Interprofessional education (IPE) between Medical and Dietetic students: Prescribing Medical Nutrition Therapy?

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Abstract

**Introduction**: Interprofessional education (IPE) is a collaborative learning process between health professionals to improve healthcare outcomes. Limited data exists on IPE specifically between medical students (MS) and dietetic students (DS). Our study evaluated a two hour didactic and experiential Medical Nutritional Therapy (MNT) session for MS, facilitated by dietetics faculty and DS.

**Methods**: Dietetics faculty provided a didactic training on nutritional risk assessment and MNT. Then, DS worked with groups of MS to alter sample meals using MNT guidelines. Psychosocial and economic challenges were addressed. MS completed pre and post-session surveys and DS gave reflective feedback.

**Results**: Significant change in pre to post survey scores occurred for every question (p<0.006). MS reported increased confidence for altering meals for MNT, suggesting healthy food solutions, recognizing nutrition risk, and understanding the role of dietitians. DS felt their role on healthcare teams was recognized.

**Conclusions**: This novel study was the first of its kind to assess an IPE session solely between MS and DS, underscoring the use of food as medicine. MS learned about specific MNTs, making appropriate food alterations, and responding to psychosocial/economic challenges. Future studies should assess longitudinal impact on MS and their incorporation of Registered Dietitians in future practice.

**Keywords**: Interprofessional Education; Registered Dietitian; Medical Nutrition Therapy
Introduction

Interprofessional education (IPE) was introduced 40 years ago to the healthcare field and endorsed by the World Health Organization (WHO) in 1988. According to WHO, IPE fosters the ability to collaboratively share knowledge and skills, enables students to work together, integrates new skills and areas of knowledge, and improves understanding and cooperation between educational and research institutions [WHO 1988]. In 2008, the Association of American Medical Colleges (AAMC) called for IPE to be addressed and taken into action [Panel 2011].

Collaboration is necessary for delivering quality health care. Practitioners must understand what other health professionals offer in order to provide a comprehensive approach to care [McPherson et al. 2001]. IPE facilitates efficiency as well as improves patient safety through its multi-faceted approach, utilizing skills of every health professional involved [Reeves et al. 2013]. A prospective controlled study in New Zealand evaluated the impact of IPE between students in dietetics, physiotherapy, medicine, and radiation therapy. After the intervention, students had improved self-reported effectiveness as a team member. Their perceived confidence, knowledge, and ability to manage long-term conditions improved. Additionally, students’ attitudes were more favorable toward interprofessional teams and IPE learning. This intervention, with many participating disciplines, affirms that IPE has a positive impact and helps develop relationships between health professionals, intending to improve patient outcomes [Darlow et al. 2015].

When training health professionals, health educators clarify the roles of various professionals and foster relationships between them. Current medical school curricula have limited time to devote to IPE [McPherson et al. 2001]. Furthermore, in medical schools, there is limited translational nutrition education where food is seen as an effective intervention. According to research from the University of North Carolina at Chapel Hill, most medical schools in the United States fail to provide the recommended 25-30 hours of nutrition education [Adams, Butsch, & Kohlmeier 2015]. One way this gap in medical education may be bridged is by collaborating with a Registered Dietitian (RD) at the student level, thus promoting relationships between physicians and dietitians for the future. However, with advancements in medical knowledge and ever-increasing requirements, medical school education is already dense. This highlights the need for efficient teaching. An IPE session is a relatively easy, feasible way to incorporate nutrition and food education into the medical curriculum and support interprofessional relationships and knowledge, while being time-efficient. Research in Brussels between physiotherapy, nursing, and medical students found their IPE module produced significant improvement in attitudes of IPE collaboration while requiring only limited faculty and student time and low-costs to implement [Goelen et al. 2006].

With limited information on IPE interactions [Lairamore et al. 2013; Pullon et al. 2013; Whelan et al. 2005], in particular, those pertaining to dietetics and medicine, The Ohio State University (OSU) College of Medicine’s new "Lead, Serve, Inspire” curriculum intentionally incorporated education on nutrition, behavior, obesity, and social determinants of health as they impact disease. Lectures and online modules provide detail on nutrient biochemistry, nutrient pathophysiology, and Recommended Daily Allowance/Reference Daily Intake. Yet, there was still limited emphasis on the practical use of food as nutrition therapy, especially for chronic conditions. As a solution, we conducted an experiential IPE session at the medical school using problem based learning (PBL). MS and DS worked together to apply information taught in lectures as they adjusted sample meals to meet MNT guidelines. DS encouraged additional problem solving when common life and food challenges were also incorporated. PBL is noted to have many positive effects in medical education including improved social and cognitive abilities, skill-based application, and long-term retention [Abercombe et al. 2015]. Research at the Tokyo Women's Medical University evaluated the effect of PBL and its application to clinical work. First and second year residents felt PBL in their medical studies improved their collaboration with others, self-directed learning, creating doctor-patient relations,
and solving clinical problems [Okubo et al. 2016]. By combining PBL with IPE, we hoped to offer a time-efficient session that reviewed dietary modification as disease-specific therapy and maximized retention of knowledge in this already packed curriculum.

