Teaming Up Against Smoking: Incorporating an Interprofessional Education Framework Across Graduate and Undergraduate Health Students Utilizing Electronic Health Records

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Abstract: The dietetics profession has a long history of interprofessional education (IPE), yet there is limited evidence of IPE activities involving Health Studies students pursuing healthcare administration careers. This article examines the feasibility, strengths, and challenges of using an electronic medical record (EHR) to engage students in an IPE health promotion experience. The study aimed to enhance the curriculum with an IPE case study utilizing EHR technology. Three collaborative assignments focused on a virtual smoking cessation client: a teaching plan, a profession-specific chart note, and a self-reflection on the IPE teamwork experience. Two researchers reviewed student learning outcomes using an inductive approach and manual coding. A thematic analysis of the teaching plan revealed differences in patient care provided by Health Studies students compared to Nutrition students. Health Studies students contributed to smoking cessation through health teaching, coaching, and nicotine replacement therapy (NRT), while Nutrition students focused on appetite, weight gain, diet recommendations, and hand-to-mouth motion replacements. Students excelled on the rubric for the profession-specific chart note using assessment-diagnosis-intervention-monitoring-evaluation (ADIME) or subjective-objective-assessment-plan (SOAP) notes. A thematic analysis of reflection papers highlighted five themes, emphasizing students' appreciation for Interprofessional Education Collaboration (IPEC) and skill development. The reflection paper results indicated that this innovative IPE teaching strategy promotes collaboration and team communication, potentially leading to improved education and patient outcomes. The use of an online mock EHR platform for teaching IPEC was feasible, providing access, engagement, and simulation activities at a reasonable cost. Conclusions: An online EHR platform effectively supports interprofessional education between future dietitians and healthcare administrators, demonstrating competence in IPE collaborations in smoking cessation care.

Keywords: Interprofessional Education, Electronic Medical Records, Smoking Cessation, Health, Nutrition

INTRODUCTION

Defining the term "e-health" has long been a moving target. The e-words (e.g., e-commerce, e-business, e-solutions, etc.) were originally defined by business leaders and marketing professionals who became buzzwords for the term electronic. Eysenbach (2001) first defined e-health as "an emerging field in the intersection of medical informatics, public health, and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology." As the target continues to move with advancements in technology, Kukafka (2019) defined "digital health" as the overall term which encompasses e-health. Digital health includes (but is not limited to) software solutions, big data, genomics, and artificial intelligence. The use of one such software solution, electronic health records (EHR), is a major aspect of digital health.

The adoption of EHRs in the US has been a slow process. Before 2010, it was estimated that 5% (Cutler et al., 2005) to 59% (Laschober et al., 2005) of all US healthcare facilities utilized EHRs to collect data and documents on patients. The drive towards implementing EHRs to a greater degree in general practice leaped forward with the introduction of the Affordable Care Act (Health Information Technology, 2010), which mandated the implementation of electronic health records into everyday healthcare practice. By 2017, 80.5% of hospitals in the US utilized some form of EHR. With the start of the CO-

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VID pandemic in February 2020, the use of EHRs to provide telehealth services to patients skyrocketed (Patel et al., 2021; Wosik et al., 2020) and has continued to remain high. As this technology continues to advance, it is expected that the use of EHRs and healthcare-focused software solutions will continue to increase across the US.

As educators of future healthcare professionals, it is vital to instruct students not only on the basic uses of EHRs but also on the ability to collaborate with other healthcare professionals based on data collected in EHRs. The concept of explicitly instructing healthcare students in competencies to develop collaborative behaviors is known as interprofessional education and collaboration (IPEC). Interprofessional education and collaboration occur when instructors and students from ≥2 healthcare fields intentionally work together to foster an environment where attitudes, knowledge, and skills can be shared (Institute of Medicine Committee on Quality of Healthcare in America, 2001). Previous research has examined the development of interprofessional competencies between healthcare professionals using EHRs (Cresswell et al., 2023; Stickley & Gibbs, 2021). While the majority of IPEC focuses on healthcare professions that actively treat/interact with patients, there is a gap in the literature involving IPEC between future healthcare *providers* and healthcare *administrators.* The ability of healthcare administrators to learn interprofessional skills and understand the various roles healthcare professionals play in patient care may play a crucial part in the successful operation of a healthcare facility while providing superior care to the patient. Likewise, healthcare providers may think of healthcare management as a separate entity, but their actions can play major roles in patient care (Begun et al., 2011).

While the dietetics profession has a long history of IPEC (Aboueid et al., 2020), there is little evidence of IPEC activities done with students who may be pursuing careers in healthcare administration, such as students in general health studies programs.

