodily functions • Insufficient energy and protein needs to maintain body stores • Malnutrition characterised by severe weight loss • Protein energy malnutrition due to poor intake and inability to prepare other than quick meals • Significant unintentional weight loss • Signs weight loss with evidence muscle and fat wastage • Suspect PEM - estimated Nutritional Intake less than recommendations • The requirement for protein and energy is not being achieved due to poor intake
	Inadequate protein-energy intake [NI-5.3]	• Inadequate intake of protein and/or energy compared to reference standards or recommendations based on physiological needs of short or recent duration	• Protein energy intake inadequate to maintain body weight	• NA

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	[b]Inadequate protein intake [NI-52.1] / [NI-5.7.1]	• Lower intake of protein-containing foods or substances compared to established reference standards or recommendations based on physiological needs	• Inadequate protein intake to maintain lean body mass	• Inadequate protein intake due to inability to prepare other than quick meals • Showing mild or severe changes in nutritional status
	[c]Inconsistent carbohydrate intake [NI-53.4]/ [NI-5.8.4]	• Inconsistent timing of carbohydrate intake throughout the day, day to day, or a pattern of carbohydrate intake that is not consistent with the recommended pattern based on physiological or medication needs	NA	• Improper food intake
	[d]Inadequate fibre intake [NI-53.5]/ [NI-5.8.5]	• Lower intake of fiber-containing foods or substances compared to established reference standards or recommendations based on physiological needs	• Reduced ingestion of soluble/insoluble fibre	• Inadequate fibre causing or leading to constipation. Fluid intake need to be assessed • Inadequate fibre intake relating to poor overall intake • Suboptimal fibre received from diet to be able to incur benefits

DOMAIN	NDT [code]	IDNT reference manual (ADA, 2009)	Acceptable alternative definitions	Invalid definitions
	[e]Inadequate mineral intake (specify) [NI-55.1]/[NI-5.10.1]	• Lower intake of mineral containing foods or substances compared to established reference standards or recommendations based on physiological needs	• Consumption of mineral does not meet requirements • Reduced ingestion of food containing iron	• Current oral intake provides inadequate amount of iron to maintain serum iron level within normal range • inadequate intake of iron due to inadequate intake of sufficient food as supplemental sources of the mineral • Patient is aneamic (non-illness related) or has low iron as diagnosed by iron-studies pathology • Poor food intake and lack of interest in selection, preparation and cooking may lead to anaemia • Suboptimal intake of a mineral needed to perform essential bodily functions

[a]This Nutrition Diagnosis was deleted from the IDNT list as it was determined that this problem is not treatable by dietetics practitioners.
[b]The code for this Nutrition Diagnosis has changed from [NI-52.1] (ADA, 2006) to [NI-5.7.1] (ADA, 2008)
[c]The code for this Nutrition Diagnosis has changed from [NI-53.4] (ADA, 2006) to [NI-5.8.4] (ADA, 2008)
[d]The code for this Nutrition Diagnosis has changed from [NI-53.5] (ADA, 2006) to [NI-5.8.5] (ADA, 2008)
[e]The code for this Nutrition Diagnosis has changed from [NI-55.1] (ADA, 2006) to [NI-5.10.1] (ADA, 2008)

Appendix 6

All justifications for NDTs provided by practitioners

Appendix 6 All justifications for NDTs provided by practitioners

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Food and nutrition-related knowledge deficit [NB-1.1]	• NA	• NA	• Diet worse since wife died, lives alone, male with few cooking skills • difficulty associated with groceries shopping and no support system to help him • food and nutrition related knowledge deficit related to decreased knowledge an importance of nutrition AEB poor nutrient intake • food and nutrition related knowledge deficit related to low food preparation and cooking skills AEB preparation of simple quick meals • Food related knowledge AEB preparation of simple quick meals and low interest in cooking • knowledge deficit RT poor cooking skills and previous dependence on wife AEB simple meal preparation • not adept at cooking, lack of interest, think he lost weight, not motivated to eat • Patient only prepares quick and easy meals secondary lack of knowledge. Wife previously was responsible for shopping and meal preparation

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]				• Patient's wife did all the cooking before she passed. Patient claims to be not adept at cooking. Lack of motivation due to fatigue • Related to simple meals being prepared • Weight loss occurred after wife died co-incident with patient preparing own meals and receiving treatment for pharyngeal cancer
	• Self-monitoring deficit [NB-1.4]	• NA	• NA	• Related to fatigue, lack of interest • Unaware of actual recent weight loss
	• Disordered eating pattern [NB-1.5]	• NA	• NA	• disordered eating pattern related to lack of motivation to eat AEB fatigue, general loss of appetite and constipation • disordered eating related to poor appetite, nausea, related to diagnosis of pharyngeal cancer and radiation therapy AEB inadequate kJ intake and weight loss • Related to lack of interest, lack of cooking skills / knowledge
	• Limited adherence to nutrition-related recommendations [NB-1.6]	• NA	• NA	• Patient not eating balanced diet, not eating optimally • Poor adherence to nutrition-related suggestions RT pt being unmotivated AEB lack of interest, fatigue, poor health

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Physical inactivity [NB-2.1]	• NA	• NA	• Pt suffering from constipation possibly partly due to lack of physical activity only shops once a week due to poor health probably relatively inactive rest of week
	• Inability or lack of desire to manage self care [NB-2.3]	• NA	• NA	• AEB lack of motivation to eat, RT complaint of fatigue and general loss of appetite • Client lacks motivation as evidenced by fatigue, loss of appetite, recent bereavement, poor cooking skills • Fatigue, not shopping (properly) for food • Inability or lack of desire to manage self-care as related to shopping and preparation of meals AEAB inadequate oral intake of 4000-6000 kJ/day • Inability or lack of desire to manage self-care related to not being adapted at cooking, lack of interest, unable to go shopping more than 1x/week. secondary to poor health, fatigue AEB his caloric intake 4000-6000 kJ/day and weight loss

