




Case studies and realist review of nutrition education innovations within the UK medical undergraduate curricula

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BACKGROUND

It has already been recognised both nationally and internationally that medical undergraduate teaching in nutrition is limited.^{1–3} Despite the development of a more detailed nutrition curriculum in 2013 by the UK Intercollegiate Group on Nutrition (ICGN),⁴ there has been little guidance on its implementation or information on its uptake and impact on nutrition in medical education. In 2016, all UK medical school faculty were invited to participate in a survey of current nutrition training, and one-third (11 of 32) of medical schools responded.⁵ Three felt that nutrition training was already adequate, which they reported was due to increased teaching time and better organisation. The presence of a ‘nutrition lead’ was associated with greater mean dedicated nutrition teaching hours (25.4 vs 16.2) and greater likelihood of teaching the four core nutrition topics from the ICGN nutrition curriculum (5/5 vs 2/5, $p=0.08$). The majority of responders felt their training was inadequate. Cited barriers included ‘a lack of prioritisation’, an ‘inability to devote time to nutrition’ and a ‘difficulty organising topics and teaching sessions’.

The General Medical Council (GMC) document ‘Outcomes for Graduates’ has incorporated diet and nutrition into five separate places (see [box 1](#)).⁶

Most recently in 2021, the Association for Nutrition, published its *UK Undergraduate Curriculum in Nutrition for Medical Doctors*, outlining explicit knowledge, assessment and skills in nutrition as well as expected ‘graduate fundamentals’.⁷ The report acknowledged that as well as the five GMC outcomes where nutrition was specifically mentioned, that ‘nutrition and its role in health and disease can also be applicable to many more outcomes and applies across multiple clinical areas’. However, despite the report including ‘Teaching Points’ under their relevant curriculum statements, there is currently no further guidance given in regard to either implementation or evaluation of nutrition curriculum.

This paper aims to address this gap by providing case study examples of nutrition teaching and evaluation and sharing points for practice from the teaching teams. We use a realist review strategy for synthesising the evidence, as this has been recognised as an effective strategy to focus on providing

Box 1 GMC Outcomes for graduates diet and nutrition-related outcomes

GMC outcomes for graduates

1. To recognise where addiction, poor nutrition, self-neglect, environmental exposure or financial or social deprivation are contributing to ill health. And take action by seeking advice from colleagues and making appropriate referrals.
2. Newly qualified doctors must be able to apply biomedical scientific principles, methods and knowledge to medical practice and integrate these into patient care. This must include nutrition (among other considerations).
3. To discuss the role and impact of nutrition to the health of individual patients and societies.
4. They must be able to: explain the concept of wellness or well-being as well as illness, and be able to help and empower people to achieve the best health possible, including promoting lifestyle changes such as smoking cessation, avoiding substance misuse and maintaining a healthy weight through physical activity and diet.
5. Communicate clearly, sensitively and effectively when discussing issues that may be sensitive for the patient, such as alcohol consumption, smoking, diet and weight management or sexual behaviour.

GMC, General Medical Council.

Box 2 Outline of bags of taste 4-stage programme (9)

1. Outreach to people who would not normally attend a cooking class.
2. Community based, free, cooking classes teach people how to make £1 meals.
3. £3 bags of ingredients, sourced locally, sufficient for four meals, commit participants to continuous learning at home.
4. Keep participants engaged long-term by joining the volunteer workforce (bagging up ingredients and teaching on future courses)

explanations for why interventions may or may not work, in what contexts, how and in what circumstances.⁸

Case study 1: working with third sector organisations – Barts and the London and Bags of Taste

There was the opportunity to expand the nutrition curriculum within the Barts and The London timetable, specifically within the general practice (GP) teaching time allocation. The academic GP department was put in touch with local organisation Bags of Taste through a practice-based social prescriber.

Bags of Taste is a cooking and dietary behaviour change programme, and works specifically with people in poverty to improve their diets and finances.⁹ Their four-stage programme, based on behaviour change methodologies, is outlined in [box 2](#) below.

