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Introduction

Nutrition is integral in the promotion and maintenance of good health.¹ Nutrition research is recognised as a priority in many countries because of its potential to enhance population health outcomes.² As a result, nutrition research is globally abundant, resulting in continual advances in areas of biochemistry, physiology, food science, health services and public health nutrition.³⁻⁶

Doctoral degrees in nutrition traditionally involve a programme of research with a defined scope and research questions. Some universities require doctoral candidates to also undertake nutrition coursework to obtain broad knowledge in their area.⁷ However, this requirement does not exist worldwide in all programmes.⁸ For countries/programmes without mandatory coursework, students may graduate with detailed expertise on a specific topic, such as a biochemical pathway or a gastrointestinal condition, yet lack general knowledge about how nutrition affects health. This lack of knowledge regarding broader concepts is particularly evident when graduate students try to incorporate their research into the context of nutrition and public health nutrition, with only modest understanding of these fields. It is also imperative for graduate students to understand the broader context when translating their findings into practice, including their interaction with the public and media.

Translating research for application to practice requires depth *and* breadth.⁹ Effectively communicating research findings is important for contemporary nutrition scientists to have meaningful impact from their work.¹⁰ When doctoral training has not encompassed generic nutrition training (it is noted that several doctoral programmes do include some form of generic nutrition training), a comprehensive, theory-based education strategy is recommended.¹¹ Innovative education strategies can increase doctoral researchers' depth and

breadth of nutrition knowledge using short, interactive sessions, which cover basic concepts and supplementary resources. The aim of this paper is to present an overview of a model that others could consider adopting, based on an initiative undertaken to provide nutrition education to non-nutritionists working in a nutrition research setting. This information is intended to guide fellow research programme leaders in the provision of nutrition learning experiences for non-nutritionist postgraduates and professionals to address:

(i) disparity in basic training of those undertaking nutrition research

(ii) the need to harmonize language, understanding and basic messaging to the public.

Development of the Generic Nutrition Training (GNT) Course

The Generic Nutrition Training (GNT) course is an initiative of the UK Need for Nutrition Education/Innovation Programme (NNEdPro) Group¹² which is primarily based in Cambridge, UK, at the Medical Research Council's Elsie Widdowson Laboratory (MRC EWL). The NNEdPro Group represents a strategic partnership between doctors, dietitians, nutritionists and other healthcare professionals, as well as educators and researchers. It is composed of several partner organisations including the British Dietetic Association, MRC EWL (incorporating the UK National Diet and Nutrition Survey [NDNS]), Ulster University School of Biomedical Sciences, Wolfson College in Cambridge and Cambridge University Health Partners (including Cambridge University Hospitals and the School of Clinical Medicine). The NNEdPro Group currently delivers a government-funded strand of nutrition training for medical students at the University of Cambridge, within the School of Clinical Medicine.¹³

In 2013, the NNEdPro Group collaborated with the MRC EWL scientists to form the internal Public Health Nutrition (PHN) Forum. The Forum included members from all research groups at the unit, with professionals from biochemistry, food science, nutrition surveillance

and public health communication. Previous initiatives to increase the breadth of nutrition knowledge of doctoral researchers included lectures on a variety of topics. Evaluations of the lectures indicated that an interactive course in nutrition may be more beneficial than lectures alone to increase breadth of knowledge. Sufficient interest justified extending the initiative to all researchers within the unit, which led to the development of the GNT course.

The Generic Nutrition Training Course

The objective of the GNT course was to provide comprehensive, introductory-level generic training on human nutrition and public health. The course included one teaching day every four months (each university term), totalling three days (18 hours) of professional development training each year. The format encompassed lectures and practical sessions. Supplementary material was provided to support learning. During the first year of implementation (2013/14), the GNT course was free and voluntary for doctoral students/candidates and other researchers in the unit. Favourable evaluations supported the course to become mandatory from 2014/15 for all new doctoral students. The course was also opened for postgraduates and professionals across Cambridge, with external participants attending from the Centre for Diet and Activity Research (CEDAR) and the Cambridge Institute for Public Health (CIPH).

Using the Dreyfus five stage model of adult skill acquisition, it is anticipated that participants complete the training with an Advanced Beginner or Competent level of knowledge.¹⁴ The course aims to introduce generic concepts and provide skills for identifying further evidence-based resources. Topics covered in the course were initially decided by the PHN Forum and then refined based on evaluation from previous course offerings. Resources, such as the Association for Nutrition (AfN) core competencies,¹⁵ were also consulted for developing these topics. Standards for short courses, including the AfN Continuing Professional

Development Endorsement criteria were considered,¹⁵ however as this course is designed for increasing breadth of knowledge for nutrition doctoral students, rather than to provide a regulated qualification, these standards were only used as a guide. This GNT is in line with the Research Council UK (RCUK) Statement of Expectations for Postgraduate Training, which aims to develop highly skilled researchers and emphasizes the importance of enhancing the excellence and quality of doctoral training.¹⁶

Key topic areas for GNT are included in Table 1. Tutors were nutrition specialists with experience that allowed explanation of foundation concepts in their respective speciality, supported by examples of their own research.