This IPE session occurred in Fall 2014 between second year medical students (MS) and internship-experienced dietetic students (DS) at OSU College of Medicine. We based this study on a pilot session in Fall 2013, without pre and post surveys, that gleaned positive feedback and prompted further evaluation. Our 2014 session consisted of a series of lectures followed by the experiential PBL session between MS and DS, where DS helped groups of MS to adjust sample diets according to established MNT guidelines.

Objectives

The objectives of the MS/DS IPE session were to:

- Describe the fundamentals and relevance of the use of nutrition assessment markers, specifically anthropometry, biochemistry, clinical observation, and dietary intake.
- Describe the rationale and mechanisms of common nutrition therapies for hypertension, diabetes, celiac, cardiovascular, and renal conditions using evidence-based MNT.
- Create an interactive and personalized small group IPE environment where DS, who actively worked in MNT for the past year, coached MS to adjust foods from sample meals or to create improved meals to fit one of five therapies addressing common diseases.
- Create an interactive opportunity for students to consider additional strategies when faced with challenges anchored in social determinants of health.
- Assess perceptions of MS about the impact of this IPE session on food/diet choices through pre and post surveys.
- Assess reflective feedback of DS on the effect of this IPE session through open-ended questions.

Methods

This was a prospective cohort study conducted at The Ohio State University, a large Midwestern academic institution. The instrument was reviewed by a panel of experts for content validity.

Participants: Participants were medical and dietetics students from The Ohio State University College of Medicine. Participation from both disciplines was optional. The MS were beginning their second year and DS had at least one year of internship experience working with MNTs for patients. Participation in the IPE and the pre- post surveys was voluntary and demographic data was not collected.

Intervention: IPE study design and session flow are shown in Figure 1.
Professors from Dietetics taught two thirty minute lectures. The first was on nutrition assessment and markers of nutritional health. Then, a second lecture provided guidelines of specific MNT (Dietary Approaches to Stop Hypertension (DASH), carbohydrate-controlled, gluten free, the national cholesterol education program (NCEP) and mineral-controlled for renal disease), as specified by the Academy of Nutrition and Dietetics Nutrition Care Manual. Then, MS in groups of 2-6 paired with one DS (n=20) and were assigned one of the five disease-specific MNTs. In the small groups, the DS reviewed details of each disease-specific MNT. Groups were given a sample patient meal log. Each MS was asked to make suggestions to alter the meal in accordance to the specific MNT assigned. Common real life challenges were added to simulate actual patient interactions and solutions were discussed. The challenges included picky eaters, family dysfunctions, food insensitivities, food insecurity, dislike of cooking, and frequent restaurant eating. The session concluded as the dietetics faculty facilitated a discussion between MS and DS who shared perceptions of this experience, challenges encountered in altering meals to fit MNT guidelines, and their understanding of the value of the other health professional.

**Evaluation:** The MS were asked to complete a voluntary and anonymous survey before the session (pre-survey) with questions rating their knowledge of and confidence in the practice of food as therapy. Immediately following the discussion, as shown in Table 1, students were asked to complete a post-survey with the same questions rating the helpfulness of the session in learning MNT concepts and confidence in their ability to alter diets, address potential challenges, and work with a RD in the future. A 5-point Likert scale (least = 1, most = 5) was used to record these
opinions. Pre and post surveys were identical, except "Rate your knowledge about" in the pre-survey was replaced with "Rate helpfulness of session for learning" in the post-survey.

<table>
<thead>
<tr>
<th>Table 1: Post-Survey Questions</th>
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<tbody>
<tr>
<td><strong>Rate helpfulness of session for learning</strong>*:</td>
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<tr>
<td>Q1: the value of patient self-perspective of past lifestyle successes and challenges.</td>
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<tr>
<td>Q2: barriers and compliance issues with alterations of diet.</td>
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<tr>
<td>Q3: how to alter a sample meal to meet the appropriate nutrition therapy.</td>
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<tr>
<td>Q4: to recognize parameters to assess nutrition risk in acute care.</td>
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<tr>
<td>Q5: the role of the dietitian for counseling our patients.</td>
</tr>
</tbody>
</table>

Please rate your confidence for your ability to:
Q6: make correct diet or food suggestions.
Q7: suggest ways to overcome barriers.
Q8: work alongside the dietitian to encourage patients with practical solutions.