To date, the programme has taught over 2500 members of the public, and provided ingredients bags for over 30 000 meals. Post course survey data has shown that participant’s takeaway consumption has reduced 50%–100% with up to 30% increase in vegetable consumption and typical household savings of approximately £1400 per annum.⁹

Year 3 medical students were all allocated to spend a half-day with the organisation’s representatives in small groups (maximum 12 students) based in a community setting. Apart from lectures related to nutrition metabolism, the students had had no previous teaching on nutrition. An initial meeting with medical school representatives from the GP academic department and Bags of Taste had established joint educational aims.

After a brief introduction to the organisation, students observed a recipe from the course being cooked, and

undertook a short practical cooking session, where there was the opportunity to discuss food poverty.

At the end of the session, students were given a bag of ingredients to take home. They were invited to cook the recipe they had observed at home, just like participants on the course would be expected to do. The students were also asked to write a reflection about what the activity had taught them overall about barriers to healthy eating. A thematic analysis of the reflections submitted by the students was then undertaken.

A total of 228 number of students undertook the half day of teaching, and over 85% either agreed or strongly agreed with the statement ‘I enjoyed the session with Bags of Taste’. A summary of the main themes and sub-themes derived from thematic analysis of the reflections is summarised below ([table 1](#)).

A joint project between educationalists and charity sector organisations is an example of interprofessional education (IPE), defined as ‘occasions when two or more professions learn with, from and about each other to improve collaboration and the quality of care’.¹⁰ In such IPE projects, it is important to establish shared language and goals, on occasion defining explicitly, to improve engagement between parties. The joint educational goals established, the written reflection activity and the placement of an IPE activity mid-way in the curriculum have all been acknowledged as effective IPE techniques.¹¹

It was initially considered running the half-day teaching in a medical school building, but not only was it felt the activity would have higher fidelity run in a community setting, it also proved impossible to find an approved educational setting to undertake a cooking

Table 1 Summary of themes and subthemes from medical student feedback

Theme 1: Educational impact of programme	Theme 2: Wider community impact of programme	Theme 3: Personal impact on students of programme
Student awareness of barriers to healthy eating in poverty*.	Impacts on public attending course on decreasing isolation.	Impact on students personally improving their own cooking skills
Student awareness of behaviour change techniques	Awareness of Bags of Taste organisation*.	Improving students’ own health and well-being.
Student awareness of the importance of nutrition on both physical and mental health		Students considering becoming involved in charity sector work as a career or in a voluntary capacity
Students perceived improved future engagement with patients in terms of nutrition information gathering.		
*Subthemes denote preidentified educational aims.		

demonstration. There is a certain paradox that as medical student educators we are encouraged to be innovative and provide inspiring educational experiences for our students, but then do not have the appropriate resources or mechanisms 'in-house' to undertake them. Finally, the cost of running the course was ultimately prohibitive in continuing the activity in its initial format, although Bags of Taste have remained participants in teaching via contribution to a problem-based learning scenario involving food poverty.

Take-home messages

- ▶ When working across organisations, it is important initially to establish joint goals and anticipate any barriers in terms of indemnity, delivery and remittance.
- ▶ It is important to provide scaffolding to students when we expect them to work with professionals outside their own specialty and spheres of knowledge to support IPE learning.
- ▶ Where nutrition teaching is placed in the curriculum, and by which academic discipline it is championed (eg, basic sciences, public health, primary care), will impact on both how it is delivered, and how it is perceived by both the student body and the educational institution.

Case study 2: specialist nutrition medical educator – creation of a new role at Brighton and Sussex Medical School

Following the development of the ICGN nutrition curriculum⁴ and as part of a strategy to implement the recommendations, a 2015 Brighton and Sussex Medical School (BSMS) curriculum review was undertaken. It revealed that nutrition was only explicitly included in a single first-year module, although it was implicit within other aspects of the curriculum (including symposia). The review concluded that although nutrition education was present, explicit signposting depended very much on the interests of individual lecturers and was not linked to prior or future learning or included as key objectives. Therefore, nutrition teaching was not always obvious to the learners, there was no explicit nutrition education strand, and limited evidence of assessment or progression of learning.