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Inability or lack of desire to manage self care [NB-2.3]			• Inability to manage self care related to pharyngeal cancer AEB inadequate cooking and shopping skills and fatigue • Lack of desire to manage self-care as a result of feeling unwell with cancer treatments and disinterest in food preparation • Lack of interest in meal preparation and shopping related to symptoms of illness and decreased motivation AEB c/o difficulty eating, preparation of quick meal and only gets out to shop once a week • Limited physical activity due to fatigue secondary to anemia, loss of appetite. Also constipation secondary to poor fluid intake and intake of Ferum supplement • No physical activity and inability / lack of desire to manage self care • Not motivated to eat due to fatigue, decrease appetite, constipation. Inexperienced with cooking, limited access to food • Patient reports lack of interest in cooking • Poor health, inability to shop as needed, less motivation and appetite since wife's death, fatigue, nausea, decrease skills in cooking • Pt living alone, not able to do much shopping by himself, not adept at cooking • Unable to shop / cook or source help to look after one's self

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Impaired ability to prepare foods/meals[NB-2.4]	• Impaired ability to prepare food/meals related to functional deficits AEB fatigue and general poor health • Impaired ability to prepare foods / meals RT lack of skills, interest and energy AEB mainly eating simple quick meals and inadequate oral intake • Limited skills and ability to prepare meals AEB reduced kJ intake • RT living alone and fatigue AEB weight loss and low energy intake	• difficulties in food preparation, related to poor cooking skills, decreased appetite and decreased functional status • Impaired ability to prepare food/meals RT lack of interest, lack of cooking skills, poor health AEB infrequent shopping, preparation of only quick, simple meals • Impaired ability to prepare meals due to fatigue and lack of cooking skills • low energy intake, variable energy intake based on diet history combined with reduced ability to shop and cook his own meals, it low energy / appetite / mood to prepare meals	• Can only prepare simple meals secondary to poor skills and motivation • Client has poor cooking skills as evidenced by his self reports • Evidenced by lack of interest and lack of skills • He has lack of interest in cooking and really not adept at it • Impaired ability RT lack knowledge, lack motivation and difficult access to shop AEB patient reports • Impaired ability to cook meals related to low skills base lack of interest as evidenced by individual report • impaired ability to prepare foods/ meals related to wife being cook who passed away and lack of interest in cooking AEB observations and documentation • impaired ability to prepare foods/meals related to poor knowledge and skills AEB patient report

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Impaired ability to prepare foods/meals[NB-2.4]		• impaired ability to prepare meals RT lack of interest, lack of cooking skills and limited access to shops due to general poor health • Impaired food preparation RT loss of spouse, poor skills, lack of interest and lack of energy • Inability to prepare / get foods RT fatigue, lack of knowledge and lack of motivation • Lack of skills and experience in meal preparation, lack of interest / appeal of food and limited to shops due to fatigue and general poor health • Patient fatigue and in ill health, living alone and cooking for 1 since wife died affecting food acquisition and preparation • Poor health limit shopping, lack of interest / experience • Related to death or wife AEB no or little prior knowledge / skills for food preparation • Wife used to prepare meals. Patient not interested, • fatigued and nauseated and unable to shop often.	• Lack of interest and cooking skills reported and notable to get to the shops sufficiently • Limited access to food, limited cooking and food preparation skills and knowledge • Limited preparation skills, general poor health with poor social supports • Only prepares simple meals following death of his wife, who did all food preparation 2 years ago • Patient only able to shop once a week, not adept at cooking, lack of interest in food preparation secondary to illness • Patient reports lack of skill in this area and motivation and limited access to shops due to poor health • Poor ability to prepare foods related to poor cooking skills, lack of interest and fatigue • Preparation of quick / simple meals as wife did this before she passed away • related to lack of knowledge and previous dependence on deceased wife AEB perceived inability to cook and lack of interest and skills • Related to wife deceased 2 years ago and she did the cooking and caring AEB husband does simple meals only sometimes. • self report by patient that he is not adept at cooking

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Impaired ability to prepare foods/meals[NB-2.4]			• Simple strategies increase ISE/ISP social supports systems to improved food intake. May need nutritional supplements • States that his wife use to do the preparation and he now only prepares simple meals and lacks interest in doing so • Weight loss since wife died and recent low iron status reflect inadequate oral intake which maybe exacerbate by limited cooking skills • Wife used to prepare meals until death 2 yrs ago. Pt only prepares 'quick' meals (can be nutritious if well planned) • Wife was main cook. Prepares simple quick meals

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Poor nutrition quality of life • [NB-2.5]	• .NA	• Lack of social support AEB sole provider of meals after death of wife • Nutrition impact symptoms of the disease and treatment (dry mouth, taste changes, nausea) functional decline and psychosocial issues (lives alone, limited knowledge of cooking)	• As a result of cancer treatment / cancer itself and tasteless foods / poor appetite • little cooking skills, cooking for one, lack of interest, has to go to shop once a week • Lives alone &prepares own simple meals since wife died. Probably eats alone therefore meals <enjoyable than when eating with others. Limited cooking skills & LOA would reduce appeals of meals. Dry mouth limits enjoyment of meal • patient reports food as 'tasteless'; like eating cardboard'; lack of interest in food; general loss of appetite; fatigue interferes with food procurement preparation and consumption • Patient reports reduced eating enjoyment, loss of appetite and constipation • Poor appetite AEB foods no longer have any appeal and lack of interest in eating and preparing food • poor nutrition quality of life related to loss of spouse, lack if interest in cooking and poor health AEB simple meals, nausea and fatigue • Poor nutritional quality of life RT reduced intake AEB reduced palatability, inability to get food at store > once/week and lack of cooking skills, wife passed away

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Self-feeding difficulty • [NB-2.6]	• NA	• related to wife passing away, evidenced by lack of interest, preparing simple meals, not adept at cooking	• NA
	• Limited access to food • [NB-3.2]	• Due to patient weakness and lack of will and location of food, he is unable to or has some degree of difficulty to get food for adequate oral intake • Limited access to food as a result of poor health and infrequent shopping trips as a result • Limited access to food related to physical limitations to shop and prepare food for self AEB underweight status (BMI-17.4) • Limited access to food RT lack of energy for shopping and food preparation AEB infrequent shopping outings and mainly eating simple quick meals	• AEB his limited number of food shopping trips due to general poor health • Limited access to food as evidenced by shopping once / week or less • Limited access to food related to general poor health AEB shopping only once a week • Limited access to food related to lifestyle factors AEB reported lack of motivation, fatigue, and social support • Limited food intake related to decreased ability to shop / obtain food stuffs • Mr. Vege only able to shop once per week due to poor general health	• Poor motivation / fatigue related to his ability to access food regularly

