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A web-based nutrition competency implementation toolkit for entry-level medical courses

Final report 2015

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Abbreviations and acronyms

ACCLAiM	Australian Collaboration for Clinical Assessment in Medicine project
AMC	Australian Medical Council
AMSAC	Australian Medical Schools Assessment Collaboration
ANZAHPE	Australian & New Zealand Association for Health Professional Educators
CMT	Curriculum-Mapping Tool
DAA	Dietitians Association of Australia
DU	Deakin University
GP	General Practice/Practitioner
HERD	Higher Education Research and Development Journal
MCQ	Multiple Choice Questions
MDANZ	Medical Deans Australia and New Zealand
MU	Monash University
NCF	Nutrition Competency Framework
NHMRC	National Health and Medical Research Council
OLT	Australian Government Office for Learning and Teaching
OSCE	Objective Structured Clinical Examination
PBL	Problem-based Learning
RACGP	Royal Australian College of General Practitioners
SLO	Student Learning Outcomes
UQ	The University of Queensland
UTAS	University of Tasmania
WNCIT	Web-based Nutrition Competency Implementation Tool

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Executive summary

Introduction

The *Web-Based Nutrition Competency Implementation Toolkit (WNCIT) for entry-level medical courses* project was constructed to equip universities across Australia to effectively embed nutrition competencies into their medical curricula. This project is significant, given that at least 80 per cent of the chronic disease burden has been attributed to diet and lifestyle factors [1], the development of nutrition competencies in medical graduates has the potential to improve the health of Australians. Nutritionally-competent medical practitioners will be able to assist patients to make improvements in their diets to reduce the personal and health costs of this problem.

Deliverables

1. **A set of student learning outcomes**
   The Nutrition Competency Framework (NCF), developed at Deakin University was revised and developed and two final versions produced. A simplified version, summarising four knowledge-based and five skill-based competencies, provides a simple tool for nutrition curriculum-mapping for medical courses. The extended and more detailed version includes resources for curriculum renewal: additional Student Learning Outcomes (SLOs), examples of subject matter to address SLOs, and examples of integration into existing topics. Each of these additional components is matched to individual nutrition competencies as well as the Australian Medical Council (AMC)/Medical Deans Australia and New Zealand (MDANZ) competencies for medical courses.

2. **Nutrition curriculum mapping tool**
   An online curriculum-mapping tool (CMT) was developed to enable the mapping of nutrition competencies developed during the first two years of four different medical courses with different course structures (two post-graduate courses and two undergraduate courses). The tool can incorporate data from simple Excel spreadsheets and can generate reports across a range of curriculum criteria.

3. **Nutrition competency assessment tools**
   A set of 67 multiple choice questions in the appropriate format required for Australian medical schools, and two nutrition Objective Structured Clinical Examinations (OSCEs) were developed to measure nutrition knowledge and skills and rigorously evaluated for quality. A subsample of the multiple choice questions (MCQs) and one OSCE will be submitted to the Australian Medical Schools Assessment Collaboration (AMSAC) / Australian Collaboration for Clinical Assessment in Medicine Project (ACCLAiM) which uses a small set of shared assessment materials to benchmark across all medical schools in Australia.

4. **Nutrition education resources**
   Four teaching exemplars were developed and a set of online nutrition education materials was collated and matched to specific competencies in the NCF. All materials were rigorously evaluated by both student and expert reviewers. The teaching modules include:
   - Nutrition and Prevention of Cardiovascular Disease (1st year)
   - The Patient Partner Program 'Nutrition Week' (4th year)
   - Nutrition in Practice: NEAT - Nutrition Exercise Assessment Tool (1st year)
   - A problem-based learning (PBL) tutorial on Type 1 Diabetes (1st and 2nd year).

5. **Instruction manual**
   An instruction manual (*Guide for Users of WNCIT*) has been developed that includes strategies to engage medical schools in developing nutrition competencies, strategies to overcome barriers and ideas for effective use of materials available on the WNCIT project website.

Project impacts

This project has already begun to make a significant contribution to increase the nutrition education incorporated into the medical curricula of the organisations partnering in this project in Australia.

At The University of Queensland, the revised teaching exemplar developed during this project (Nutrition in Practice) is to be a mandatory course requirement for all 1st year medical students for the first time in 2015.

At the University of Tasmania, the nutrition exemplar developed and evaluated as part of this project (The Patient Partner Program (P3) 'Nutrition Week') is now scheduled as an ongoing component of the fifth-year MBBS program at the Launceston Clinical School of Medicine.

At Monash University, one of the problem-based learning (PBL) scenarios developed will be used in the curriculum in years one and two, and an adaptation of the diabetes OSCE will be considered for future use.

Finally, at Deakin University, numerous project impacts have been identified.

- The medical course content on nutrition has been increased by more than 100 per cent with the inclusion of an additional two new lectures on nutrition and a team-based teaching module on food labelling in 2015. Nutrition expertise will be included on a teaching panel.
- The curriculum-mapping tool developed is being used with some modifications for other medical competency standards required by the AMC for accreditation purposes.
- First- and second-year students have formed a nutrition special interest group with more activities planned for 2015.

The project has created opportunites for further networking and development of nutrition education in medical and health curricula.

- The project leader has been invited to be a chief investigator on a National Health and Medical Research Council (NHMRC) application for a Centre of Research Excellence in Maternal Care. The Centre will incorporate strategies to embed nutrition into medical training and will extend this approach into nursing education, particularly as it relates to health professional education for childbearing women.
- This project has built strong linkages with key US and UK medical educators to contribute to international efforts. This has resulted in a visit from a leading US medical educator and a published paper on this topic co-authored by the Project Leader.
- The project has resulted in planned international expert visitors from New Zealand and the US, with invitations to collaborate and present on the project in Cambridge, UK in 2015.

Successes and recommendations

The NCF has been well-received by interested medical educators across Australia, but the challenge remains to have nutrition competencies accepted by MDANZ, which is the peak body representing professional-entry level medical education, training and research in Australia and New Zealand.

The online curriculum-mapping tool has been trialled in four universities with differing course structures and provides valuable information on the nutrition content of the curriculum for the first two years of the course. It has become clear that another method of mapping the curriculum is required for the later clinical years for all medical courses, as the tool cannot encompass the course-wide, detailed documentation of skill and knowledge development for all students. It is likely that the clinical experience portfolios kept by individual students to demonstrate competency would need to be mapped to achieve this aim. The development of this extension to the current CMT is important as it would enable mapping of the whole range of competencies developed by medical graduates.

The acceptance of some of the nutrition-related MCQs developed for this project by the Australian Medical Schools Assessment Collaboration (AMSAC) in their benchmarking database would be a major step forward, as this would alert medical schools to the need to include sufficient nutrition content in their curricula. It would also be useful to develop some extended MCQs that integrate nutrition components into MCQ questions covering broader disease topic areas. There is also further scope for developing innovative methods of formative nutrition competency assessment with respect to development of basic nutrition risk assessment.

There are indications that the teaching exemplars developed as part of this project will be useful resources that can be utilised by other medical schools, as evidenced by the uptake of some of the teaching exemplars into the ongoing curriculum of the partner universities. The trialling of these exemplars and the improvements made as the result of student and staff feedback will maximise the successful implementation of these resources. The collated directory of online nutrition resources will be useful for medical educators and students and promotion of this directory, with the commitment from Deakin University to maintain the currency of the resource, is likely to attract these audiences to the project website.

There will be ongoing challenges in motivating medical schools to integrate nutrition into their curricula given their crowded nature and schools' limited resources. It is likely that components of the WNCIT will serve as the impetus for many Australian medical courses to increase the integration of nutrition competencies into their curricula. However it will be fundamental to implement effective dissemination strategies to promote the use of WNCIT to facilitate this agenda.

Introduction and context

Given that at least 80 per cent of the chronic disease burden has been attributed to diet and lifestyle factors [1], the development of nutrition competencies in medical graduates has the potential to improve the health of Australians, as nutritionally-competent medical practitioners will be able to effectively assist patients to make improvements in their diets to reduce this burden.

The importance of incorporating nutrition into the medical curriculum has been widely recognised overseas [2-4], but in Australia there is resistance to the integration and implementation of a comprehensive nutrition curriculum due to the large subject matter that is required to be covered to meet graduate outcomes set by the Australian Medical Council (AMC).

The AMC develops standards for medical education and training in all phases of medical education. A thematic framework has been used to organise the AMC's Graduate Outcome Statements into four domains. These domains collectively provide the requirements that students must demonstrate at graduation. The domain framework is a reference for medical education providers.The four domains are:

1. Science and Scholarship: the medical graduate as scientist and scholar;
2. Clinical Practice: the medical graduate as practitioner;
3. Health and Society: the medical graduate as a health advocate;
4. Professionalism and Leadership: the medical graduate as a professional and leader.

In interviews with key staff of all 18 Australian medical courses in 2010, there was no consistent integration of nutrition knowledge and skills, and the assessment of nutrition knowledge and skills varied significantly between universities [5].

The primary purpose of the The *Web-Based Nutrition Competency Implementation Toolkit (WNCIT) for entry-level medical courses* was to develop a 'toolkit' to equip universities across Australia to effectively embed nutrition competencies into their medical curricula.

This project facilitated a novel strategic partnership, which brought together four higher education institutions delivering entry-level medical courses with a variety of methods of delivery and curriculum emphases. These were:

- Deakin University (DU), which runs postgraduate course (120 students per year) with an emphasis on producing general practice (GP) graduates interested in working in rural and remote regions
- Monash University (MU), which is a multi-campus university with graduate- and undergraduate-entry MBBS programs based on an integrated, patient-centred curriculum (more than 500 domestic and international students each year across sites in Malaysia and Australia)
- The University of Queensland (UQ), which offers a postgraduate course with the largest student cohort of medical schools in Australia, including a significant number of overseas students (more than 500 students per year)
- The University of Tasmania's (UTAS) undergraduate course (120 students per year), delivered across three niche rural, regional and urban campuses.

The partnership was further strengthened by its alliance with the Dietitians Association of Australia (DAA), the key professional body for dietitians.

The project was designed to formally position nutrition within discipline-based medical courses, through the integration of clearly-defined nutrition competencies, and to include appropriate methods for assessment of these competencies applicable to medical courses across in Australia.

Project approach

Project establishment

The project initially explored its context through an Educator Perspective Survey (2013) (publicised through an oral presentation at the June 2013 Australian & New Zealand Association for Health Professional Educators (ANZAHPE) Conference). The results of this survey extended our understanding of the challenges faced by medical schools in effectively embedding nutrition into the curriculum which enabled us to tailor our material to enhance uptake by medical schools (see Appendix B for summary).

A workshop was run in Melbourne involving project team members (drawn from the four partnering universities) attending in person or via teleconference. At this workshop, the program of work and teleconference meeting schedule (eight meetings) was agreed upon.

A formative evaluator and dietetic educator (both from Deakin University) agreed to join the project team and a summative evaluator and an administrative assistant were appointed. The summative evaluator also participated as an active participant at this initial workshop. As the workshop was considered so useful it was decided to run another meeting (in February 2014) involving all project team members including the formative evaluator and research fellows as well as one member of the reference committee and the summative evaluator. A final face-to-face meeting was held (in December 2014), attended by all project team members and both the formative and summative evaluators.