*Pre-survey: “Rate your knowledge about”

Each MS completed one pre and one post survey. The survey was created as an evaluation tool for this experiential PBL session and was based on questions from the validated Readiness for Interprofessional Learning Scale (RIPLS) [McFadyen et al. 2005; Parsell & Bligh 1999; Reid et al. 2006]. MS who completed the survey were asked to identify themselves with the last four digits of their social security number so that pre and post surveys could be matched. MS also had the opportunity on the post-survey to write reflective comments on the session. DS provided narrative feedback through a post-survey of open-ended questions. Comments from the Fall 2013 pilot session were used to modify the Fall 2014 session as well as survey to help improve overall effectiveness.

**Analysis:** Surveys were collected and data entered into Excel. The mean change per question from pre to post survey and standard deviation is shown in Table 2. SPSS was used to evaluate 2-tailed paired sample t-tests of the mean change for each survey question. Statistical significance was set a priori to p<0.05. The Bonferroni correction was applied to adjust for multiple comparisons; p< 0.006 was necessary for significance. Narrative comments from MS and DS surveys were transcribed into excel. DS reflective feedback was assessed independently by two reviewers and categorized into three concept areas: learning the importance of food, interprofessional training, and general comments.

**Results**

There were 99 medical students and 20 dietetic student interns that attended and participated in the experiential PBL IPE session. Pre and post surveys were successfully matched for forty-six MS. The mean differences from pre-survey to post-survey were calculated for each survey question and are shown in Table 2. A 2-tailed paired sample t-test demonstrated statistically significant pre to post change (p<0.001) for every question asked.
In order of greatest to least mean change value, MS had a statistically significant self-reported increase in knowledge of:

- Recognizing parameters to assess nutrition risk in acute care (1.67, p<0.001).
- How to alter a sample a meal to meet the appropriate nutritional therapy (1.59, p<0.001).
- The role of a Registered Dietitian (RD) (1.09, p<0.001).
- Barriers and compliance issues with alterations of diet (0.70, p<0.001).
- The value of patient self-perspective of past lifestyle successes and challenges (0.58, p<0.001)
Also statistically significant was an increase in confidence for ability to:

- Work alongside the dietitian to encourage patients with practical solutions (0.72, p<0.001).
- Suggest ways to overcome barriers (0.70, p<0.001).
- Make correct diet or food suggestions (0.67, p<0.001).

![Figure 3: Medical student change in confidence after IPE session with dietetic students and faculty after pre and post survey results](image)

*significant change, p<0.001

The questions with the greatest positive difference were helpfulness in learning how to assess nutrition risk in acute care (1.67, p<0.001) and learning how to alter a sample meal for specific MNTs (1.59, p<0.001).

MS and DS reflective feedback is in Table 3. MS comments on the post-survey were positive and evidenced a better understanding of nutrition therapies and the role of the dietitian. Independent reviewers grouped narrative comments from DS into two major themes: the value of future physicians learning the importance of food and the opportunity for interprofessional experiences.
Interprofessional education (IPE) was introduced 40 years ago [WHO 1988]. Lairamore states that IPE increases student respect for other professions and awareness of the benefits of teamwork. IPE has a positive impact on client-centered care [Lairamore et al. 2013]. There is a demand for research assessing IPE’s effectiveness, specifically between students of medicine and dietetics. Our work demonstrated that an IPE session is a feasible, time-efficient way for large numbers of medical students to increase knowledge and confidence in applying nutrition to clinical practice. Our results are similar to IPE sessions conducted between other health professions. One such study was a separate IPE session at OSU. It simulated patient visit and included the disciplines of dietetics, nursing, medicine, physical therapy, respiratory therapy, pharmacy, occupational therapy, and social work. Dietetic students (DS) who participated felt the session made them better members of the healthcare team, showed them the importance of communication and teamwork in patient care, and increased their ability to participate in team decision-making [Holthaus et al. 2015]. DS feedback was very similar to our study. Additional IPE research between dietetic, medical, and physiotherapy students demonstrated a statistically significant improvement in student understanding of IPE and an increase in their confidence in the effectiveness of an interdisciplinary teamwork [Pullon et al. 2013]. Additionally, medical and nursing student feedback from an IPE study at the University of Hawaii were similar to the feedback provided by our medical students and dietetic students. Both studies expressed that the IPE session was
a valuable opportunity to support positive patient outcomes [Sakai et al. 2012].