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
BEHAVIORAL –ENVIRONMENTAL [NB]	• Limited access to food • [NB-3.2]		• Only shops once a week due to poor health • Patient has limited access to food due to inability to go more frequently to do his grocery and due to lack of interest in cooking compounded by having no expertise in cooking food • patient report of not being able to access shops due to his poor health 9also related to patients reported limited skills preparing food • Patient shops ~ 1/week (Note: In Canada-shopping 1/week would be quite appropriate!) • Pt only able to shop once/week (no mention re transport) and states little interest / few skills in cooking • Shops once / week as poor health • shops once per week if able to poor health, wife looked after this before she died	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Swallowing difficulty • [NC-1.1]	• Cancer therapy can cause dry mouth, AEB his description e.g.: 'like eating cardboard' • Difficulty with food & fluid consumption due to radiation secondary to pharyngeal CA AEB xerostomia & tastelessness of food • Dysphagia RT pharyngeal cancer and increased mouth dryness • Evidenced by dry mouth and taste changes due to disease process and treatment • Mouth dryness related to radiation therapy from pharyngeal cancer • Pt has had radiotherapy for pharyngeal Ca. this is always associated with swallowing difficulty. Dysfunctional swallow may put pt at risk of aspiration & pt needs to be assessed before other recommend	• AEB by foods having no appeal "tasting like cardboard", xerostoma. Dry mouth • Mouth dryness leading to difficulties / more effort required to swallow normal textures • Patient complains of "dry mouth" which is affecting his ability to swallow due to decreased lubrication • swallowing difficulties related to dryness in his mouth AEB patient reporting foods are tasteless and like eating cardboard • Swallowing difficulty related to medication side effects AEB mouth dryness	• Difficulty in swallowing related to dryness in patient's mouth as evidence by patient has experienced foods no longer have any appeal and feel its tasteless • Lack of motivation in food intake • Provided by case history and links with weight loss history • Swallowing difficulties with food textures reported for some time

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Swallowing difficulty [NC-1.1]	• Related to insufficient salivary production due to radiation therapy AEB reported dryness of mouth • Swallowing difficulty due to dry mouths from radiation treatment • Swallowing difficulty related to pharyngeal cancer and radiation treatment AEB dry mouth and food no longer appealing • Swallowing difficulty likely related to radiation therapy and possibly medications AEB dry mouth and complaints of difficulty with eating • Swallowing difficulty related to side effects of radiation AEB dryness in mouth and nausea • Recent radiotherapy treatment &/or medications may be causing dry mouth. Patient complains of constipation may be having inadequate fluid intake that would also exacerbate dry mouth		

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Chewing (masticatory) difficulty • [NC-1.2]	• Chewing difficulty and lack of food taste, resulting in low food intake (several factors) • chewing difficulty related to radiation therapy AEB symptoms of tastelessness, 'like eating cardboard' and dryness in his mouth • Chewing difficulty related to radiation therapy as evidence by dry mouth and food being tasteless • chewing difficulty RT dry mouth AEB difficulties reported with eating • Claims foods like cardboard • Dryness in mouth related to radiation treatment as evidenced by food being tasteless. • Mouth dryness and feel like eating cardboard • Patient reported of food being 'tasteless' and 'like cardboard' due to mouth dryness. • Reported difficulties with eating, taste changes and dry mouth • Reported difficulties in eating as indicated by reported dry mouth	• chewing difficulties related to dry mouth and fatigue AEB varied intake dependent on how he is feeling • Dryness in mouth, possible fatigue when chewing food • dryness in mouth, reduce taste sensation, pharyngeal cancer, radiation therapy, potential for swallowing issues • patient reports dry mouth and difficulty chewing food • Provided in case history and diagnosis of pharyngeal cancer and radiotherapy side effects • States foods are tasteless and 'like eating cardboard'	• no desire to eat secondary to poor taste

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Altered GI function • [NC-1.4]	• NA	• Altered GI as evidenced by constipation and nausea • Altered GI function related to effects of radiation therapy as evidenced by reported change in taste and dry mouth • Altered GI function related to Fe supplements / decreased intake AEB reported constipation • altered GI function with taste changes related to radiation therapy and constipation due to reduce food / fluid intake • Client complains of constipation which may be increased with iron supplements • Constipation due to poor food intake, poor choices, some iron medications • constipation likely due to iron supplements affecting appetite and desire to eat	• dry mouth, food tastes like cardboard • Dysgeusia and xerostomia RT radiation therapy AEB reported dryness in mouth and tasteless foods • No taste buds, food 'tasteless' • pharyngeal cancer diagnosis, reduce taste due to therapy • Range of above symptoms reported • Side effects of recent XRT and reduce with intake (constipation) in combination with Fe supplementation

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Altered GI function • [NC-1.4]		• constipation related to iron supplements and poor oral intake • Constipation reported with recent commencement of iron supplements • constipation which is affecting food intake • dry mouth, low appetite and severe nausea and radiation treatment and fatigue • he has taste changes and dry mouth due to radiotherapy and constipation and poor appetite + low oral intake • Patient report of feeling • nausea occasionally constipated • possibly related to low fibre and fluid intake AEB constipation • Related to taste changes, nausea AEB energy less than half estimated needs • related to xerostomia, • constipation, nausea, taste changes	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• NC-2.1 Impaired nutrient utilization	• NA	• NA	• RT nausea as a side effect of chemotherapy which is improving now that 1st cycle is now finished
	• Altered nutrition-related laboratory values (specify) • [NC-2.2]	• NA	• NA	• altered lab parameters related to anemia which could be Fe, Transferrin, Ferritin, etc AEB use of iron supplements • Altered lab values RT malnutrition and cancer, AEB GP diagnosed anemia • altered nutrition-related laboratory values related to iron AEB by CBC and inadequate iron intake • Anemia with iron supplements commenced • Poor oral intake
	• Food-medication interaction • [NC-2.3]	• food-drug interactions, related to polypharmacy AEB possible side effects of nausea, dry mouth decreased appetite, constipation • Reports constipation, dry mouth, has anaemia / fatigue, polypharmacy (6 meds), loss of taste for food	• Taking 6 different types of medication. Interaction should be investigate	• Mouth dryness