Reference committee and working groups

Terms of reference were drafted for the reference committee and members invited in March 2013. It was agreed that meetings would be run as teleconferences and that there would be two meetings per year. A total of three meetings were run, with the last meeting being cancelled due to scheduling difficulties.

A number of working groups were convened to facilitate achievement of the intended outcomes, including members of the project team as well as external expert members who were interested in contributing to the project (see Appendix C for membership details).

Processes and timelines

The commencement of the project was slowed initially by staff changes but an administrative support person was engaged to assist.

Conceptually the project could be divided into four phases, although there was a clear overlap with respect to timelines:

1. Review and refinement of the Nutrition Competency Framework (NCF), and development of a set of Student Learning Outcomes (SLOs). This framework formed the basis of the nutrition curriculum-mapping tool (CMT) (stage two).
2. The CMT was developed initially at Deakin University in conjunction with the web developer, course and topic coordinators. Frequent meetings with the web developer commenced at the beginning of the project to identify the process and steps required to develop a useable tool. Course coordinators assisted in locating the required data, defining the outcomes and level of detail required for mapping. Deakin University course

coordinators also assisted in collating the current SLOs and relevant assessments and met with the web developer. The web developer then produced data collection templates suitable to map DU's curriculum. After the initial mapping of DU's curriculum input was sought from partner organisations and the tool modified accordingly. The three other partner organisations then commenced mapping and further modifications to the tool to accommodate different course structures.

3. Development and evaluation of nutrition competency tools, teaching exemplars and assessment and collation of quality online nutrition teaching resources.
4. Development of a project website and drafting of an instruction manual.

Evaluation

The WNCIT project has been evaluated iteratively throughout its duration and this was facilitated by the appointment of both a formative evaluator and an independent summative evaluator in the early stages of the project. The regular feedback and ongoing contribution of the formative evaluator to the project ensured that any emerging issues were addressed promptly and outcomes recorded. The contribution from the summative evaluator at the face-to-face meetings was invaluable in keeping the team focused on the key outcomes and the importance of documenting criteria for quality. See Appendix D for the summative evaluation report.

Development of project deliverables

The project team and working groups successfully produced five key deliverables included in the WNCIT. These, and the processes for their development, are described in detail below.

Student learning outcomes **(SLO)**

SLOs identify what the learner will know and be able to do by the end of a course or program. Hence nutrition based SLOs are essential if nutrition is to be incorporated into medical curriculum.

The NCF, initially developed in 2011, was revised and two versions produced (Appendix E). A simplified version summarises the four knowledge-based and five skill-based competencies and essential tools required to undertake the nutrition curriculum-mapping exercise for medical courses. The full version includes a list of Student Learning Outcomes (SLOs), examples of subject matter to address SLOs and examples of SLOs that could be integrated into existing topics. Each of these additional components is matched to individual nutrition competencies as well as AMC competencies for medical courses. The SLOs and assessment strategies included are appropriate for staged nutrition education through the curriculum [3, 6] and provide the basis for ongoing personal and professional development for students because they establish a progression of incremental steps to competency. This framework was extensively reviewed and further developed by a team of experts drawn from project staff and interested expert academics to provide a suite of useful key benchmarking documents.

Nine teleconferences were held by the working group between August 2013 and March 2014. A total of three drafts were developed and disseminated for comment amongst the group, with two final reviews undertaken by project team members and one final review by the reference committee.

A video clip detailing the NCF has been produced and reviewed by both the project team and reference committee and is available on the WNCIT website.

Nutrition curriculum-mapping tool

An online curriculum-mapping tool (CMT) was developed to enable the mapping of nutrition competencies developed during the first two years of four different medical courses with different course structures.The tool can incorporate data from simple Microsoft Excel spreadsheets and can generate individually tailored reports across a range of curriculum criteria.

The CMT was initially developed at DU in conjunction by the web developer with input from project manager, DU course and topic coordinators. This group identified the processes and staff engagement required to develop a useable tool. Course coordinators assisted in locating the required data, defining the outcomes and level of detail required for mapping. DU course coordinators also assisted in collating the current SLOs and relevant assessments and met with the web developer and project manager. The web developer then produced data collection templates suitable to map DU's curriculum. After the initial mapping of Deakin's curriculum input was sought from partner organisations and the tool modified accordingly. The three other partner organisations then commenced mapping and further modifications to the tool to accommodate different course structures.

After DU completed an initial exploratory mapping of the nutrition competencies, utilising the CMT, the tool was made available to partner organisations to enable them to trial the tool in their organisations.

The total curriculum of years one and two were mapped for Deakin University. In total, the mapping tool (CMT) was trialled in two postgraduate courses and two undergraduate courses, and was demonstrated to effectively map the curricula (see Appendix F for summary of initial mapping exercise).

Course content information can be loaded directly into the tool via excel spreadsheets or information. Once stored in the tool, information can be readily modified/updated. Users can generate a variety of customised reports to provide individually relevant information on the content, delivery method, assessment type and frequency of coverage of nutrition competencies.

A set of instructional videos on the use of the tool to map, analyse and report on nutrition in medical curricula have been developed to provide WNCIT users with key information.

Nutrition competency assessment tools

Summative competency assessment tools that comply with the summative processes in Australian universities and align with the NCF were developed. After consultation with team members and medical educators (see Appendix B) it was clear that for nutrition to be effectively embedded into medical education programs, any nutrition content must be formally assessed.

The results from the curriculum-mapping exercise demonstrated that the curriculum structure within medical courses makes it difficult to demonstrate that nutrition has been effectively embedded within the curriculum. There was evidence that nutrition was covered in the curriculum, but was not formally assessed. This was particularly noted when nutrition content was provided by guest lecturers. One of the reasons for this is likely to be that guest lecturers, experienced in their field, do not have the expertise and/or time to write quality assessment questions in the specific format required by medical schools. Alternatively those directing assessment have not allocated sufficient priority to nutrition and have not developed any formal assessment methods for nutrition.

To address these issues it was considered a priority to develop a set of nutrition assessment tasks that could be readily integrated in the existing formal assessment processes prior to the development of more innovative competency assessment tools which could be used in the latter clinical years. Two types of assessment were developed:

1. a bank of high quality, summative multiple choice questions (MCQs) for first-, second- and third-year medical students, in the appropriate format utilised by medical courses in Australia
2. two Objective Structured Clinical Examinations (OSCEs) to address the skill competencies.

Although these assessment tools were primarily designed for summative assessment, some of the MCQs and one of the OSCEs will be made available to educators for formative assessment.

Multiple Choice Questions (MCQs)

A group of team members and external experts were trained by an MCQ expert (Mr Neville Chiavaroli) and formed a Working Group (Appendix C) to develop a set of MCQs and Extended Matching Questions for years one and two of medical courses in Australia.

A pilot set of 35 questions was administered to 30 dietetic students from Deakin University and University of Wollongong and evaluated by item analysis (this analysis examines student responses to individual test items (MCQs) to assess the quality of those items [7,8]). The quality components assessed were:

- the relative difficulties of the items
- discrimination index (point biserial) ie. measures item reliability; correlates student scores on one particular question with their scores on the test as a whole
- Rasch statistics ie. an indication of poorly-written items and information on the extent to which a question discriminates between high-ability and low-ability examinees.

After review of the item analysis the pilot set of questions was revised and additional questions drafted by members of the Working Group. Final testing of 84 MCQs was conducted on 171 students (140 dietetic students from three universities and 31 second-year medical students from two universities). Item analysis was conducted and results reviewed by the expert team, resulting in the retention of 67 quality nutrition MCQs in the database (56 for year levels 1 and 2; 11 for years 3 and 4). The MCQs have been matched to specific nutrition competencies in the Nutrition Competency Framework.

Some of the MCQs will be submitted to Australian Medical Schools Assessment Collaboration (AMSAC) for consideration for inclusion in a small set of shared assessment MCQs which are embedded in examinations around the mid-point of the medical degree to enable benchmarking of student performance across all medical schools in Australia. This could have a longer-term impact on increasing the nutrition content in medical education if selected for use. The majority of the remaining MCQs will be made available to medical educators on request with appropriate screening and security measures, and a subset made available to educators for use in formative assessment.

Objective Structured Clinical Examinations (OSCEs)

For assessment of clinical skills in years 3 and above, it became evident that the development of nutrition OSCEs was required if clinical nutrition-related skills were to be valued, taught and formally assessed in the course. Two nutrition OSCEs were developed to measure nutrition knowledge and skills and rigorously evaluated for quality.

Three teleconferences were conducted and a peer evaluation framework for the OSCEs was drafted. The OSCE tasks were reviewed by experts from Deakin University and Monash University and modified in response to the review.

The MU OSCE was considered most appropriate for assessment of students who had completed one year of clinical placement, yet could be modified to focus upon eliciting a history for earlier years. It could be also be readily modified to provide an OSCE for later years as it illustrates the integration between clinical skills and health promotion, human development and the focus upon lifestyle aspects of history and management.

Further development could address some wording changes and minor alterations to the scoring rubric and customisation for individual universities.

Details of the OSCEs must remain confidential if they are to be considered for use in the formal examination of medical students (details can be provided on request). As the OSCEs developed in this project have gone through a rigorous process of quality evaluation, one of them will be submitted to ACCLAiM (AMSAC OSCE benchmarking) database for consideration for inclusion in the small set of shared OSCE assessment materials to benchmark across all medical schools in Australia. It will also be made available to individual medical schools on a case-by-case basis

with safeguards employed to ensure confidentiality. The other OSCE will be made available on the WNCIT website, so that it can be used as small group teaching resource and as a formative assessment tool.

The process of developing nutrition OSCEs provided significant insight for the project team. It was clear that there is currently no clear consensus among the experts on the level and depth of nutritional clinical skills that a medical graduate requires. An alternative approach may be to integrate a component of nutrition clinical skill competency into an existing OSCE not primarily targeted at nutrition. Further discussion is needed to create strong integration of assessment of nutrition skills into medical degree assessment. It is unlikely that a consensus will be reached on these issues in the short term. The project has created a dialogue and activity in at least four medical schools to inform further debate.

Nutrition education resources

Resources to support nutrition education in medical degrees were collated by a working group of members from three universities with varying medical, dietetics and public health backgrounds. Two Deakin University medical student representatives who expressed interest were also included to provide the important student perspective. Criteria were developed by the working group to choose appropriate electronic resources for all knowledge-based and skill-based competencies to ensure consistency in choosing resources that:

- provided core policy or knowledge
- were evidence based
- were current
- included ethical, social or cultural considerations
- were easily accessible via a web link
- were relevant to health professionals.

Key nutrition resources have been identified, collated and linked to specific competencies outlined in the NCF (Appendix E). These align with SLOs and assessment activities to assist medical schools in finding appropriate resources when introducing nutrition into teaching programs. It is expected that this resource will be reviewed for currency every six months (overseen by DU) and that input from collaborating organisations will contribute to its ongoing currency.