Key recommendations of the review included the creation of a nutrition lead post and improved integration of nutrition throughout the curriculum, so the relevance of nutrition to clinical conditions would be discussed in context. A further recommendation was to have explicit nutrition content within taught modules, including assessment within examinations and to increase clinical opportunities to allow students to participate in nutrition related clinics and research projects.

In response, BSMS developed the role of a research and education dietitian to work with a Principal Lecturer in Nutrition alongside the Faculty, and to act as the 'Nutrition Lead' to integrate nutrition into the existing spiral curriculum. This role involved working on the findings of

the curriculum review; to clearly identify where nutrition teaching was already taught and where gaps were present. By working with curriculum module leads, opportunities for increasing nutrition content were identified with clear learning objectives and assessment strategies to create a more cohesive and visible nutrition strand.

In 2019, a 2-year review revealed that explicit nutrition content had increased from inclusion in one module in 2015 to nine modules in 2019.

Nutrition is now integrated into undergraduate modules through either direct lectures or symposia, with clinical exposure across the first 4 years of the curriculum, and opportunities in the final year within student rotations to engage with nutrition and dietetic staff. Nutrition education includes mandatory lectures, tutorials and learning resources as well as training in clinical nutrition assessment and communication skills. In addition, students can choose self-selected components and nutrition-related research projects.

The development of a clear nutrition strand has supported an increasing number of medical students approaching faculty for nutrition related research projects, resulting in the publication of peer-reviewed papers and UK and international conference presentations.¹²⁻¹⁴

In addition, medical students have developed a student-led volunteering opportunity, An Apple a Day¹⁵ to deliver teaching sessions in local secondary schools focusing on delivering core health and healthy eating messages. Further changes noted include an increasing number of students choosing to intercalate on nutrition related and public health topics, and faculty now contacting nutrition educators (rather than vice versa) to request inclusion of nutrition related content into their modules.

Research into the efficacy of teaching and student feedback is currently underway. Changes in nutrition knowledge, attitudes and practices as well as qualitative data on student experience is also currently being investigated.

The sustainability of ensuring that a medical school has nutrition content embedded in their curriculum and a dedicated nutrition lead with the knowledge and expertise to develop and support the delivering of nutrition education is challenging. To ensure continuity it is important that faculty value the importance of nutrition, alongside other medical specialties, as identified by the GMC⁶ and the NHS Long Term Plan¹⁶ and recognised in the forthcoming Medical Licensing Examination.¹⁷

The medical school also was a key actor in the development of ERImNN (education and research in medical nutrition network), linking educators already delivering or interested in nutrition education, students, patient educators, public health and the third sector, in order to share resources and to increase the capacity of nutrition education within BSMS.¹⁸

Take-home messages

- ▶ Increasing visibility of nutrition and involving a wide range of different professionals, including doctors,

helps to change the culture and normalise nutrition within the curriculum.

- ▶ Creating roles with specific responsibility for teaching helps to better match nutrition and incorporate, where relevant. Due to challenges with curriculum space, nutrition can be added in small (sometimes as little as a 15 min) chunks.
- ▶ Medical students and practicing doctors are key in driving change and are best placed to advise on opportunities to include nutrition in their learning.
- ▶ Practicing doctors are key, to act as role models supporting the delivery of nutrition education and demonstrating how nutrition is situated within their practice
- ▶ Sustainability of nutrition teaching depends on a team approach (ERimNN) that includes medical students and faculty (rather than only relying on one individual nutrition champion).