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Underweight • [NC-3.1]	• 5% unintentional weight loss related to inadequate intake not meeting elevated requirement AEB loss few kgs 9~5%) and BMI < 18.5) • below ideal weight and usual weight with low energy intake and BMI 17.5 and unplanned weight loss • BMI less than 18.5 kgm-2 • BMI=17. underweight, due to low energy intake and unintentional weight loss • Loss of weight reported (65--->55kg), due to limited food intake (many factors), BMI now 17.4 kgm-2 • Patients' current body weight is only 17.4 kgm-2 • Underweight (BMI 17) RT low oral intake due to eating difficulties, poor food preparation and low appetite AEB BMI 17 • Underweight as related to decreased food intake as evidenced by lack of appetite fatigue BMI 17.35 kgm-2 • Underweight BMI =17 related to decreased intake of food secondary to nausea, dry mouth, constipation, anorexia	• BMI < 18.5 • BMI < 18.5 kgm-2, lost over 10 kg on last few years • BMI < 18kg/m2 • BMI < 20 kgm-2 • BMI = 17. Recommended > 20 for age range • BMI = 17.4 (< 18.5) • BMI of 17.4 kgm-2 compared to reference of 22-27 kgm-2 • BMI=17 below reference range • BMI=17 kgm-2, reference range of 22-27 = severely underweight for height • Current BMI is 17.3 which is less than recommended range of BMI 18.5 - 24.9 kg-2 • pt BMI = 17.35, which is < 20 • underweight as BMI is 17.3 kgm-2 when compared to 18.5 cut off • underweight related to decreased food intake related to cancer treatment and disinterest in food and lack of cooking skills • Underweight related to nutrition impact symptoms of dry mouth, taste changes, reduced appetite, constipation and nausea, BMI < 18.5 and functional activity decline	• 10 kg weight loss and eating difficulties reported • inadequate energy intake secunder, reduce appetite, nausea, constipation, fatigue, lack of interest for food, taste changes • Provided by history symptoms of nausea, vomiting during radiotherapy treatment • related to 65 kg decreased to 55 kg over 2 years = 15% weight loss

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Underweight • [NC-3.1]	• Underweight related to long term low kJ intake as evidence by BMI 17kgm-2 • Underweight related to hypermetabolism and poor oral intake as evidenced by low BMI • Underweight related to inadequate dietary intake AEB recent weight loss and a BMI of 17.36 kgm-2 • Underweight related to inadequate energy intake as evidenced by BMI < 18.5kgm-2 • underweight related to limited access to food AEB BMI < 18.5 • underweight related to limited access to food and swallowing • difficulties AEB BMI < 18.5 • Underweight related to limited access to food as evidence by BMI < 18.5 kgm-2 • Underweight related to limited access to food as evidenced by BMI < 18.5 kgm-2 • underweight related to loss of appetite 7 limited food preparation skills AEB BMI of 17.3 kgm-2		

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Underweight • [NC-3.1]	• Underweight related to low appetite, taste alterations, fatigue and lack of interest in food, AEB BMI < 18.5 kg/m2 • underweight related to low energy and food intake AEB BMI =17 • underweight related to nausea, fatigue and inadequate energy intake AEB BMI of 17.4 • Underweight RT decreased energy intake, increased energy requirements AEB BMI of 17.4 (<18.5) • Underweight RT decreased intake and limited access to food AEB BMI < 18.5 kgm-2 • underweight RT inadequate energy intake AEB BMI < 18.5 kgm-2 • Underweight RT inadequate oral intake AEB BMI 17.4 kgm-2 continued weight loss overtime • Underweight RT limited access to food AEB BMI < nutrition knowledge and preparation skills, and taste changes evidenced by BMI < 18.5 kgm-2 • 18.5 kgm-2 (17.4 kgm-2) • Underweight secondary to hypermetabolism,		

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Involuntary weight loss [NC-3.2]	• 10 kg body weight loss secondary to reduced food availability and food appeal alterations • Involuntary weight loss related to disease process as evidence by > 15% total body weight loss • Involuntary weight loss related to decreased oral intake AEB loose clothing and 10 kg weight loss over past few years • Involuntary weight loss related to dry mouth and nausea AEB loss of several kg over last few months • Involuntary weight loss related to limited food preparation skills and decreased appetite AEB 10 kg weight loss over last few years and clothes feeling looser in recent months • requirements and decreased oral intake as evidenced by estimated calorie intake	• 10 kg weight loss caused by low interest in food and by his inability to manage this aspect of self care • 10 kg weight loss over the past few years, plus additional weight loss over the past few months --> not trying to lose weight • 10 kg weight loss reported approximately, clothes fitting looser now and not attempting to control weight • 15% (10 kg) weight loss from usual body weight • 15% loss of body weight (not just due to cancer) • 15% weight loss is considered very significant, as per SGA guidelines • 15% weight loss or usual body weight last few years. More severe weight loss / cloth sizes reduce last few months	• Continues to lose weight (vs. stabilization) • Related to low oral intake and poor appetite AEB low caloric intake and gradual weight loss • related to physical difficulties with eating and lack of motivation • The reasons for not eating properly are not related to wanting to lose weight, the weight loss is not deliberately and can be put down to general poor health • Underweight as evidenced by BMI • underweight related to loss of appetite, loss of motivation to eat, to limited access to food AEB BMI <18.5 kgm-2