In addition to this comprehensive list of resources, a set of four exemplars of teaching resources for nutrition education were developed and evaluated by students and experts. The exemplars were developed and assessed independently in individual partner sites, and will be made available on the project website. These are summarised below.

1. Deakin University – Nutrition and Prevention of Cardiovascular Disease
Acknowledging discrepancies between their own nutrition knowledge and food behaviour could provide relevant learning opportunities for students to develop an appreciation of the challenges of food behaviour change and develop skills in providing effective support to empower patients to make positive lifestyle changes.

<u>Student Learning Outcomes:</u>
- to develop an appreciation of the challenges of food behaviour change and develop skills in providing effective support to empower patients to make positive lifestyle changes. This is by

examining dietary recommendations related to cardiovascular disease prevention and treatment (fruit, vegetable and salt intake).
- to identify the extent of any difference between students' nutrition knowledge and behaviour.
Target group: students in nutrition and population health lectures towards the end of their first or second year.
Format: lecture
Resources:
- A selection of slides with key nutritional information
- Six multiple choice questions delivered to students (using an audience-response system) which assesses medical students' self-reported nutrition practices and knowledge and illustrate the mismatch
- Sixty-minute slide presentation that and can be delivered It assesses medical students' self-reported nutrition practices and knowledge
- Six multiple choice questions delivered to students (using an audience-response system)
Nutrition competencies addressed: K2.1, K2.2, K3.1, K3.2, K4.2
Evaluation: in two first-year student cohorts (2013 and 2014), it was found that although more than half of the students knew the number of recommended daily servings of vegetables, less than two students in ten consumed the recommended amount.
Outcomes: This interactive lecture has been successfully integrated into the first year medical curriculum at Deakin University, and will be incorporated again in 2015.

2. The University of Queensland – Nutrition in Practice: Nutrition Exercise Assessment Tool (NEAT)

This module (addressing nutrition competencies) introduces the Nutrition Exercise Assessment Tool (NEAT) and associated solution sheets, allowing students to initially complete this tool to describe their own dietary practices, and includes associated case study-based practical examples.
Student Learning Outcomes:
-to understand the role nutrition and lifestyle play in the development of chronic disease
-to appreciate the nutritive and pharmacological roles of nutritional substances
-to differentiate between marketing and evidence-based information on the benefits of particular lifestyle and dietary practices on health outcomes
-to gain practical skills and resources to effectively and succinctly provide beneficial lifestyle and nutrition advice to patients.
Target group: 1st year medical students within 15 weeks of commencement
Format: preliminary student work in the form of a recorded lecture; MCQs to be completed and achieve a 75 per cent pass mark to be eligible to attend the large group practical session
Resources:
-preliminary lecture recording – Clinical Nutrition Myth Busting (60 min)
-MCQs directly relating to the preliminary lecture
-an introduction to practical session slides
-the NEAT assessment tool (adapted from US Reap and Wave (Rapid Eating and Activity Assessment for Patients) [9])
-NEAT interpretation guide
-NEAT practical activity slides and support resources
-practical nutrition assessment session (90min).
Positive feedback was received from students indicating that the assessment tools (NEAT) were useful, the case study was relevant and interesting, and clinical examples were helpful. The

lecturer reflections noted that attendance at the session was not high due to timetabling issues and that the module cannot be run successfully in a large group lecture format (n= 200+).
Outcomes: Now a mandatory course requirement for all first-year medical students. The revised format is a one-hour lecture recording, to be watched by students in their own time prior to attending the 90 minute practical session. Formative nutrition competency will be assessed by student completion of a mandatory quiz based on the content of the lecture recording prior to the practical, with students required to obtain a 75 per cent pass mark in order to attend the practical session. The practical session will be delivered in a small interactive group format (60 students per session).

3. University of Tasmania – Patient Partner Nutrition Program (P3)
The Patient Partner Program (P3) is run by a team of clinical and teaching experts from the University of Tasmania, the Launceston General Hospital and the wider health care community. It correlates with all five of the current themes within the University of Tasmania .
Student Learning Outcomes:
-integrate nutrition in the medical history and physical examination
-interpret and integrate findings from the assessment to define nutritional problems
-apply clinical reasoning to prioritise nutritional management strategies
-provide basic evidence based advice on nutrition to patients
-appreciate the social and cultural importance of food (influence of the social determinants of health).
Target group: Year 5 students
Format: student evaluation/assessment via a weekly reflective log/workbook regarding their P3 sessions that is submitted for academic staff feedback.
Resources: weekly logbook
Nutrition Competencies: K2, K4, S1, S3, S4
Evaluation:
-trialled over five days with a student evaluation survey/questionnaire (piloted and further refinements made to the survey), plus clinical tutor feedback. Thirty-three students indicated the high degree of revelvance of this subject matter to their course and recognised the need for more skills and knowledge in nutrition, and identified a lack of this discipline in their undergraduate training.
-the program would benefit from some refinements including resources given prior to the session as well as an improved set of nutrition education resources
Outcomes: A P3 nutrition session has now been incorporated into year 5 of the Program at UTAS in 2015.

4. Monash University – Problem-based learning scenario
A problem-based learning (PBL) scenario relating to Type 1 diabetes.
Student Learning Outcomes:
-Describe the role of nutrition in treatment of disease
-Describe the dietary management strategies for relevant medical conditions and disease
-Appreciate the social and cultural importance of food
Target group: second year
Format: Problem based learning tutorial
Resources: Tutor notes
Nutrition Competencies: K3.1;K3.2;K4.3
Evaluation:

- qualitative feedback from two PBL tutors and a group of second-year undergraduate students
- Student feedback indicated the authenticity of the PBL , and the usefulness in the patient-centred approach it used, providing the opportunity to consider nutrition and lifestyle issues an adolescent/young adult.
-tutors suggested this PBL could be used to trigger self-reflection on patient management and inter-professional approaches to health care. Also that students were able to achieve the intended learning outcomes and better appreciate the need to include other health care providers in patient care.

Instruction manual (A Guide for Users of WNCIT)

A guide to using the WNCIT to embed nutrition into medical education has been developed and is available on the WNCIT website.The instruction manual includes information on strategies to engage medical schools in developing nutrition competency in their graduates and how to effectively use the materials and tools available on the WNCIT website. This includes information from lessons learnt during the implementation of this project and includes:

- strategies to engage key staff at all levels in incorporating nutrition into medical education
- strategies to effectively embed nutrition into medical education courses
- information regarding the differing structure and operation of each medical training course including curriculum issues and skill level of staff
- discussion of the importance of vertical integration of nutrition in the medical curriculum [3].

The manual include information and ideas on:

- medical school engagement strategies
- nutrition competencies and NCF
- an overview of the curriculum-mapping tool and instructions for use
- examples of curriculm mapping undertaken
- summaries of newly-developed teaching and learning exemplars
- assessment tools developed
- nutrition education resources reviewed and collated.

Dissemination

A communication and dissemination plan was developed as part of this project. The plan included development of:

1. an informative website (www.wncit.weebly.com) that provided the project background and regular updates on project activities
2. creation of a @WNCIT Twitter account
3. conference presentations at national (ANZHPE 2013 (oral + poster), ANZHPE 2015 (oral + poster), DAA 2015 (poster) and international (American Society of Nutrition 2014 (two oral + one invited oral)

The strategy also involved building links to key international experts through the project reference committee and attempting to garner support in the field through project team contacts. As our dissemination plan was not particularly effective early in the project, a public relations consultant was engaged in July 2014 to provide relevant expertise. The consultant assisted in the development of a dissemination plan that included production of:

- a media kit
- a list of target long-lead media (e.g. monthly medical magazines)
- a list of target short-lead media (e.g. daily and weekly medical media)
- a list of target health writers and health-focused radio programs
- a list of relevant professional association websites and newsletters.

The implementation of this dissemination plan resulted in articles being published in *Medical Observer (*"The value of nutrition" October 2014), *Australian Medicine* ("Time for med students to bone up on nutrition" October 2014), *6 Minutes* ("Doctors lack confidence to treat nutrition issues: professor" November 2014), *Good Practice* (RACGP GP magazine January 2015) and University of Queensland's *Medicine* magazine ("Recognising the need for nutritional considerations in medical education and practice" Summer 2015 edition), with other potential news items under consideration by *Australian Doctor, Medicine Today, ANZAHPE* and the *Higher Education Research and Development Journal (HERD).*

The addition of professional expertise had an important effect on raising the profile of the project publically. This will be significant in future discussions with medical degree regulators and leaders.

Project impacts

The WNCIT project has made a leading contribution to embedding nutrition in the medical curricula of the project partner institutions in Australia.

At The University of Queensland, the Nutrition in Practice module was developed, trialled, and evaluated by students as part of this project. It has been subsequently modified and has become a mandatory course requirement for all first-year medical students for the first time in 2015.

At the University of Tasmania, the nutrition exemplar developed and evaluated (The Patient Partner Nutrition Program (P3)) is now scheduled as an ongoing component of the fifth-year MBBS curriculum at Launceston Clinical School of Medicine.

At Deakin University, the project has directly influenced the medical curriculum in a number of ways.

1. The medical course co-ordinators have requested increased nutrition content in the curriculum, and in 2014 an additional two new lectures were included.
2. A new team-based teaching exercise on food labelling developed as part of this will be revised and delivered in 2015.
3. The Deakin University project team members were invited to add a nutrition contribution to a first-year interactive teaching panel (September 2014) on cardiovascular disease which was well-received by staff and students and will be included again in 2015.
4. First- and second-year students have formed a Medical Students' Nutrition Special Interest Group. The first meeting involved a guest lecturer who gave a presentation on topical nutrition issues featured recently in the media. Thirty four students attended that meeting, and three more are planned for 2015, co-ordinated by the students themselves.

In addition to direct impacts on project partner institutions, the project has sought to raise the profile of nutrition in medical education in other universities and at the national level.

- The Project Leader was invited to be a chief investigator on a National Health and Medical Research Council application for a Centre of Research Excellence in Maternal Care (led by Professor Helen Skouteris, School of Psychology Deakin University) which will incorporate the continued development of strategies to embed nutrition into medical training and extend this approach into nursing education, particularly as it relates to health professional education for childbearing women.

The outcomes of this project have created interest in the more general application of its tools. The Head of the School of Medicine, Deakin University and staff are currently exploring the broader potential use of the tool for other curriculum components. The mapping tool can be adapted easily to map other competencies required to meet accreditation standards, and plans are now underway to modify this tool to enable the medical curriculum to be mapped for other competencies required by the Australian Medical Council.

Finally, this project has also begun a contribution to the international movement to embed nutrition into medical education through collaboration and discussion with international colleagues. While searching for nutrition resources, the project leader connected with Martin Kohlmeier from the University of North Carolina Schools of Medicine and Public Health. Dr Kohlmeier (who has been working in this area for more than 20 years) accepted an invitation to

present his work at Deakin University, and has helped to raise the profile of nutrition education within the university and the local medical profession.

The project leader was invited to present the project at a special symposium (Nutrition Competencies in Health Professionals' Education and Training: A New Paradigm) in San Diego, April 2014 and contributed to a published paper on this topic [10]. Two oral presentations were also delivered at Experimental Biology 2014 on interim outcomes from this project. As a result of these presentations the project Leader was invited to be one of four international specialist guest editors for a Special Issue on Nutrition Education for the HealthCare Professions of Journal of Biomedical Education which will be published in 2015.