Case study 3: development of a nutrition online learning module at Barts and The London Medical School

A nutrition online learning pilot was designed by a dual-trained dietitian and junior doctor (who had previously delivered Foundation Doctor training in nutrition) and a GP academic at the medical school. The medical school curriculum nutrition learning outcomes were used to form the basis of the content.

A PowerPoint presentation was initially made of the content and then this was developed into an interactive e-learning package and launched on the QMUL virtual learning environment (VLE) with support from the e-learning technician based at the medical school.

The content of the learning was a mix of didactic information and spot diagnoses via vignette or photographs, multiple choice questions, free text responses to questions and interactive activities (such as identifying specific foods containing gluten from a longer list of options).

Students were allocated to complete the online learning during one of their three academic terms in year 3. The online learning was allocated a 3-hour timeslot in the timetable for students to complete it. However, as the online learning was available for a 4-week period each term, it could be accessed as many times as the student wished to during that time. It was also reopened for all students in the run-up to the end of years exams.

Evaluation of the intervention was twofold. First, before and after the online learning, students were asked to rate their confidence in regard to 10 parameters about knowledge of nutrition. At the end of the package, students were also asked to rate the package in terms of content and volume, and also given the opportunity to provide free text feedback.

Second, in terms of evaluating the impact on learning, a related end-of-year practical 'OSCE' station was included.

A total of 240 third year students completed the online learning. There was a significant increase in confidence in all ten measured confidence parameters when tested with a Wilcoxon two-way t-test.

On a Likert scale, the majority of students either agreed or strongly agreed that the online content was appropriate, particularly highlighting the interactivity of the module as a useful tool in the free text. Free text allowed students to suggest improvements which included increased use of video and audio formats, reducing overall volume and creating the ability to stop and save the package and rejoin at a later time.

In the nutrition-related OSCE station, students achieved a mean station score of 7.4/10, with this and other examination metrics (such as fail rate and SD) comparable to other stations in the examination.

E-learning has gained popularity due to the potential benefits of allowing learners to tailor the pace and content of courses to their individual needs, increasing the accessibility of information to remote learners, decreasing costs and facilitating frequent content updates.¹⁹ The technology required to develop this package was minimal, as an annotated PowerPoint presentation was quickly adapted to an interactive e-learning package on a VLE. A variety of formats to the learning was mindful of individual learning styles²⁰ and data on immediate impact on knowledge as well as content feedback could be collected, which may have been more challenging if content had been delivered in a lecture format.

In terms of future development, the plan is to modify the technology to allow breaking of up the learning, introduce either short videos and/or audio files within the package, and alter the balance between text and activities. External national accreditation of the module is also being explored.

Take-home messages

- ▶ Aligning learning outcomes to recognised internal and external learning outcomes (eg, medical school curriculum and GMC Outcomes for graduates) strengthened the case for adoption of the online module as core curriculum content. Likewise, linking learning to assessment and linking to external accreditation increases legitimacy of the activity with the student body.
- ▶ Technology to develop the module was simple, but specific and protected time from the E-Learning Fellow (or equivalent) was required.
- ▶ Feedback from students after the pilot allowed development of the platform in terms of creating a more effective balance of didactic and interactive material, as well as incorporating evidence from the literature of effective e-learning models.

DISCUSSION

The three case studies approached integrating nutrition education into the undergraduate medical curriculum in various different formats, but common themes across these innovations can be drawn out:

Curriculum issues: The undergraduate curriculum is already 'packed',²¹ and the opportunity to include new content can be seized as an opportunity when an opening

arises (such as in case studies 1 and 3), or as part of a recommendation post curriculum review (case study 2). The choice between making any new content core or optional, and its place and delivery format within the overall curriculum, will depend on many factors, and involve multiple academic stakeholders with various levels of power—as Prideaux reminds us, curriculum is ‘the result of human agency...often contested and problematic’.²² Presenting new curriculum to decision-makers as a ‘solution’ to a current curriculum problem for them is one pragmatic suggestion from the authors to increase its chances of adoption, as well as explicit signposting and mapping content to internal curriculum and external (eg, GMC) outcomes. Mechanisms to support visibility and sustainability, including the embedding of nutrition into core learning outcomes and examinations as well as building a pool of qualified educators and resources for delivery, is key.