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Involuntary weight loss [NC-3.2]	• Involuntary weight loss related to low food intake AEB weight loss of >15% over several months • Involuntary weight loss RT decreased energy intake and increase energy requirements AEB 10 kg (15%) weight loss • Involuntary weight loss RT recent low oral intake and loss of wife AEB weight loss 6.5% few years and loose fitting clothes • Involuntary weight related to hypermetabolism and poor oral intake as evidenced by reduced BMI • Involuntary weight loss RT inadequate energy intake AEB significantly reduced body weight and looser clothing • Involuntary weight loss related to difficulty in eating and general loss of appetite AEB several kg weight loss in the last few months • Losing weight related to loss of appetite and limited access to food as evidence by losing 10 kg within a few years and his clothes seems looser in lasts few months	• AEB weight loss of 10 kg and lack of interest in eating and finds food tasteless • client is unintentionally losing weight as evidenced by losing 15% of weight in total and he is continuing to lose weight • Current weight 55 kg and usual weight is 65 kg. Involuntary weight loss of 10 kg related to decreased oral intake • current weight loss is less than usual weight - pt reports 'clothes seem looser' • Due to radiation therapy and resultant nausea, dry mouths, lack of taste and interest and ability to prepare food. • He seems 'surprised' that his clothing seems looser • Involuntary weight loss RT swallowing difficulties/ altered GI function and hypermetabolism AEB inadequate oral food / beverages intake • lack of appetite 7 weight loss over past few months	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Involuntary weight loss [NC-3.2]	• weight down 10 kg over past few years possibly due to change in diet since wife died and recent inadequate intake during radiotherapy, decreased food, beverage intake and radiation treatment • weight loss related to • AEB loose clothes and lower values on scales • Weight loss related to inadequate oral intake AEB weight loss of several kg over several months / or by 10 kg weight loss over past few w years • Weight loss related to increased energy / protein	• Radiotherapy treatment for cancer, combined with limited access to food • recent weight loss related to decreased appetite • related to inadequate energy intake, side effects of radiotherapy treatment including nausea, loss appetite, xerostomia, constipation, fatigue • Reports clothes looser, decrease 10 kg weight change • Underweight related to poor food/fluid intake AEB BMI =17.4 and clothes seeming much looser now • Unintentional weight loss RT decreased intake AEB decreased interest in food and being unable to get to store • Unplanned weight loss secondary effects of XRT on food intake and food access / availability issues • Weight 65 kg a few years, gradual weight loss to 55 kg • Weight change from 65 kg - 55 kg, giving pt BMI = 17.3 (underweight) and equal to 15% initial body weight loss	•

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
CLINICAL [NC]	• Involuntary weight loss [NC-3.2]		• Weight decreased of ~ 15% x 1-2 years with overt signs of weight change i.e. reduced clothing size • Weight loss • Weight loss 10 kg in past few years. Short term weight loss past few months based on change in clothing size. • weight loss from 65 kg to 55 kg as evidence by clothes being looser • Weight loss of 10 kg - noticed by patient only in fit of clothes • Weight loss related to decreased energy intake AEB inadequate oral intake • Weight was 65 kg now 55 kg	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• [a]Hypermetabolism (increased energy needs) • [NI-1.1]	• NA	• Actual cancer diagnosis may increased metabolism, underweight status and weight loss indicate need for increased energy intake • cancer induced increased energy requirements, loss of body weight • Client has increased energy needs as evidences by new diagnosis of pharyngeal cancer • Has pharyngeal cancer undergoing treatment • Hypermetabolism related to increased requirements from Cancer • Hypermetabolism related to pharyngeal cancer as evidenced by injury factor increasing energy requirements • Hypermetabolism RT Ca pharynx AEB involuntary weight loss • Increase requirements secondary to cancer • Increased energy needs RT nausea, radiation and weight loss	• BEE x 1.5 injury factor

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
	• [a]Hypermetabolism (increased energy needs) • [NI-1.1] •	•	• Pharyngeal cancer increased needs • Presence of cancer-increases energy requirement • Suspected effect of radiotherapy and oncology diagnosis based on professional knowledge and the evidence of patients weight loss.	•
INTAKE [NI]	• Increased energy expenditure • [NI-1.2]	• NA	• Increased energy expenditure related to cancer AEB weight loss and radiation treatment • Unplanned weight loss and has become underweight. Complaint of constipation, complain of fatigue	• NA

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
	• Inadequate energy intake [NI-1.4]	• Decreased calorie intake RT increased requirements (cancer), and impaired ability to shop for and prepare food AEB weight loss, infrequent shopping and preparation of only quick, simple meals • Estimated intake of 4000-6000 kJ below minimal requirements considering disease / treatment • His intake only 4000-6000 kJ per day is less than his estimated requirement ~ 8400 kJ per day	• 15% loss of body weight unintentionally, diet history shows inadequate KJ intake daily • 4000-6000 kJ/day only requires ~6000+ 4000 extra, weight gain to regain lost 10kg + poor appetite • 952-1429 Kcal intake which is approximately 50% of what this patient needs, also RT nausea • consumption of 4000-6000 KJ is below recommended needs which are likely > 8500 kJ	• Inadequate intake related to loss of appetite and decreased food preparation • lack of interest in cooking, fatigue / nausea related to radiation therapy • Related to xerostomia, limited cooking skills and lack of interest to eat, appetite and constipation affecting appetite • Usual weight 65 kg, patient reports his clothes feel looser, scales indicate 10 kg loss over past few years