The publicity generated from this project has also resulted in:

- a planned visit (in May 2015) from Dr Clare Wall (University of Auckland, New Zealand) with a view to developing a collaborative project
- the submission of a Fulbright Specialist Program application by a US medical education specialist (Dr Charlotte Pratt), which although unsuccessful will be re-submitted
- invitation extended to the project leader to participate in an International Summit in Cambridge, UK (August 2015).

Successes, challenges and recommendations

1. Relating to the set of learning outcomes matched to the NCF

The Nutrition Competency Framework (NCF) has been well-received by interested medical educators, but the challenge remains to have any set of nutrition competencies broadly accepted by Medical Deans Australia and New Zealand (MDANZ). MDANZ is the peak body representing professional-entry level medical education, training and research in Australia and New Zealand and has developed the set of medical competencies into which the NCF fits. Without further endorsement or regulation, effective inclusion of nutrition in the medical curriculum will only be addressed by medical schools with a particular interest in their graduates achieving nutrition competency. A sustained campaign advocating the adoption of nutrition competencies across all medical schools is perhaps required to continue the momentum generated by this project.

2. Relating to the nutrition curriculum-mapping tool

Many universities use curriculum mapping to drive curriculum renewal. For example in Canada and the UK 55 per cent of medical schools report building a curriculum map [11]. A number of curriculum mapping tools has been developed that allows users to evaluate organisational-specific outcomes in medical schools relating to competencies and learning objectives, and then link these to the standardised topics in a meaningful way[12]. Curriculum mapping is a useful tool for the implementation and development of nutrition within the curriculum as it identifies key elements of the curriculum that relate to nutrition, documents the vertical integration of nutrition throughout the curriculum, and maps the relationship between learning activities, assessment and the development of students' competency. This project has developed an online curriculum mapping tool (CMT) which can map the nutrition competencies attained by students in the first two years of both undergraduate and postgraduate entry-level courses.

The online CMT has been trialled in four universities with differing course structures and provides valuable information on the nutrition content of the curriculum for the first two years of the course. The project has identified that another method of mapping the curriculum is required for the later clinical years for all medical courses, the tool cannot encompass the course-wide, detailed and consistent documentation of skill and knowledge development for all students.

The uptake of this tool more broadly depends on individual medical schools' interest and staffing resources available to transpose documented curriculum content and assessment strategies into the required excel template format. The advantages of the tool are that once the information is uploaded it is an easy task to update items in the curriculum or suite of assessment items that change over time, and the tool can also be modified to map to a range of different competencies. With minimal modifications this tool has the capacity to map to a range of outcomes. Its use to map medical course content to numerous other competencies, such as the AMC guidelines, global learning outcomes and subject areas simply via keyword searches has generated great interest in this mapping tool within DU and the partner organisations.

3. Relating to the nutrition competency assessment tools

Endorsement of assessment for nutrition competencies holds the key for further embedding of nutrition competencies in medical curricula. The project has created two forms of assessement to facilitate uptake by medical schools.

Inclusion of nutrition-related MCQs developed by this project into the benchmarking database of the AMAC would be a major step forward. This would bring this area of competency to the immediate attention of all medical schools in Australia. In the interim, independently of AMAC, the questions will be useful to the many medical schools with non-staff lecturers in nutrition and where it may be difficult to generate high-quality nutrition-related exam questions. It would also be useful to develop some extended MCQs that include nutrition content.

The use of the nutrition OSCEs in the formative assessment of medical courses requires further investigation given the limited number of OSCEs that can be used with one cohort of graduates. It would sensible to explore the integration of nutrition competencies into OSCEs designed around specific medical conditions where nutritional management is relevant. There is also scope for developing innovative methods of formatively assessing students' competency in basic nutrition risk assessment.

4. Relating to the nutrition education resources

This project has also created teaching resources to support teaching staff who wish to embed nutrition into medical degrees. The teaching exemplars developed as part of this project will be useful resources that can be used by other medical schools. The trialling of these exemplars and improvements made following staff and student feedback will maximise the successful implementation of these resources. The second resource, the collated directory of online nutrition resources, will be useful for medical educators as well as students, and with the commitment from Deakin University to maintain the currency of the resource, is likely to attract these audiences to the website.

There will be ongoing challenges in motivating medical schools to integrate nutrition into their curricula. It is likely, however, that components of the WNCIT toolkit will provide some useful resources that will promote this agenda both in Australia and internationally.

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Appendix A: Certification by Deputy Vice-Chancellor (Education)

I certify that all parts of the final report for this OLT project provide an accurate representation of the implementation, impact and findings of the project, and that the report is of publishable quality.

Name: ……..…….....Date: ……..……

Appendix B: Educators Perspective Survey

Survey of medical educators in 2013/2014, August 26 2013: 22 respondents

Higher education institutions represented:

- Flinders University
- Griffith University
- Sydney Medical School
- University of Auckland
- University of Sydney
- University of Western Sydney
- Not all respondents indicated their institution

Demographics:
Most individuals who responded were involved in the teaching/designing of graduate-entry level medical courses in Australia 14/17
Roles included (note respondents could select multiple roles): Lecturer (8), Member of curriculum or assessment committee (4), Tutor (3), Coordinator Theme/Topic/Unit (3), Associate Dean/Associate HOS (2), Coordinator of pre-clinical years (2), Placement clinical supervisor (1), Chair of curriculum or assessment committee (2)

Response:
Generally, respondents through each component of the WNCIT would be useful, but were less certain that their institution would actually use the components in their curriculum.

Barriers to the introduction of nutrition competencies:

1. already full nature of the curriculum (predominant response)
2. ability to train educators
3. costs
4. ability to use the technology
5. lack of understanding of importance and existence of competencies
6. not regarded as high priority compared to other subject matter

Facilitators to the introduction of nutrition competencies:

1. their highly relevant nature
2. potential for integration throughout courses (including distributing the content over several years, providing a timeline as to when information should be integrated) and alignment with existing problem based, case based and system topics
3. low cost (free)
4. support from Head of School
5. ease of use
6. provision of useful resources
7. providing clear examples of how learning objectives can be achieved
8. partnerships with nutrition and dietetics experts in the teaching institution

Appendix C: Reference Committee & Working groups

1. Reference Committee

Caryl Nowson (chair), Eleanor Beck, Robyn Perlstein, Andy Sinclair (representing the National Academy of Sciences Nutrition Committee), student representatives (Rose Stewart (University of Tasmania), Richard Arnold (Australian Medical Students' Association), Zoe McCallum (Parental and Enteral Nutrition Society), Lee Kennedy/Jon Watson (Professors of Medicine, Barwon Health & Deakin University), Karen Hitchcock (Consultant Physician, General Medical Unit, Alfred Hospital) from May 2013 and Mark Kennedy (General Practitioner, Corio Medical Clinic) from May 2013.

Representatives from Royal College of General Practitioners, the Australian Medical Association, and Medical Deans Australia & New Zealand could not be identified.

2. WNCIT Nutrition Competency Framework Working Group

Sonia Brockington (chair), Eleanor Beck, Robyn Perlstein.

3. WNCIT Nutritional Competency Assessment Steering Committee (March 2014)

Eleanor Beck (chair), Susie Macfarlane, *Jen Lindley, *Claire Palermo and *Evelyn Volders (Monash University), Janet McLeod, Ross Carne **Kate Save, **Daniella Tassoni (Deakin University), Neville Chiavaroli (University of Melbourne), *Meredith Kennedy (University of Wollongong).
*members of writing group, ** appointed as casual research fellow writers

4. WNCIT OSCE Working Group and External Reviewers (June 2014)

Caryl Nowson (chair), Robyn Perlstein, Jennifer Lindley, Eleanor Beck, Sonia Brockington, Jennifer Schafer, Kim Rooney, Jennifer Lindley (WNCIT), Gerard Gill, David Bainbridge (Deakin University) Paul Fullerton, Jan Coles, Carmel Pezaro, Rebecca Pellicano, Brad Frew (Monash University)

5. WNCIT Nutrition Education Resource Working Group (September 2014)

Sonia Brockington (chair), Robyn Perlstein, Niikee Schoendorfer (WNCIT), Colin Bell, Ellie O'Connor (Deakin University), Meredith Kennedy (University of Wollongong)

6. WNCIT Curriculum Mapping Working Group

Robyn Perlstein (chair), Jessica Woodruff, Niikee Schoendorfer, Jennifer Linley, Wendy Steward (Research Fellow, Monash University, appointed July 2014)(WNCIT).

Appendix D: Summative Evaluation Report

Conducted by Dr Di Challis, *Challis Consultancy*

February, 2015

1. Executive summary

The hallmarks of a successful project such as this are that it meets a demonstrated need and that, through effective leadership and management, it achieves its intended outcomes with a high probability that the project will, indeed, make a significant contribution to student learning in its specified context. The independent evaluation of this project indicates that these criteria were substantively met and the sector stands to gain from a well conceptualised and well executed study.

The grant proposal and the interim and final reports offer convincing arguments and evidence of the need to incorporate approaches to ensure nutrition competency in medical curricula. As claimed at the outset of the grant proposal, with at least 80 per cent of the chronic disease burden attributed to diet and lifestyle factors, nutritionally-competent medical practitioners will be effectively able to assist patients to make improvements in their diets which will reduce the chronic disease burden in Australia. The project team's [PT] perception of the need for the WNCIT project is demonstrated by such comments as:

> In relation to assessing the way in which nutrition is taught in med schools, this has been haphazard and random. Nutrition is a critical element in health, and the elements of it need to be named up, and incorporated within an overall curriculum framework [PT].

With its collaboration across four universities (Deakin University, Monash University, the University of Queensland and the University of Tasmania) and with involvement by relevant associations, committees and societies as well as students, the project draws on a broad range of expertise and contexts. As well as the value accruing from networking and collaboration, the project should raise the awareness of the importance of nutrition in the medical curriculum of the partner institutions and the various professional groups represented within the project team and reference group [RG].

Increasing awareness of the importance of nutrition to medical education is an important outcome. However, as the project members are aware, being able to demonstrate a need and providing tested resources that seemingly address that need is meeting but part of the challenge. Having these resources embedded into curricula and so used is the third critical step. As outlined in the *Final Report* (pp21-22), there is evidence at each of the partner institutions of nutrition being more fully integrated into medical curricula and resources developed as part of the project being used for teaching and learning. Beyond the partner institutions, once avenues of access are resolved and disseminated, those interested in nutrition, especially its incorporation into medical curricula, should find much of value. Through its articulation of learning outcomes, the online curriculum mapping tool, the nutrition competency assessment tools and education resources including an instruction manual, medical education should be enhanced and educators and their students should be equipped with effective resources. Whether WNCIT is "the beginning of something that hopefully will be sustainable" [PT] will depend on how, and to what extent, flexibility and pathways for revisions/updates to ensure contemporary relevance are used and on successful leveraging of support for its adoption.