Our study contributes to IPE literature and to our knowledge is the first of its kind demonstrating IPE collaboration between medicine and dietetics. This two-hour experiential PBL format, emphasizes feasibility and efficiency for the use of medical nutritional therapy in medical school curricula. The Ohio State University endorses IPE and has now incorporated this MS/DS session into its new "Lead, Serve, Inspire" curriculum for second year medical students. MS and DS were able to engage in multi-disciplinary learning of nutrition assessment and nutritional therapy. MS experienced a personalized approach to learning and applied one of five common nutrition therapies. Our session highlights medical nutrition therapies for diseases commonly seen in the clinical setting such as hypertension, diabetes, and obesity [Adams, Kohlmeier, & Zeisel 2010]. Groups of students also shared ideas and strategies to address the real life challenges and barriers that influence food intake, choices, and availability.

It is particularly important to get dietetics and medical students working together, because according to the AAMC Nutrition Education in U.S. Medical Schools study, many reports suggest that MS graduates feel unprepared for counseling or making decisions about patient nutritional care [Reeves et al. 2013].

We recognize that this study has limitations, namely our small survey sample size of N=46. While 99 MS participated, only 46 surveys could be matched with a self-identified number (last 4 digits of social security). It is possible that giving out part of the social security number deterred participation. Asking for another identifier may increase matched responses. MS and DS both had the choice to attend, possibly resulting in a self-selection bias of those more interested in interprofessional practice. We did not measure participant demographic characteristics such as gender, age, and ethnicity.

Another limitation is that the session required faculty and students from both departments of medicine and dietetics. There are time constraints for busy faculty and students. Additionally, it requires that a dietetics program exists at the medical school. Furthermore, the survey handed to MS was not validated. We drew themes from the Readiness for Interprofessional Learning Scale (RIPLS) questionnaire, but the outcomes we measured were unique to our study and were self-reported improvements in knowledge. A validated survey would increase accuracy and reliability of our data.

Future directions for this unique MS-DS IPE include:

- Using a validated pre and post-session survey.
- Sessions with a greater diversity of eating behaviors and cultural environments.
- Assessing the longitudinal impact of sessions by administering a second post-session survey to the same group of MS later in their clinical and residency rotations.
- Evaluating more intimate sessions with individual faculty interaction.
- Receiving input from faculty physicians who did not ever have nutrition education.
- Learning whether these sessions impact the food choices MS make in their own diet.
- Measuring actual knowledge, behavior, and impact on patient care.

A positive outcome as a result of this session was that MS showed great interest in ‘food as medicine. MS were connected with DS and these two groups now gather four times a year to implement potlucks exploring different MNT diets. In 2015, 3 potlucks occurred focusing on DASH, celiac, and paleo diets. We hope to continue to encourage such collaboration among students from different health professions in hopes that the relationships will continue into future practice. Physicians and Registered Dietitians working together will ultimately serve to improve patient care and the long-term management of today’s chronic diseases.
Conclusion

A brief two-hour didactic and experiential session increased self-reported medical student knowledge and confidence in ability to alter sample meals to fit disease specific MNT and recognize parameters to assess nutrition risk in acute care. This session was a unique and sustainable opportunity to bring together medical and dietetics professional students and faculty and exchange expertise in problem based IPE sessions. Feedback from both professional students proved it to be a dynamic and engaging experience. It had a positive impact in conveying the importance of nutrition and food in medicine and the role of the Registered Dietitians to medical students. MS recognized 1) the value of teaming with nutrition experts to improve patient health through nutrition therapy, and 2) the need to add relevant MNT course material to the medical school curriculum. Narrative feedback from DS was also positive and indicated enthusiasm for this session and enthusiasm for being recognized as vital to optimal care of patients. IPE sessions like these are a highly efficient way to incorporate education on nutritional therapies and the role of RDs into the medical school curriculum. We anticipate that this early collaboration will increase the rate of partnerships in future practice.

Take Home Messages

- A brief lecture on MNT provides foundation for understanding of food as medicine.
- Group discussion improves awareness of barriers anchored in social determinants of health.
- IPE enriches discussion of food suggestions to optimize meals for MNT.
- IPE encourages problem solving for real patients.
- Self-actualization of food as medicine is valuable for all participants.

Notes On Contributors

Anna Cherian: Anna is a RD who graduated from the Medical Dietetics program at OSU, going to Touro College of Osteopathic Medicine. She was born in India and moved to the US shortly after. She has strong interests in urban health and using nutrition as a primary-prevention tool in the community setting.

Suman J Gupta: Suman is a 4th year medical student at OSU going into Emergency Medicine. Originally from San Diego, she received undergraduate degrees in Psychology and Conservation and Resources Studies from UC Berkeley. She has strong interests in medical education as well as Integrative Medicine, particularly mind-body practices and nutrition.

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Appendices

Declarations

The author has declared that there are no conflicts of interest.

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