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Inadequate energy intake [NI-1.4]	• Inadequate energy intake related to reduce appetite, GI symptoms and poor health AEB estimated intake 4000-6000kJ vs. estimated needs 6500-8500 kJ • Inadequate energy intake related to loss of appetite, loss motivation and limited access to food AEB diet history 4000-6000 kJ • inadequate energy intake related to low appetite and nausea AEB inadequate average daily intake • Inadequate energy intake related to overall caloric intake AEB diet history indicate by 4000-6000 kJ. Harris-Benedict estimates needs 1400-1850 Kcal • inadequate energy intake related to poor oral intake AEB diet history of 4000-6000 kJ daily • Inadequate energy intake related to poor oral intake AEB total calorie intake and weight loss	• Diet history 4000-6000 kJ (=1000-1500 Cals) + reported weight loss, clothes looser, low appetite • diet history below estimated energy recommendation with evidenced of weight loss • diet history showing an intake deficit compared with predicted energy requirements • evidenced by 4000-6000 kJ intake from diet history • Has lost several kilos in body weight and intake in the order of 4000-6000 kJ/day • Inadequate energy intake RT loss of appetite / taste and nausea, AEB loss of weight • Inadequate intake related to poor motivation, fatigue and loss of appetite, dry mouth AEB tasteless food, 'like eating cardboard' reported by patient	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Inadequate energy intake [NI-1.4]	• Inadequate energy intake related to poor oral intake as evidence by patient intake only 4000-6000 kJ/day • Inadequate energy intake related to radiation therapy for pharyngeal cancer AEB diet history, lack of appetite and weight loss of several kg • Inadequate energy intake related to swallowing difficulties and limited access to food AEB reported weight loss and lack of interest in food • Inadequate energy intake related to treatment AEB energy intake < 1900 kcal/day and weight loss • Inadequate energy intake related to treatment and lifestyle changes AEB reported diet history KJ intake providing 46-70@ of patient's estimated energy requirements • inadequate energy intake RT low appetite from XRT side effects AEB estimated energy intake (4-6MJ) compared to estimated requirements (7-8MJ) and recent weight loss	• Inadequate kJ intake indicated by diet history analysis and weight loss • Intake of 4000-6000 kJ /day is less than calculated requirements resulting unplanned weight loss • Loose weight • Low energy intake related t o lack of interest and not adept at cooking AEB low intake • Only consuming 4000-6000 kJ, estimated requirements are greater • Provided by diet history and weight loss history • Recent weight loss indicates energy imbalance. Adequate energy also needed for protein sparing. diet deficient in ~ 2000kJ/day • related to eating difficulties AEB diet history, lack of energy, anaemia • Reports weight loss and only 4000-6000 KJ intake • Significant weight loss (unintentional) and estimated intake below estimated requirements	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Inadequate energy intake [NI-1.4]	• inadequate energy intake to meet elevated requirement • related to nutrition impact symptoms and reduce access to food AEB lose weight and malnutrition • Inadequate energy related to hypermetabolism as evidenced by recent weight loss and low BMI • Inadequate intake due to oncology treatment side effects and social issues as evidenced by weight loss during treatment • Lost several kgs in body weight over few months when receiving radiotherapy and energy requirements were higher than normal. Diet history reveals oral intake reduced by 2000 kJ when feeling unwell • Low energy intake related to nausea, decreased appetite, dry mouth AEB intake 4000-6000 kJ • Pt consuming only 4000-6000 kJ, instead of 8000-9000 kJ • Related to low calorie intake and mouth dryness from radiation and reduce ability for meal preparation AEB weight loss of 10 kg over past 3years •	• Unplanned weight loss has occur as a result and has become underweight i.e. BMI< 18.5kgm-2 • weight loss • Weight loss due to nausea from radiation treatment, loss of taste, dry mouth, lack of food knowledge & shopping preparation skills	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Inadequate oral food/beverages intake • [NI-2.1]	• Inability or lack of desire to manage self care AEB consume ~ 1/2 estimated caloric needs • Inadequate dietary intake related to nutrition impact symptoms AEB constipation, nausea, dry mouth, anorexia • Inadequate oral food / beverage intake due to nausea, general loss of appetite, no motivation to eat, fatigue and dryness in his mouth AEB weight loss 10 kg • Inadequate oral food / beverage intake RT impaired ability to prepare foods / meals/ limited access to food and food and nutrition related knowledge deficit AEB underweight • Inadequate oral food/beverage intake related to decreased taste and appetite AEB stated tasteless foods/like cardboard, only shops once per weeks, live alone, limited cooking skills, weight loss, BMI<19,energy intake < than calculated bodily needs, nausea	• 4000-6000 kJ not meeting high energy requirements and has experienced weight loss as a result • AEB weight loss of 10 kg and lack of interest in food • As evidenced by ongoing weight loss and as estimated energy intake of 4000-6000 kJ /day (70-110 kJ/kg/day) • current intake assessed to be below estimated requirements and reported poor oral intake due to range issues • Decreased intake due to any combination factors e.g. depression, sore mouth etc • difficulty eating, no longer have appeared and taste changes not motivated to eat and loss of appetite • evidenced by reported weight loss and BMI < 18.5 • food is loosing appeal / tasteless / weight loss, not good at cooking and lack of interest	• Evidenced by low kJ intake 4000-6000 kJ/day • Increased protein energy intake due to cancer treatment, body weight. Provide snacks and meal options • Polypharmacy, patient description and self-monitoring weight loss • to increase lost weight plus cancer requirements would be closer to 10000 kJ per day (approx) • underweight RT reduced intake of energy containing food/beverages AEB few trips to grocery stores and reduced palatability and interest

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Inadequate oral food/beverages intake • [NI-2.1]	• Inadequate oral intake related to changed physiological function and emotional issues as evidence by diet history assessment of intake • Inadequate oral intake related to loss of appetite, fatigue, nausea, dry mouth AEB weight loss • Inadequate oral related to hypermetabolism as evidenced by low kJ intake and weight loss • Insufficient due to current consumption of 955-1433 Kcal/day related to difficulty with chewing and swallowing, access to food and limited food preparation knowledge • Pt feels food no longer taste good - reduced appetite, lack of interest to eat	• his current caloric intake indicate insufficient food / fluid intake • Inadequate food intake related to difficulty eating with GI symptoms of illness AEB energy intake only 4000-6000 kJ, some foods 'tasteless / like cardboard' and not motivated to eat • Inadequate intake of food related to decrease taste, nausea and appetite as evidenced by estimated oral intake 4000-6000 kJ /day • Inadequate oral intake RT loss of appetite/ taste and nausea, AEB loss of weight • Inadequate oral intake RT low motivation to eat AEB estimated reported energy intake • Intake is inadequate as evidence by weight loss and difficulties with intake • Intake of 4000-6000 kJ lower • than recommendations based on height, weight and age • Limited oral intake related to reduced appetite AEB 4000-6000 kJ daily intake	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Inadequate oral food/beverages intake • [NI-2.1]		• low energy intake and weight loss • Nausea, inability to shop and prepare adequate nutritional meals due to poor health and physical ability • Not always motivated to eat depending on how he is feeling related to fatigue, nausea, constipation and chewing difficulties • Patient has lost weight, and calculated energy requirements are 8151 kJ/day (65 x 30 kcal/day x 4.18), he is eating below this • patients reports of poor interest, ability and motivation to eat/ drink and reported diet history containing only 4000-6000 kJ • Poor appetite, tired, tasteless, lacking skills, inadequate calories, weight loss, BMI 17.3 kgm-2 • reduce appetite and intake, inadequate intake, unintentional weight loss over past several years, anaemia, reduce interest	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Inadequate oral food/beverages intake • [NI-2.1]		• Reduce with intake related to side effects of XRT (nausea, loss appetite, dry mouth, taste changes) and social issues of living alone evidenced by weight loss • Reduced intake related to reduced food preparation, lack of motivation, fatigue as evidenced by weight loss • related to reduce appetite, nausea, constipation, xerostomia, lack of interest with food, limited access to food /shopping • related to reduced meal preparation ability, reduced taste alteration, documented / unplanned weight loss and low weight status • Related to swallowing difficulties and taste reduction AEB energy intake of 4000-6000 kJ / day • Reported loss of significant weight (since wife died) and clothes are looser, also has low appetite • RT oral intake of only 4000-6000 kJ AEB weight loss of 10 kg over past few years	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
	• Inadequate oral food/beverages intake • [NI-2.1]		• unintentional weight loss , inadequate kJ intake as determined by diet history weight loss / underweight / fatigue • weight loss and constipation	
INTAKE [NI]	• Inadequate fluid intake • [NI-3.1]	• Inadequate fluid intake RT inadequate oral food/ beverage intake AEB xerostamia / constipation	• NA	• constipation • Constipation may be partly due to inadequate fluid intake • Constipation related to poor fluid intake • Constipation reported by patient maybe related to lack of fluid more information required • Inadequate fluid intake AEB problem on constipation • Inadequate fluid intake related to loss of appetite AEB dryness of his mouth • Inadequate fluid intake related to poor oral intake AEB constipation • Related to need to drink 1650 mls to 2200 mls fluid / day for male 55 kg