Probably the true test of the success of this project will be twofold:

- The degree of influence WNCIT has on the medical curricula and whether the curriculum mapping tool is used more widely to map competency standards required by the Australian Medical Council for accreditation.

- The extent to which the materials developed by this project are used and then have a positive impact on student learning within the next few years.

2. Evaluation and the role of the independent evaluation auditor

The grant proposal (p7) stated the final project evaluation would determine:

- How well the project has achieved its stated outcomes
- How useful the developed deliverables would be to the intended stakeholders (medical schools around Australia).

It was agreed at the outset that the independent evaluation would consist of an interim evaluation completed in April 2014 and a final evaluation undertaken in January and February 2015. With the appointment of a formative evaluator whose role was to ensure all components underwent stringent evaluation to assist with the development of WNCIT and related learning and teaching resources, it was also agreed that the role of the independent evaluator was to evaluate the project, itself, appraising the processes set in place to achieve its stated outcomes and determining whether the project was implemented as planned. It is beyond the scope and timeframe of this evaluation to draw conclusions regarding the usefulness of WNCIT and the related resources beyond seeking informed perceptions from the project team members and reference group. While these perceptions and the findings reported are useful, it will take two to three years, at a minimum, and then quite rigorous research, to gauge the utility of the deliverables for the intended stakeholders (Australian medical schools) and to determine the success of the various dissemination strategies that have already been implemented and those that are proposed.

From the experience of the independent evaluator with similar projects, salient elements that contribute to the success of projects such as these are:

- Effective project leadership and strong project management
- Sustained effective partner contributions supported by adequate institutional support
- Shared understanding of the project's desired outcomes and what is needed to achieve these
- Appropriate guidance from the reference group

Leading to

- Useful deliverables and the meeting of the project's stated outcomes

Supported by

- An effective dissemination strategy.

Each of these is considered below.

To determine the extent to which each of the indicators of success was achieved the independent evaluator:

- Reviewed the documentation related to the project
- Attended two face-to-face workshops on 21-22, February 2014 and December 3, 2014
- Prepared, administered and analysed surveys sent electronically in April 2014 and February 2015 to the 10 members of the project team (100 per cent response rate for both) and the nominated eight and 10 members of the reference group (87 per cent response rate for the first and 30 per cent for the second)

- Had follow-up email and telephone discussion where required for clarification and/or amplification with members of the project team
- Had face-to-face discussions with the project leader at the start of the project, with her and the project manager at the time of the interim evaluation (April 2014) and with both at the completion of the project
- Had a face-to-face discussion with the Deakin IT staff member who had a key role in the curriculum mapping tool.

The evaluation brief did not include contact with academic teaching staff outside of the partner group, students, or members of the relevant professional body and employers. Given the budget and timing, these constraints are reasonable but, as noted above, these constraints preclude the kind of evaluation that does assess value and impact of the project's outcomes for stakeholders.
However, it is pleasing to note that students from the four partner universities and the University of Wollongong (see *Final Report*, pp15-16) did provide feedback on teaching exemplars and resources and participated in the trial of the multiple choice questions.

3. Indicators of success

3.1 Effective project leadership and strong project management

The ability to bring people from different organisations and areas to work well together over a two year period is vital to the success of such a project – "this will be critical to the success of an ambitious, complex project with many partners" [RG]. As well as passion and commitment such leadership requires being able to work effectively with others. The project team members were unanimous that the leadership was excellent, most rating it at '5/5', and comments such as the following provide useful insights into the project leader's style:

> Caryl Nowson has been a positive leader, passionate about improving nutritional education, effective at keeping the project on track, and with a willingness to listen to, and encourage, other's ideas [PT].
>
> Caryl is an outstanding leader who drives the process, sets clear dates and deadlines and participates actively. She is an incredibly impressive person and leader [PT].
>
> Timely, transparent, efficient, even, adaptable. Did not overreach, and did not try to do too much [PT].

The team was fortunate to have a communications manager as well as a project evaluator and project manager. After the initial setback with the resignation of the first project manager, and despite the inexperience of the administration team who, by their own acknowledgement, were "on a steep learning curve", the project appears to have been well managed with team members generally rating it at '4/5' so 'good'. Reservations expressed concerned difficulties with information and document management and production and review of the documentation suggests that, while reasonably comprehensive, there are some gaps with not all the activities and learning captured. It is apparent also that the project manager spent considerable time and energy on a key deliverable (the curriculum mapping tool) and, while a significant contribution, this did put some aspects of the role under pressure. Importantly, the project manager shared the commitment to the project and enthusiasm of the project leader and it is noteworthy that her support, understanding and encouragement meant at least one of the project team members continued with her role.

While the lack of engagement of the reference group (see below) was a persistent challenge, the leadership approach taken which ensured wide-ranging and pertinent contact and consultation, the inclusion of experts and the formation of working parties as well as embedded evaluation and rigorous quality assurance measures meant that high quality outcomes were possible.

3.2 Sustained effective partner contributions supported by adequate institutional support

For any such project to succeed, it is vital that the members of the project team are keen to participate and that the team has the appropriate mix of skills, expertise and experience and their institutions support their endeavours. All members of the team have impressive credentials in terms of this project (see Grant Proposal, Appendix 4) and were in a strong position to make valuable contributions. While the project was led by a nutritionist and had solid input in this area, the inclusion of medical educators was critical for its success:

> I hope I brought an understanding of real clinical practice and contemporary medical education understanding to the decision making/ discussion. This I thought was necessary, and hopefully useful, as it was important to avoid nutritionists deciding what doctors needed to know and how they should know it. That needed a balanced viewpoint, an interesting challenge and illuminating at times [PT].

Maintaining momentum over a long time is challenging, particularly for a group of busy people facing competing priorities and it is understandable that contributions from the partners were spasmodic. While there were some complaints of people "not pulling their weight" and "expecting to be spoon-fed", there were also "huge wins" when partners delivered in key areas and it is apparent that members of the project team, and their colleagues, were prepared to devote additional time to the project at key intervals.

Project team members were frank about the impacts of personal problems but claimed that these did not impact severely in the long term. While all agreed that Deakin had provided strong institutional support – "Deakin was very generous in its use of resources [PT]" – and the project relied on project-funded administrative support at Deakin, local impediments in terms of accessing advice, recruitment and unhelpful institutional financial arrangements were noted but, while frustrating for those involved, none had a deleterious effect.

While Deakin was the lead institution and had responsibility for project management and for report writing and documentation, this university also took the main role in the development of the curriculum mapping tool. The other three partner institutions contributed especially in the development, trialling and evaluation of resources and, with varying degrees of success, trialling the curriculum mapping tool.

In response to a survey invitation to list and rate their individual contributions, each member of the project team could specify significant areas of input and all but one person who gave a '3' so 'reasonable', rated their contributions as '4/5' 'good' or '5/5' 'very good'. Their list of contributions is not only impressive but also speaks to the role of the project leader in engaging all members of the project team with various activities.

> The stakeholder engagement and consultation at each phase of the project and for each deliverable was very thorough and skilful. As a result the project outcomes are of exemplary quality, highly relevant and very useful and have the authorisation and support of practitioners, researchers, nutritionists and dietitians, medical practitioners and educators, accreditation bodies, teaching staff and students [PT].

Project team members were asked to state what – if anything – they gained from contributing to the project. Their responses indicated the project's value not only in personal growth and satisfaction but also its perceived broader impact:

> I have learnt a great deal from observing the way in which Caryl managed to bring her vision of this project to life while encompassing others' ideas, goals and strengths so there is now a shared commitment and ownership across all stakeholders involved in the project.

> I absolutely enjoyed working with committed and interesting people, who were diligent, efficient and forward thinking learned much from them, and hopefully contributed something in return. Beyond the project itself, I have made very valuable connections that will assist the scholarship of our team.

> Quite a lot. It was a pleasure to get to know the project team and I got a lot from our face to face meetings. Both this relationship building, and the content of the project (learning about competencies and priorities within nutritional education) - as well as seeing a team of women from a multi-disciplinary background come together was very rewarding to me.

3.3 Shared understanding of the project's desired outcomes and what is needed to achieve these

With different perspectives, contexts and experiences it is to be expected that team members sometimes held differing views on what should and could be achieved and how and when this should occur. Regular teleconferences and contact certainly assisted, but meeting face-to-face, while expensive in time and money, was widely seen as the most positive contributor to "ensuring everyone was on the same page". The additional workshop at the end of the project had an important role in stimulating action as well as giving all project team members the opportunity to see and comment on key outcomes and for different perceptions to be articulated and, in many cases, addressed. It was disappointing that, despite numerous overtures and flexible arrangements, no reference group member attended as their insights would have been valuable, as evidenced in the earlier workshop where one member of the reference group participated actively.

The workshops brought team members together and provided important learning opportunities for all participants: "It just occurred to me, listening to you that we can…"; "I just realised that we could … and that would make it more meaningful"; "My mind is really ticking over. I could really use that"; "Oh, yes! That's a great idea!" Not surprisingly, many of the project team saw the community of practice that resulted from this project as one of its most valuable attributes:

> I think perhaps the best deliverable from the project has been the community of practice developed by the participants, and the benefits that open and honest dialogue has had in establishing where we collectively understand nutrition to sit in a complex integrated medical curriculum [PT].

3.4 Appropriate guidance from the reference group

The stated role of the reference group (Grant Proposal, p8) was to assist the management team to articulate a clear vision and clear goals for the project and ensure their constructive advice on the design, development and ongoing evaluation of the project. Reference groups have the potential to do much to ensure the achievement of high quality outcomes and it is essential to appoint appropriate/useful people who have the time and energy to contribute and for the project leader, especially, to understand how to use their expertise to maximise their input. This seems not to have been the case for this project, except for the rare-cited instance where one reference group member participated in meetings and stimulated discussion, thinking and outcomes.

Over the span of the project, as well as the team leader and manager and one member of the project team who represented the Dietitians Association of Australia in this context, 12 other people representing significant agencies, experts in key areas, the medical community and students were named members at various times. This is a large group and the interim evaluation surfaced problems with engagement, with comments such as:

> (Although) I have attended teleconferences, I really haven't been able to contribute much at all. I am uncertain how my ongoing involvement is warranted or needed. I have been made to feel very welcome but feel very at a loss as to what value I can add [RG].

A recommendation to clarify the roles/responsibilities of members and to seek their guidance in discrete areas and set times was implemented but, in the words of the formative evaluator:

> This [engaging the Reference Group] was a challenge. The project leader and project team persistently offered welcoming entreaties for contributions from reference group members on many occasions. This was not forthcoming. The project leader consulted me for suggestions on how to engage reference group members, and these also bore no results. This has not however, had any measurable impact on the

> outcomes of the project. The benefits a reference group would normally provide have been achieved through the wide-ranging and thorough engagement and consultation across the sector, the formation of specialist working parties as required, and the range of quality assurance measures undertaken [PT].

While this seems a justified conclusion, it is also apparent that the sort of links to key bodies that these people represented have not eventuated.