In this paper, we demonstrate how a range of different teaching methods can be used to reflect varied needs of medical schools to be easily integrated to compliment and enhance current teaching and is realistic within other priority subjects. The role of leadership and advocacy to champion nutrition education is also highlighted.

Legitimacy issues: as nutrition education content has historically been hidden and not explicit, finding its ‘place’ alongside the traditional basic and clinical science can be problematic for some stakeholders, including students and some academics. The authors’ experiences were often that nutrition was not viewed as ‘core’ by all stakeholders; it can be argued the decision to revise specific nutrition outcomes in the most recent edition of GMC Outcomes for graduates was a backwards step for explicit nutrition presence in the undergraduate curriculum. Explicitly mapping to internal and external outcomes, assessing nutrition-related outcomes in high stakes exams, and the physical presence of Nutrition Leads and Champions all assisted Nutrition to find legitimacy within the curriculum. Case 2 highlights the importance of the Nutrition Lead in terms of curriculum implementation, but also the importance of the multi-disciplinary team to support sustainability and to champion qualified doctor professional role models.

Interprofessional issues: Nutrition as a discipline has traditionally been delivered by a multiprofessional team, reflecting its clinical, behavioural and social constructs, and as such, the most effective education will need multiprofessional teams across a range of disciplines and professions involved in its design and delivery. Case 1 took a public health and social science approach, while case 3 content was designed by clinicians from across medical and allied medical professional disciplines. IPE theory can support initial curriculum design and ongoing evaluation. As discussed, the focus of nutrition needs to reflect the module in which this is placed, where the practical application can clearly be related back to the role of a doctor within the wider multi-professional team. For example, the role of nutrition assessment and monitoring

of disease related malnutrition in a clinical setting is very different to a public health role in disease prevention. It is important therefore that nutrition teaching is included across different modules to support clinical reasoning skills and appropriate application to different clinical settings. This includes when to refer on to nutrition professionals or how to link to community or third sector organisations. The authors recommend further research into nutrition education IPE with the potential to link multiple healthcare students and professionals. This may help to demonstrate distinct and shared roles and responsibilities for nutrition care across public health and clinical settings.

Further considerations

The need to consider the role of nutrition education in the undergraduate curriculum has never been greater, with increased focus on the role nutrition plays in prevention, treatment and recovery from COVID-19,^{23–25} adding to what we already know about the leading role nutrition plays in the risk of metabolic disease. Furthermore, nutrition inequality has also been exposed as both a risk factor for COVID-19²⁶ and as a consequence of COVID-19 containment measures.²⁷ There are further concerns on how COVID-19 is likely to widen financial and racial disparities in health.²⁸ The relationship between poor diets and poverty could be explored in the medical school curriculum via public health and social science teaching. Medical students of today are the advocates of the patients of tomorrow and need to be equipped with broader societal concepts underpinning health risks and health inequalities to support the implementation of clinical sciences across diverse populations. The student voice is powerful and their engagement in innovative curriculum is imperative for its long-term embedding.

All of our cases use an IPE model for delivery to help solve the catch-22 situation that current doctors are not trained in nutrition. This model requires the use of other health professionals such as dietitians that, while providing the appropriate knowledge, may not reflect the best way to implement nutrition into medical practice.

Without suitably trained doctors as role models, students may not appreciate their role in nutrition care, thinking that this is solely the job of nutrition professionals. However, if doctors lack a basic understanding of nutrition and the skills to screen for and diagnose nutrition problems, patients will likely be missed.

The authors hope by sharing these case studies and demonstrating how nutrition can be included within traditional medical curricula using a variety of educational strategies, that it can provide a recipe, excusing the pun, for other institutions.

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