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
	• Increased nutrient needs (specify) • [NI-5.1]	• Increase nutrient as evidenced by anaemia • increased nutrient needs for iron related to chemotherapy AEB presence of anaemia • Weight loss due to cancer radiation treatment, suggested diagnosed aneamic by doctor. Iron supplements, poor food intake and perhaps lack of fluid lead to constipation	• has cancer and undergoing radiotherapy, therefore body requires more protein and energy for recovery • Patient's body is fighting cancer, therefore the patients body is in increase state and metabolic requirements, have increase, burning more energy and using protein in immune process • related to weight loss (calculated % TBW past few months) ...	• due to therapy for pharyngeal cancer, poor appetite • Increased caloric and protein requirements RT cancer AEB Harris-Benedict x Activity Factor X Stress Factor • Intake of 4000-6000 KJ/day would likely not be adequate enough to meet recommendations

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Evident protein-energy malnutrition • [NI-5.2]	• Evident protein-energy malnutrition related to inadequate consumption and food as indicated by BMI 17 • he has lost weight -assuming muscle loss with fatigue due to low oral intake and has anaemia • Inadequate calorie intake, has had weight loss, fatigue • large weight loss, underweight related to limited access to food and being underweight • Malnutrition related to low oral intake and side effects AEB weight loss • Malnutrition related to nutrition impact symptoms and reduce access to food AEB unintentional weight loss and inadequate intake • Patient loss 10 kg for past few months • Protein energy malnutrition related to inadequate energy intake AEB energy intake of 4000-6000 kJ and involuntary weight loss	• Intake is only 4000-6000kJ and GP identified patient as having anemia. • SGA would score B/C dependent on physical with unintentional weight loss, GI symptoms and low functional status • This man is underweight, still loosing weight, ongoing gastrointestinal side effects likely to lead to further nutritional depletion. He is fatigue, an other sign of poor nutrition • Weight loss and complaints of fatigue (probable muscle loss)	• NA

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
	• Evident protein-energy malnutrition • [NI-5.2]	• Reported recent weight loss, combined with poor oral intake and BMI < 18.5 indicate protein-energy malnutrition and low dietary intake of 4000-6000 kJ /day • Suspect PEM - RT inadequate nutritional intake AEB inadequate diet history and weight loss • Unintentional weight loss RT decreased intake AEB diet history (4000-6000 kJ/day) and decreased appetite		

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• Inadequate protein-energy intake • [NI-5.3]	• Inadequate intake related to poor food/beverage intake AEB weight loss and inadequate kJ intake • Inadequate protein /energy intake related to loss of appetite, limited access to food AEB weight loss of 10 kg and possibly anemia (low meat intake) • inadequate protein and energy intake related to decreased appetite, decreased motivation to eat and fatigue AEB an energy intake of 4000-6000 kJ/day • Inadequate protein-energy intake RT low appetite and side effects XRT AEB signs of malnutrition and weight loss • Inadequate protein/energy intake RT hypermetabolism / inadequate oral food/ beverage intake AEB involuntary weight loss, underweight.	• 15% weight loss that was unplanned and limited food intake, it reduce shopping ability and ability to prepare meals • As evidenced by ongoing weight loss • energy intake 4000-6000 kJ related to poor cooking skills, lack of interest and loss of appetite • Inadequate intake related to multiple causes AEB intake of 50-75% of needs and BMI < 18.5 and weight loss of 15% • loss of appetite, inability and / or disinterest in cooking • Related to 55 kg male needing 25-30 kcal/kg body weight minimum = 5775 kJ - 6930 kJ. Yet managing 4000-6000 kJ • weight loss over past few months	• Inadequate protein energy intake related to nausea, dry mouth, decreased interest, constipation, fatigue, decreased mobility

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• [b]Inadequate protein intake • [NI-52.1] / [NI-5.7.1]	• NA	• Intake of protein usually ~20% energy intake given intake of 4000-6000 kJ this equates to 47-70 g/day	• Anaemic • Complaint of fatigue (probable muscle loss) • Evidenced by weight loss, low appetite secondary to taste changes and dryness in mouth. Dietary intake only 4000-6000 kJ /day • Evident protein / energy malnutrition and poor appetite • Inadequate energy intake would suggest a low protein intake as well unless most of energy is from protein sources. If most of the energy from protein sources, some would be used for energy rather than anabolism as energy intake low. • Inadequate protein intake related to poor oral intake AEB low haemoglobin • low weight, low appetite = low protein intake • Weight loss
	• NI-53.1 Inadequate carbohydrate intake	• NA	• NA	• Evidenced by weight loss, low appetite secondary to taste changes and dryness in mouth. Dietary intake only 4000-6000kJ /day
	• [c]Inconsistent carbohydrate intake • [NI-53.4]/ [NI-5.8.4]	• NA	• NA	• not motivated to eat cause of fatigue and general loss of appetite