Project team ratings of the provision of appropriate guidance by the reference group clustered around '1' and '2/5', so to a 'low/very low' to extent, and it is telling that several felt unable to comment or rate – "I was not aware of its input". Those who gave a higher rating, albeit '3/5' so 'reasonable', saw the guidance as coming through the project leader. Although seven of the eight reference team members responded to the interim evaluation survey, albeit minimally in most instances, only three of 10 (there had been changes in the group's composition) responded to a brief final survey that, on the advice of the project leader, did not seek detailed perceptions of the project but rather focused on their contribution. This, coupled with their lack of response to the invitation to comment on the final report and on what the project had delivered, not only provided further evidence of the group's disengagement but meant that it was not possible to discern reasons for their lack of participation beyond a strong impression of changing commitments and priorities.

4. Outcomes

Table 1 Outcomes

N=10 [PT] Extent	**No/uncertain response**	**0** **None**	**1** **V low**	**2** **Small**	**3** **Reasonable**	**4** **Good**	**5** **V good**
A set of learning outcomes						2	8
A nutrition curriculum mapping tool				1	6		3
Exemplars of nutrition competency assessment tools					2	4	4
A set of nutrition resources for teaching staff	1				3	3	3
An instruction manual for the use of the WNCIT and associated resources	6		1	1			2

The grant proposal (p1) stated that the project had five stated outcomes and each of these is considered separately. As Table 1 indicates, with one exception – the instruction manual which was completed very late in the project - participants considered the outcomes have been met, with many judging this to a '4'/'good' and '5'/'very good' extent.

4.1 A set of learning outcomes

The team recognised that the task was to map existing learning outcomes, as distinct from creating new ones, but the refinements and developments represent significant value-adding. Having them reviewed

by external experts is a critical step towards their validation and of special value is the approach that allowed reflection and further comment after the first revision. Because of the considerable review and input, and also because they are not over complex and can be readily applied to an range of disciplines and integrated into most clinical settings, there is an enhanced likelihood that the learning outcomes will be useful. The two versions developed have resulted in an important codification and should be a valuable tool to highlight what is relevant and valid in medical education and an essential basis from which to undertake the curriculum mapping exercise for medical courses. As Table 1 above shows, this was the outcome that the project team felt most confident had been achieved to a 'good'/'very good' extent. However, as the *Final Report* (p23) acknowledges, the challenge remains to have nutrition competencies accepted by Medical Deans Australia and New Zealand Inc., the peak body representing professional-entry level medical education, training and research in Australia and New Zealand.

4.2 A nutrition curriculum mapping tool

The face-to-face workshops revealed a lot of excitement about the potential of the nutrition curriculum mapping tool but this was the issue that caused the most concern as the enormity of the task became more evident. Developing and piloting the tool raised awareness of the paucity of nutrition education within medical curricula and, because partner institutions were at different stages in their curriculum mapping process, sector difference and workload implications for using the tool were surfaced. As is common with many such technology-based solutions, those involved needed opportunities to clarify what they expected from the tool and be tolerant and understanding that such developments tend to occur in an iterative manner and, initially, consume much more time than anticipated. It is not surprising that there were several comments regarding markedly differing levels of contribution across the partner institutions and their staff and that perceptions varied.

Deakin, as the lead institution, had the closest involvement with the development of the tool and this, in part, explains the discrepancy between their perceptions as to the extent this outcome had been achieved, with Deakin rating it at '5/5' so 'to a very good extent' and the partner institutions rating it at '3/5' 'to a reasonable extent'. The amount of effort expended (especially by the project manager and the IT support person) reinforced their commitment to its success and the product by the end of the project had been trialled in four universities. The trials, while evidencing the spreadsheets would accommodate the uploading of large sets of information that could then be modified, analysed and reported, also revealed problems for users who found it cumbersome and lacking a user friendly interface and evidenced the inherent difficulties in providing such a generic solution – "it is the small ways in which we are different that cause difficulties" [PT].

> It [was] frustrating to apply confidently, time consuming and focused on minutiae that were not readily identifiable in a complex integrated medical curriculum. This frustration in itself was a learning moment for all, as I think it soon became apparent to the nutritionists that Medicine is challenging to map, and the tool is not strong on deconstructing integrated learning opportunities [PT].

As the tool relies on in-house software, as well as the goodwill and time of key personnel, its wider usefulness remains uncertain. Further, as acknowledged by the IT staff member responsible for the tool's technical development, curriculum mapping needs to be mandated by someone or some group with the authority to monitor its implementation, then those making such a decision and those who will work with it have to be convinced this particular tool is the right approach and it has been resourced appropriately.

The foundations of a curriculum mapping tool for the early years of medical education are in place as a result of this project and the process has surfaced related issues that should be considered beyond this project. In determining whether this outcome has been met, it is important to distinguish between what is specific to the project and problems with take up of all such tools that are endemic to the system. The curriculum mapping tool developed has been trialled at four universities and is being used with some modifications at Deakin to enable the mapping of other competency standards with the medical

curriculum required by the Australian Medical Council for accreditation purposes - a demonstrable achievement.

4.3 Exemplars of nutrition competency assessment tools

The Grant Proposal (pp5-6) promised that the project would identify and refine a range of innovative approaches to the assessment of nutrition competency and these would be assessed, developed and evaluated. The processes set in place to achieve these were exemplary in that the steering committee and working parties comprised academics who are also nutritionists, accredited practising dietitians and medical practitioners and the consultation process drew on the expertise of accreditation body representatives, practising nutritionists, dietitians and medical practitioners as well as educators. Rigorous quality assurance processes were evidenced. Those who wrote the multiple choice questions [MCQs] participated in a workshop facilitated by a renowned expert, who analysed the data resulting from the pilot with students.

Although some project team members had hoped for more (explaining the two '3'/'reasonable' ratings (See Table 1), 56 MCQs for year levels 1 and 2 (the stated target group for this project) plus 11 for years 3 and 4 were developed in the appropriate format required for Australian medical schools as well as two nutrition Objective Structured Clinical Examinations (OSCEs). As the practice of resource sharing - particularly for assessment - is apparently becoming more widespread and encouraged across medical schools, these assessments can be readily disseminated and should assist in benchmarking as well as providing validated assessment items. If, as intended, a subsection of the MCQs and one OSCE will be submitted to the Australian Medical Schools Assessment Collaboration and Australian Collaboration for Clinical Assessment in Medicine project and these are accepted it will, as the *Final Report* p23 asserts, "be a major step forward, as all medical schools in Australia would realise the need to include sufficient nutrition content in their curricula" as this group uses a small set of shared assessment materials to benchmark across all medical schools in Australia.

Embedding nutrition assessment items in an already overcrowded curriculum has challenges and it is a further positive outcome that these were identified and addressed by the working parties and recommendations for implementation have been documented and are included in the Instruction Manual.

4.4 A set of nutrition resources for teaching staff

A set of five teaching exemplars was completed. Although fewer in number than some anticipated, accounting for the three '3/5' 'reasonable' extent ratings, because these have been trialled and evaluated by students, peers and experts they provide a useful validated resource for the sector to use in full or in part or to adapt to specific circumstances and they should assist in raising awareness of pedagogical opportunities and strategies. As outlined in the *Final Report* (p11), there are encouraging indicators that the teaching exemplars developed will be useful resources that can be used by all medical schools once they are made available on the WNCIT website and relevant parties are aware of their existence.

While a plethora of freely available quality resources may exist, project team discussion at the workshops as well as survey comments indicated that such resources were not currently collated in a user-friendly manner for medical schools (staff and students) to access. The December 2014 workshop revealed progress was being made towards the completion of this deliverable but, as team members recognised, the resource bank needs to be known to staff and students, current and credible. The claim (*Final Report,* p24) that "The collated directory of online nutrition resources will be useful for medical educators as well as students, and with the commitment from Deakin University to maintain the currency of the resource, is likely to attract these audiences to the website" is a positive indication that the resource bank will be maintained and will, itself, be of value and also as a path to other elements of the project. Further, in the opinion of the formative evaluator:

> An unexpected outcome of the process of developing, implementing and evaluating the nutrition education resources was the positive impact of the involvement of other staff in each institution. This further raised awareness and understanding among staff delivering medical education of the importance of embedding nutrition in the medical curriculum.

4.5 An instruction manual for the use of WNCIT and associated resources

The instruction manual which includes information on strategies to engage medical schools in developing nutrition competency in medical graduates, strategies to overcome barriers and ideas on how to effectively use the materials and tools available on the website, along with all project documentation and resources was developed very late in the project as it drew on findings throughout the project. For this reason, only the project leader and formative evaluator who worked on this outcome were in a position to make informed judgements even as late as mid-February 2015. Both were confident this outcome had been delivered to a '5/5' 'very good' extent and the manual was completed by the end of the project.

Having reviewed it, the following assessment by the formative evaluator appears justified:

> This guide is a valuable resource that provides a blueprint for all medical schools irrespective of their current levels of experience in curriculum development and mapping, or medical education. The strengths of the guide are that it:
>
> - reflects the rigour of the development, piloting and evaluation processes
> - emphasises the importance of the alignment of curriculum design, teaching resources and activities, and assessment tasks with the Nutrition Competency Framework
> - is the result of a thorough consultation process with all relevant stakeholders and therefore highly relevant and targeted to their needs and experiences
> - captures the insights and learning gathered by project team members throughout the project.

5. Effective dissemination strategies

The development and trialling of WNCIT has meant that dissemination has been part of the entire project and there is evidence that all associated with the project are in a position to bring the findings from this project and the resultant resources to their areas. The dedicated website provides project updates, there is a twitter account and, as well as scholarly writing and conference presentations, it is important and encouraging to note international scholarly involvement and ongoing networking.

To reach a larger audience than those involved in the trials and the development of the resources at the four partner institutions, it is important to inform the sector through realisable dissemination strategies that are conceptualised and achieved in a timely manner. The project leader is cognisant of this:

> It will be fundamental to embark on effective dissemination strategies to promote the use of WNCIT resources to maximise the integration of nutrition competencies into medical education across Australia.

Although the team included recognised leaders in both the nutrition and medical domains – "I have no concerns that the team is "well connected" [RG] – when it was recognised that neither the project team nor the reference group was able to provide strategies to ensure buy-in from high-level medical educators and key professional bodies a consultant was employed. As a result, a media kit was produced and target media identified. As the *Final Report* (p21) itemises, articles have been published in relevant professional media with further items under consideration. These developments led three project team members to rate effective dissemination strategies at '5/5' ('very good') with the rest '4' and '3' (so 'good' or 'reasonable'). Tellingly, despite providing a rating, three team members revealed uncertainty in their comments.

The true test of the success of this project will be the extent to which nutrition is embedded in medical curricula within the next 3-5 years and the extent to which WNCIT has been used and deemed helpful. As one project team member concluded:

> These [dissemination strategies] are yet to be realised in the main. However the popular medical press was well harnessed and the profile raised in that regard. The presentations at meetings will enhance the profiles. The effectiveness will be measured by the uptake of the key profile bodies, be that AMSAC, Medical deans. The benefits will be measured differently and necessarily later. What will be the benefit to patients, to students, to doctors etc? When will the benefit be realised and when will it be best measured? Probably not for several years I would suggest. But it would be interesting to survey graduates later down the track, about how this project impacted on their practice [PT].