Learning sessions within GNT included practical activities such as anthropometric assessments, reading nutrition labels, writing press releases, developing nutrition messages, tours of unit laboratories, and critical appraisal. All learning experiences were evaluated to inform decisions regarding future sessions. In 2015, GNT materials and learning outcomes were endorsed by Cambridge University Health Partners (CUHP) to allow recognition of professional development.

Table 1: The Learning Objectives for the Generic Nutrition Training course (2014/15)

<i>Day One: Basic Concepts in Human Nutrition</i>	<i>Comments</i>
- To provide an overview of diet and nutrition - To exemplify diet and nutrition research methods in human studies - To describe basic principles of digestion, absorption and energy metabolism underpinning human nutrition - To outline basic principles of body composition and anthropometry, in relation to human nutrition - To highlight physiological roles of	- definitions, classification, and demystification of concepts and conflicts providing a common denominator of language - appreciation of the limitations of current nutrition knowledge and changing paradigms due to research - core understanding of the physiological processes and consequences of dietary intake

- macro- and micro-nutrients in the diet
- To establish the applied and translational nature of nutrition science
- key properties of the main nutrients in the diet

Day Two: Nutrition in Disease Prevention:

- To provide an overview of nutritional epidemiology
- To describe metabolic / endocrine disorders
- To outline the role of nutrition in musculoskeletal disorders
- To critically appraise a scientific article
- To understand how to deal with the media
- To learn how vascular function can be measured
- appreciation of the scope of population studies in nutrition
- nutritional aspects of disease aetiology and pathogenesis using a body systems approach
- understanding the boundaries of breaking evidence on nutrition and disease
- Preparation for the public interface

Day Three: Public Health Nutrition, Policy and Practice:

- To provide an overview of the double burden of malnutrition
  - To outline the role UK National Diet and Nutrition Survey in policy and public health
  - To learn how food labelling is regulated
  - To highlight the importance of national policy frameworks
  - To exemplify nutrition resources available
  - To describe international nutrition in a public health context
  - To demonstrate the impact food fortification has on public health
  - To provide an overview of the nutrition education leadership for improved clinical/public health outcomes
  - the extent of the problem at population and individual levels
  - surveillance to monitor nutrition risk
  - individual level approaches to nutrition risk management
  - policy/population level risk management
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136

137

138 **Evaluation**

Evaluation has been an important and evolving feature of the GNT course to ensure ongoing quality improvement with each successive session. The evaluation of these sessions has three aspects; (i) attendance records; (ii) quantitative measurement of researchers' self-perceived level of information for each learning area, measured through a pre and post teaching questionnaire; and (iii) qualitative feedback on the delivery of each session. The key performance indicator is the self-reported change in knowledge, attitudes and self-reported practices. It was not feasible to determine actual change in practice and impact on health related outcomes during this project, however this is a priority for future research.

Attendance at the training days varied from 18-38 participants per day (mean 29 ± 8 participants) with similar attendance across both years. In 2014/15 most participants were doctoral candidates (n=21), research staff (n=21), undergraduate research placement students (n=8) or external students (n=10).

Participants' self-perceived level of understanding for each learning area increased after each training day on all training days. Preliminary analysis was conducted for the purpose of quality improvement within the training development. For example, in 2014/15, the proportion of participants who felt they had a good understanding of energy metabolism increased from 18% to 84% after Day 1, Basic Concepts in Human Nutrition. Based on these results, content in this session was updated each year but not modified further. Similarly, the proportion of participants who felt they had a good understanding of introductory nutritional epidemiology increased from 23% to 79% after Day 2, Nutrition in Disease Prevention. Feedback from researchers on the delivery of the teaching sessions was generally positive, and helpful for informing future teaching. *"A very good 3-day course, but quite intensive so glad the days were separated"; "The organisation of day 3 was much better with the break out sessions straight after each talk"; "Well organised and very informative".*

Next Steps

Interest in the GNT course has continued to increase since its inception. There is ongoing interest to expand into a week-long Summer School in Nutrition to cover biochemistry, physiology, food science, health services and public health nutrition. This comprehensive certificate course in Applied Human Nutrition was launched in 2016 and is designed for health professionals and researchers from around the world. The content from the GNT course will form the basis of three of the five days, with additional time allocated for deeper learning about research methods, knowledge translation and the role of nutrition in delivering safe and effective healthcare. The Summer School aims to provide foundation-learning experiences about applied human nutrition and public health for researchers and non-nutrition health professionals.

Conclusion

Nutrition research is globally abundant and a priority for many countries. Doctoral researchers require an understanding of basic concepts in human nutrition and public health in order to translate research findings into meaningful improvements in population health. The GNT course is an example that can be used in other institutions as an innovative education strategy that supports researchers to increase their breadth of nutrition knowledge. Favourable evaluation of the GNT course has resulted in a model that other research leaders can use to provide consistent nutrition learning experiences for non-nutritionist postgraduates and professionals.

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