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• [d]Inadequate fibre intake • [NI-53.5]/ [NI-5.8.5]	• NA	• NA	• AEB constipation related to inadequate fruit vege grains intake • Complaint of constipation • Constipation • Constipation (however need to Fe tablets not the cause) • Constipation could be due to inadequate energy and fluid intake, poor food choices, lack of physical activity and inadequate fluid intake • Constipation possibly caused by inadequate fibre in current diet • Constipation-as determined by patient • constipation, poor oral intake • He always has constipation • Inadequate intake of fibre RT inadequate food / beverage intake AEB constipation • Lack of fibre reported by patient exchanged from energy intake and contributing to constipation • Low intake of fibre RT poor intake of food overall AEB constipation • Pt feels constipated all the time • Related to loss of appetite and poor p.o intake AEB constipation • Reports constipation (also contributes to lost appetite) could also relate to reduce fluid, reduce physical activity, medication

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• NI-54.1 Inadequate vitamin intake (specify)	• NA	• NA	• Evidenced by weight loss, low appetite secondary to taste changes and dryness in mouth. Dietary intake only 4000-6000 kJ /day • Inadequate vitamin intake RT inadequate oral food / beverage intake AEB limited access to food
	• [e]Inadequate mineral intake (specify) • [NI-55.1]/[NI-5.10.1]	• Inadequate ferum intake related to decreased food intake AEB anaemia • Inadequate iron intake related to poor oral intake AEB anaemic status • Inadequate iron intake RT overall poor oral intake AEB anaemia and fatigue • Inadequate mineral intake RT inadequate oral food / beverage intake and food medication interaction & AEB anaemia / nausea	• AEB diagnosis of anaemia and physician prescribed iron supplements • AEB GP script for iron supplements • Anaemia resulting from inadequate iron intake and other causes • Anemia (GP suggestion), fatigue • Client has low iron levels as evidenced by report from GP • Demonstrated anaemia • diagnosis of anaemia and need for Fe supplements • Ferum deficiency being treated, links with being unable to chew ferum sources as meat • GP diagnosis, most likely due to overall reduced intake of foods	• Evidenced by weight loss, low appetite secondary to taste changes and dryness in mouth. Dietary intake only 4000-6000 kJ /day • Requires support of iron rich foods, thus could also be achieved by dietary intake and nutritional supplements. Iron carries O2 around body and will omit with increase energy level

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• [e]Inadequate mineral intake (specify) • [NI-55.1]/[NI-5.10.1]	• low iron intake related to overall inadequate food intake AEB prescription of iron supplements (assuming that physician did full anaemia work-up) • Related to poor p.o and possibly disease state AEB diagnosis of anemia	• GP suggested anemia RT inadequate Nutritional Intake AEB anaemia. Inadequate NI due to nutrition impact symptoms & lack of interest and cooking skills and limited access to shops • GP suggested patient is anaemic • GP suggested that he was anemic AEB the prescription of iron supplements • GP suggestion anaemia, poor food intake reported by client • Inadequate mineral related to anaemia • Iron deficiency related to limited iron-rich foods AEB anaemia • Iron is high in protein food as patient have difficulties in chewing and anaemia problem • Lack of energy may be due to low iron levels, no knowledge of iron rich foods and means of accessing / preparing and actual desire / interest to consume	

DOMAIN	NDT [code]	Valid	Partially valid	Invalid
INTAKE [NI]	• [e]Inadequate mineral intake (specify) • [NI-55.1]/[NI-5.10.1]		• Poor food intake in general, plus diagnosed with anaemia. Poor intake of iron rich food is the likely cause • Serum iron low, GP prescribed iron supplement, inadequate iron intake possibly causing fatigue • The fact that this man is aneamic leads to the conclusion that his iron intake is inadequate • On ferum supplements, poor oral intake, quick simple meals. Fatigue • Patient thinks food taste bland, complain of fatigue thus having anaemia • Patients report he has been commenced on iron supplements and advised by his GP his anaemic	

[a]This Nutrition Diagnosis was deleted from the IDNT list as it was determined that this problem is not treatable by dietetics practitioners.
[b]The code for this Nutrition Diagnosis has changed from [NI-52.1] (ADA, 2006) to [NI-5.7.1] (ADA, 2008)
[c]The code for this Nutrition Diagnosis has changed from [NI-53.4] (ADA, 2006) to [NI-5.8.4] (ADA, 2008)
[d]The code for this Nutrition Diagnosis has changed from [NI-53.5] (ADA, 2006) to [NI-5.8.5] (ADA, 2008)
[e]The code for this Nutrition Diagnosis has changed from [NI-55.1] (ADA, 2006) to [NI-5.10.1] (ADA, 2008)

Appendix 7

List of publications

Conference abstracts

- **Ibrahim**, Z., Capra, S., & Baines, S. (2008). Towards standardised dietetics language: Can Australian practitioners agree in identifying and defining the nutrition diagnostic terms from a malnutrition case study? *Nutrition and Dietetics,* **65**(Supplement 2), A1-A24. (Oral presentation)

- **Ibrahim**, Z., Capra, S., & Baines, S. (2008). Towards international standardised dietetics language: Can dietetic practitioners agree in identifying and defining the nutrition diagnostic terms? 15th International Congress of Dietetics, Pacifico Yokohama, Japan. (Oral presentation)

- **Ibrahim**, Z., Capra, S., & Baines, S. (2010). Standardised Nutrition Care Process: A Case Study of Australian Dietetics Practice. *Journal of the Thai Dietetic Association*, **30** (3): 117. (Oral presentation)

- **Ibrahim**, Z., Capra, S., & Baines, S. (2010). Standardised Nutrition Diagnostic Terminology: Potential for International Implementation. *Journal of the Thai Dietetic Association*, **30** (3): 214. (Poster presentation)