6. Conclusion

This evaluation identified specific indicators of success and has assessed the project against these. Encouraged by strong leadership, the project team worked well together to meet their stated goals and the disappointing lack of involvement by most of the reference group was, as discussed above, largely compensated for. Formative evaluation played an important role in surfacing underlying problems and assisted in developing strategies to address these.

Although some significant caveats remain in terms of bridging the gap between the provision of resources and their use, and the curriculum mapping tool in its current form may well prove difficult to implement, the project did achieve its stated outcomes with each of the five elements that made up WNCIT delivered.

> The tool box is a great time saver for busy under resourced providers, as the tools are user friendly and ready to apply, are standardised and tested, and defensible. The resource kit that will sit alongside the toolbox, will give impetus to self-directed learning etc [PT].

Once the website is finalised and if the dissemination strategies succeed in informing medical schools beyond the partner institutions of what WNCIT is and what it can offer, WNCIT should have a significant role in medical education. If accreditation parties recognise the need to embed nutrition in medical curricula and nutrition competencies are mapped and monitored, this project will have played an important role in defining tertiary pedagogy in this critical area and also provide significant resources to assist the resultant learning to be a valuable experience for those concerned, learning that results in better prepared professionals.

There is recognition within the team that, for the project to be successful beyond the development of the five resource areas that comprise it, the basis of the grant application, WNCIT needs to be something that is used in medical schools that have different philosophies, delivery models and which already have what they believe is a crowded curriculum. Further, there are concerns regarding increased workload and inappropriately qualified staff. Undertaking a WNCIT Educator Perspective Survey increased understanding of these challenges and the team is well aware that any widespread adoption of WNCIT is dependent on these issues being satisfactorily addressed. While it is encouraging to note the listed impacts on medical courses within the partner institutions (*Final Report*, pp21-22), whether this extends to entry-level medical courses across Australia remains to be seen.

Project team members have recognised what this project has achieved:

> The benefits of building collaborative and sharing networks across medical schools in an area of common interest (nutritional education) are difficult to measure, but are far and above the most useful outcome of this (and other) OLT projects.

> I do believe there was a lot of value in this project - increasing nutritional knowledge for medical students in dealing with a community of patients and individuals with complex health needs is critical. Bringing together different universities with a common goal was valuable, and leaving a footprint of activities and exemplars and resources for building on this is a great contribution.

I believe this is in some ways a beacon project, in that it will be a valuable pilot/ proof of concept test for many similar investigations, evaluations, and curriculum support modules [PT].

Appendix E: Nutrition Competency Framework (NCF) and Learning Outcomes

Competency Number	Nutrition Competency (knowledge- or skill-based)	Student Learning Outcomes/Objectives (SLOs)	Examples of subject matter to address SLOs	Examples of SLOs that could be incorporated into existing topics in medical courses
K1 SCIENCES	Demonstrate understanding of the basic sciences in relation to nutrition	1. Describe the functions of essential nutrients, and the basis for the biochemical demand for energy and nutrients	• Macronutrient and micronutrient requirements and their biochemical functions (e.g. energy, protein, carbohydrate, fat, iron, calcium, vitamin D, zinc) • Energy balance, storage and utilisation of macro and micronutrients within the body	• Identify key macronutrients and micronutrients, understand their biochemical functions and describe individual requirements for different population groups • Describe fuel metabolism and homeostasis of carbohydrates, fats and protein; explain the impacts on biochemical demand and contributors to energy intake and energy expenditure in the body across the life course
		2. Describe the integrative normal processes of appetite, eating, intestinal function, digestion, absorption and nutrient utilisation and common disorders that affect them	• Gastrointestinal tract structure and function; digestive and absorptive processes • Hormonal control of hunger and satiety • Common disorders which may affect the processes of eating, digestion, absorption and requirements for essential nutrients	• Describe gastrointestinal tract structure and function; describe the process of digestion and identify major sites where absorption of nutrients occurs • Describe the mechanisms of hunger and satiety control • Describe how different disease processes impact nutritional status

Competency Number	Nutrition Competency (knowledge- or skill-based)	Student Learning Outcomes/Objectives (SLOs)	Examples of subject matter to address SLOs	Examples of SLOs that could be incorporated into existing topics in medical courses
		3. Differentiate the energy and nutrient requirements across the lifespan for normal growth, structure and function	• Nutritional requirements across the lifespan including infancy, childhood, adolescence, adulthood, pregnancy, lactation and later life • Impact of lifestage on biochemical demand and contributors to energy intake and energy expenditure in the body across the life course • Anthropometric standards and reference ranges for individuals/groups • Clinical/biochemical standards and reference ranges for individuals/groups	• Differentiate the nutritional requirements across the lifespan including infancy through to end of life and pregnancy and lactation • Identify appropriate strategies to address nutrition requirements of clients at different life stages and in different settings (e.g. acute care, rehabilitation, nursing home, community) • Source and identify the most appropriate anthropometric standards and reference ranges for individuals/groups • Recognise and identify clinical/biochemical standards and reference ranges
K2 PREVENTION	Demonstrate knowledge of the interactive role of nutrition in health and the prevention of disease	1. Recognise the common nutrition-related causes of mortality and morbidity in the population	• Diabetes, cardiovascular disease (including hypertension), cancer, osteoporosis, macro and micronutrient deficiencies (e.g. Vitamin D, iron, folate)	• Identify the most common causes of morbidity and mortality that have dietary links e.g. diabetes, obesity, CVD (including hypertension), cancer, osteoporosis, nutrient deficiencies (e.g. Vitamin D, iron, folate)
		2. Describe how nutrition affects health and risk factors for disease	• Cardiovascular disease: impact of dietary patterns (fruit and vegetables, saturated and trans fat, sodium, energy excess, omega 3 fatty acids) • Osteoporosis: impact of dietary calcium, Vitamin D, protein • Cancer: impact of impact of dietary patterns (e.g. fruit and vegetables, dietary sodium, excess energy, alcohol, nitrates) • Malnutrition: impact of inadequate nutrition • Type 2 diabetes: impact of excess energy	• Describe the nutrition-related risk factors for various diseases and predictors of mortality • Describe which dietary factors may impact on cardiovascular disease, including those that affect lipids, hypertension and weight • Describe the impact of a low-calcium intake on osteoporosis • Describe the dietary patterns that may impact on cancer development • Describe the impact of malnutrition and failure to thrive on health • Identify the impact of obesity on those at risk of type 2 diabetes

Competency Number	Nutrition Competency (knowledge- or skill-based)	Student Learning Outcomes/Objectives (SLOs)	Examples of subject matter to address SLOs	Examples of SLOs that could be incorporated into existing topics in medical courses
		3. Describe how disease can affect nutritional status	• Impact on physiological and psychological functions and nutrient requirements for a range of different conditions such as: ○ Gastrointestinal disease (coeliac disease, Crohn's Disease) ○ Respiratory disease ○ Eating disorders ○ Dementia	• Describe the reasons for altered nutrient requirements in inflammatory bowel disease and coeliac disease • Describe the possible reasons for increases in the risk of malnutrition in respiratory disease • Identify what body composition changes can occur in long-term eating disorder patients • Describe the nutritional effects that dementia may have on patients in aged care
K3 TREATMENT	Demonstrate knowledge of evidence-based dietary strategies for prevention and treatment of disease	1. Recognise the role of nutrition in treatment of disease	• Food Intolerance and allergy • Cardiovascular disease • Diabetes • Polycystic ovarian syndrome • Coeliac disease • Inflammatory bowel disease • Renal disease • Cancer • Malnutrition • Burns • Wound healing • Pulmonary disorders	• Outline the major medical conditions where dietary management is of particular importance
		2. Describe the dietary management strategies for relevant medical conditions and diseases	• Food allergy: eliminate problematic food components • Cardiovascular disease: reduce trans and saturated fats, increase poly and monounsaturated fats, increase omega 3 fatty acids, reduce dietary sodium, increase dietary potassium, reduce obesity, increase dietary fibre, reduce alcohol intake • Overweight/obesity including polycystic ovarian syndrome: different approaches to induce negative energy balance • Type 2 diabetes: different approaches to optimise blood glucose control • Coeliac disease: eliminate dietary sources of gluten • Inflammatory bowel disease: ensure adequate	• Describe the dietary management strategies in treating food allergy • Describe the dietary management strategies in treating cardiovascular disease • Describe the dietary management strategies in treating polycystic ovarian syndrome • Describe the dietary management strategies in treating type 2 diabetes • Describe the dietary management strategies in treating coeliac disease • Describe the dietary management strategies in treating inflammatory bowel disease • Describe the dietary management strategies in treating malnutrition

Competency Number	Nutrition Competency (knowledge- or skill-based)	Student Learning Outcomes/Objectives (SLOs)	Examples of subject matter to address SLOs	Examples of SLOs that could be incorporated into existing topics in medical courses
			energy, protein, fluid, electrolytes • Malnutrition: optimise intake of relevant macro and micronutrients • Burns and wound healing: optimise dietary protein, energy, fluid, micronutrients • Pulmonary disorders: optimise nutritional status	• Describe the dietary management strategies in treating burns • Describe the dietary management strategies in treating pulmonary disorders
		3. Demonstrate an appreciation of nutrient/drug interactions	• Common drugs (e.g. warfarin and dietary Vitamin K; insulin and risk of hypoglycaemia weight gain; monoamine oxidase (MAO) inhibiters and dietary tyramine)	• Describe drugs/treatments used that may affect nutritional status and dietary requirements
K4 FOOD	Demonstrate awareness of food sources of nutrients, food habits and the cultural and social importance of food	1. List the food sources of major nutrients	• Food sources of nutrients and where they are found in the current food supply	• Identify food sources of the major macro and micronutrients
		2. Describe how the social determinants of health influence food consumption patterns and the consequences of this	• Impact of availability of healthy food (distance to shops, location of fast food outlets, transportation) on dietary intake • Nutritional risk factors contributing to food insecurity (individual, household, community and state/federal levels)	• Identify community groups vulnerable to food insecurity • Identify factors contributing to food insecurity at an individual, household, government level
		3. Appreciate the social and cultural importance of food	• The impact of different ethnic and religious groups on the dietary intakes of specific individuals and populations	• Describe how social and cultural interactions impact the dietary intakes of individuals and populations
S1 RISK	Demonstrate skills in the identification of nutritional risk, nutritional deficits and excesses	1. Assess nutrition risk factors pertaining to over- and undernutrition	• Skills in assessment of intake of individually-relevant dietary factors related to nutritional risk (e.g. recent weight changes, regularity of eating, intake of fruits and vegetables, take-away foods) • Anthropometry – height, weight, weight history, Body Mass Index (BMI), waist circumference, use of growth charts • Awareness of validated nutritional assessment tools and procedures (e.g. Malnutrition Universal Screening Tool, Mini Nutrition Assessment)	• Demonstrate skills in identification of clients who may need further assistance in managing their diet • Demonstrate the use of anthropometric measures such as BMI, waist circumference and use of growth charts

Competency Number	Nutrition Competency (knowledge- or skill-based)	Student Learning Outcomes/Objectives (SLOs)	Examples of subject matter to address SLOs	Examples of SLOs that could be incorporated into existing topics in medical courses
		2. Integrate nutrition in the medical history and physical examination	• Assessment of weight changes, regularity of eating, appetite, living arrangements, shopping and cooking habits, thirst, pallor, energy levels, level of physical activity, use of complementary/alternative medicines	• Demonstrate awareness of the importance of nutrition-related factors in the medical and physical assessment
		3. Interpret and integrate findings from the nutritional assessment to define nutritional problems	• Markers indicating dietary concern: ○ Anthropometrical ○ Biochemical tests used as nutrition markers ○ Investigations	• Display incorporation of nutrition-related findings into assessment and management plan where appropriate; develop plans for clients and appropriate referrals to other agencies/services
S2 CRITICAL	Demonstrate ability to interpret nutrition evidence in a critical and scientific manner and apply appropriately in clinical practice	1. Locate and critically appraise literature on nutrition related to prevention and treatment of disease	• Utilise current scientific evidence and incorporate this into the nutrition management of patients	• Displays the use of current evidence based information in the management of clients with nutrition related issues
		2. Apply an evidence-based approach in the delivery of appropriate nutrition management in clinical practice	• Evidence-based nutrition guidelines (e.g. NHMRC Nutrient Reference Intakes, Dietary Guidelines, Guide to Healthy Eating) • World Health Organization (WHO) guidelines • Royal Australian College of General Practitioners: General Practice Management of Type 2 diabetes • NEDC Eating Disorders: A Professional Resource for General Practitioners • Evidence-based resources produced by Dietitians Association of Australia, Diabetes Australia, Baker IDI, National Heart Foundation, Cancer Council	• Demonstrate use of relevant evidence-based nutrition resources and apply them in patient management

Competency Number	Nutrition Competency (knowledge- or skill-based)	Student Learning Outcomes/Objectives (SLOs)	Examples of subject matter to address SLOs	Examples of SLOs that could be incorporated into existing topics in medical courses
S3 APPLICATION	Demonstrate ability to apply basic dietary strategies for prevention and treatment of medical conditions, disease and trauma, with recognition that many nutritional issues require specialist management by a dietitian	1. Prioritise nutritional management strategies	• Determining when one nutritional issue needs more immediate attention than another (e.g. elderly client with type 2 diabetes and cancer; adolescent with insulin-dependent diabetes and anorexia; overweight intellectually disabled client)	• Demonstrate skills in the identification of nutritional risk, nutritional deficits and excesses • Demonstrate prioritisation of nutritional issues, depending on the broader profile/life circumstances of the patient
		2. Explain nutritional risk factors for common diseases to patients and their families	• Dietary risk factors: ○ Low fibre intake related to constipation, diverticular disease ○ Aflavotoxins and cancer ○ Low calcium intake and osteoporosis ○ Weight gain and inactivity and type 2 diabetes ○ High saturated fat intake and cardiovascular disease ○ Sodium and cardiovascular disease ○ Sweetened drinks and weight gain • Dietary risk factors that alter depending on the setting (e.g. more money spent on fast food in low socioeconomic areas, less fruit and vegetables available in remote areas, less sunlight and lower Vitamin D levels in nursing homes, malnutrition in acute care settings)	• Demonstrate the ability to communicate common risk factors that could be modified to prevent/treat disease • Demonstrate the ability to apply different management strategies for clients in a range of settings
		3. Provide basic evidence-based advice on nutrition to patients	• Type 2 diabetes: weight loss/maintenance • CVD: reduce saturated fat/increase MUFA and PUFA • Failure to thrive: increased energy using supplements (with specialist input from a dietitian)	• Demonstrate the ability to provide basic evidence-based nutrition advice to patients with common diseases such as type 2 diabetes, CVD, malnutrition

Competency Number	Nutrition Competency (knowledge- or skill-based)	Student Learning Outcomes/Objectives (SLOs)	Examples of subject matter to address SLOs	Examples of SLOs that could be incorporated into existing topics in medical courses
			• Coeliac disease: strict gluten avoidance (with specialist input from a dietitian) • Malnourished elderly patients: increased eating frequency, energy dense foods (with dietitian input)	
		4. Where appropriate integrate nutrition goals into care plans, including referral to other professionals as required, particularly dietitians	• Combining nutrition-related goals into medical management • Availability of services that can provide nutrition-related services	• Demonstrate the ability to recognise in what situations referral to a dietitian is appropriate
S4 ETHICS	Demonstrate the ability to apply principles of ethics related to nutritional management	1. Apply ethical and legal requirements to the decision-making process concerning nutrition	• Withholding or withdrawing of nutrition or hydration support • Nutrition-related medicolegal advice, for example in eating disorders • Respecting patients' and relatives' choices in decisions related to provision of nutrition via oral, enteral or parenteral routes	• Demonstrate the ability to recognise the nutrition-related ethical issues that may be involved in end of life situations
S5 TEAM	Demonstrate ability to work effectively in a team with other health professionals to deliver optimal nutrition care	1. Recognise the limitations of one's own knowledge and skills and refer or consult with another health practitioner as appropriate	• Communication with other multidisciplinary team members and planning for management (e.g. in coeliac disease, type 1 diabetes)	• Demonstratee ability to engage respectfully and effectively with multidisciplinary team members • Demonstrate skills in locating and utilising services of community-based organisations and NGOs that promote health and nutrition (e.g. the Red Cross, Meals on Wheels, community health centres)
		2. Understand, respect, incorporate and support the roles of other health professionals in nutritional management of patients	• Formulating a referral to an allied health professional, including relevant assessment and diagnostic information	• Demonstrate the importance of using a multidisciplinary team approach to nutritional assessment and management of individuals and groups • Demonstrate the importance of communication via referral including relevant assessment and diagnostic information


UTAS

DAA
Dietitians
Association
of Australia

The University
Of Queensland
AUSTRALIA

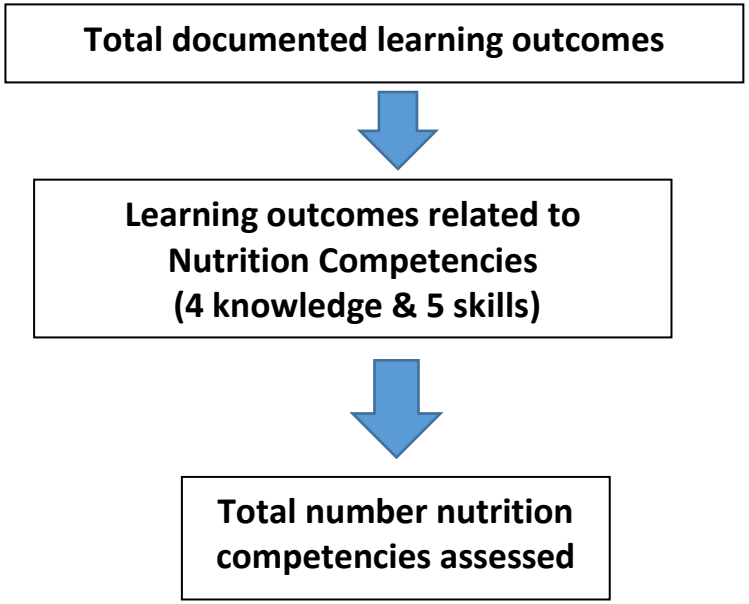
MONASH
University

DEAKIN
UNIVERSITY AUSTRALIA
Worldly

Appendix F: Summary of Curriculum Mapping Results

WNCIT

Mapping of Nutrition Competencies in medical curriculum of four Australian medical schools: years 1 and 2 (2014)



Extent of Inclusion of Nutrition Competencies Years 1 and 2

University	Total Learning Outcomes (LO)[2]	Number (%) LOs with nutrition competencies	Number of occasions where nutrition competencies were addressed (assessed and non-assessed)	Number of occasion (%) where nutrition competencies were assessed	Number of occasion where individual nutrition competencies were addressed (assessed and non-assessed)									Hours to map
					K1[2]	K2	K3	K4	S1[4]	S2	S3	S4	S5	
DU	1827	206 11%	400	229 57%	75 19%	84 21%	67 17%	47 12%	33 8%	29 7%	35 9%	14 3%	19 5%	226
UTAS[1]	1065	172 31%	327	52 17%	120 34%	79 23%	28 8%	41 12%	37 11%	21 6%	16 5%	5 1%	2 1%	195
UQ	830	31 4%	43	19 44%	7 15%	15 31%	6 12%	1 2%	10 20%	0	6 12%	2 4%	1 2%	47
MON[1]	212	15 7%	17	14 82%	9 16%	9 16%	5 9%	6 10%	4 7%	4 7%	5 9%	5 9%	9 16%	114

[1]undergraduate course [2]total all topics years 1 and 2 [3]knowledge based nutrition competency [4]skill based nutrition competency

Background

Deakin University developed a web based nutrition curriculum mapping tool which was piloted by 3 partner universities to map the curriculum for different course structures.

Aims

1. To assess the utility of mapping the 1st and 2nd year curricula of 4 medical schools (2 undergraduate, 2 post graduate) for nutrition competencies.
2. To assess the time required to undertake the mapping of nutrition competencies within 1st and 2nd years of four medical schools.

Results

The total number of LOs varied widely between Universities (n=1827 versus n= 212).

The total number of LOs with nutrition included, as a percentage of the total number of LOs displayed a wide range from 4-31 per cent.

The number of occasions where nutrition competencies were assessed as a proportion of total occasions of nutrition content ranged from 17-82 per cent.

Nutrition competencies K1 (Demonstrate understanding of the basic sciences in relation to nutrition) and K2 (Demonstrate knowledge of the interactive role of nutrition in health and the prevention of disease) were covered to a greater extent across all organisations (K1 15-30 per cent; K2 16-31 per cent). Other competencies were covered to a significant extent at variable levels in the different organisations including K3 (Demonstrate knowledge of evidence-based dietary strategies for prevention and treatment of disease),

S1 (Demonstrate skills in the identification of nutritional risk, nutritional deficits and excesses) and S5 (Demonstrate ability to work effectively in a team with other health professionals to deliver optimal nutrition care).

The hours spent in curriculum mapping, by a dedicated research fellow ranged from 47 hours to 226 hours.

Summary and Discussion

The variation in the total number of documented LOs may have been due to differences in course structure.

As a proportion of the total curriculum in years 1 and 2, nutrition learning outcomes represented at most 31 per cent.

Knowledge based nutrition competencies were covered more frequently during 1st and 2nd year than the skill based competencies, although some did report significant coverage of K3, S1 and S5. This distribution weighted to knowledge competencies appears to be appropriate for foundation years of medical curricula.

The time taken to map the curriculum varied widely across organisations and reflects the different levels of curriculum documentation available, the familiarity of the curriculum by the research fellow, and the ability to manage the IT interface.

The limitations related to the results of this curriculum mapping exercise include: incomplete documentation of learning outcomes, inability of the research fellows to access key staff and curriculum material. Student assessment of nutrition content was reported by subject coordinators, and this may have contributed to the variability in the amount of nutrition reported as being assessed.

Conclusions

Curriculum mapping is a time consuming process but does provide invaluable insights to the delivery of specific competencies delivered with medical courses.