This study was designed to answer the following questions:

a) What is the cost and implementation feasibility of an EHR-based IPEC case study between graduate-level registered dietitian students and undergraduate health studies students in healthcare administration?

b) What are the strengths and challenges of using an interprofessional team for a virtual smoking cessation patient when planning patient care activities, care documentation, and student self-reflections?

With this project, we aimed to introduce students to the use of EHRs in healthcare settings and help them understand how e-health approaches can enhance the collaborative skills of future healthcare administrators and dietitians.

METHODS

The Research Team

The research team consisted of three Ph.D.-trained, experienced health educators: a male registered dietitian, a female kinesiologist, and a female registered nurse. A key assumption was that all students intended to give good effort to these three assignments. This research begins to address the gap in the literature involving IPEC between future healthcare providers and healthcare administrators using the IPEC strategy and EHR technology.

Participants

This study involved a convenience sample of students taught by full-time faculty in the Department of Nutrition, Kinesiology, and Health at the University of Central Missouri. Two courses were chosen for this project: Medical Nutrition Therapy I (NUTR 5012, an online graduate-level course) and Drugs: Addiction to Recovery (HLTH 4310, an online undergraduate-level course). This effort helped fulfill the University's Master of Clinical Nutrition degree program learning objectives for IPEC and the mission and priorities of the Health Studies bachelor's degree program. Inclusion criteria included enrollment in either class. This study was approved by the University's Institutional Review Board**.**

Procedures

This teaching strategy was designed to enhance the curriculum for student learning via an interprofessional collaborative case study utilizing EHR technology. Before the start of the project, all students accessed the mock EHR platform EHR Go© (https://ehrgo.com/). This platform is designed for interprofessional lab and classroom experiences, simulating healthcare situations while allowing students to become proficient in technology. The EHR Go© platform cost approximately $50 per student and was funded by the University of Central Missouri Student Technology Fund, allowing all students access to the program.

Choice of Case Study

The US Surgeon General (2018) officially declared e-cigarette use among youth an "epidemic." With the recent number of JUUL users (an American electronic cigarette) at the high school level approaching 30%, evidence-based cessation techniques will help people quit more successfully. To make matters worse, young people who begin with e-cigarettes are more likely to transition to combustible cigarette use and become smokers (National Academies of Sciences, Engineering, and Medicine, 2018). Therefore, tobacco cessation is a topic that is highly relevant in today's healthcare environment.

In addition, nutrition may play a part in successfully managing the effects of tobacco cessation. Weight gain after tobacco cessation is common; a recent systematic review demonstrated that intensive counseling from dietitians decreased weight gain amongst those trying to quit tobacco (Hartmann-Boyce et al., 2021). In addition, tobacco smoking is a major generator of free radicals in the body (Pryor,

1997); increasing fruits and vegetables in the diet, a common message from dietitians, helps to eliminate free radicals from the body (Rana et al., 2022).

Due to these factors and the epidemic of e-cigarette usage on college campuses (Roberts et al., 2022), a case study focused on tobacco cessation was chosen from the EHR Go© platform. The case study focuses on a fictitious patient who is attempting to quit smoking. In provider notes located in EHR Go©, students learn of the patient's previous attempts at smoking cessation, their desire to try pharmaceutical methods to prevent relapse (in this case, the drug Chantix), their recent weight gain, and their concerns about the effects of smoking on their health after cessation.

Design of Interprofessional Assignment

Students were divided into working groups, with one nutrition student assigned to 3-4 health studies students. First, each student accessed the case study via EHR Go© individually and assessed the patient based on provider notes, lab results, etc. Then, for assignment #1, each interprofessional student team created a teaching plan for the patient's smoking cessation efforts. Each group handled its collaboration engagement independently. Many chose to meet face to face, video chat, or email each other multiple times. The teaching plan identified a tool to assess the patient's current knowledge and motivation, and two/three learning objectives that were appropriate for the patient. Students were required to detail the lesson content, including the activity description, time to complete, tasks, materials needed, the tool to assess the patient's learning, and questions to evaluate the patient's satisfaction with the teaching session.

For assignment #2, each student wrote provider notes based on profession-mandated styles and shared them with the group. For nutrition students, this was the ADIME (Assessment, Diagnosis, Intervention, Monitoring, and Evaluation) format based on Nutrition Care Process terminology endorsed by the Academy of Nutrition and Dietetics (Swan et al., 2019). For Health Studies students, this was the SOAP (Subjective, Objective, Assessment, Plan) format used by multiple healthcare professions (Podder et al., 2022).

Lastly, assignment #3 was a written reflective statement from each student on their experience working with another profession. The workflow of the assignment is illustrated in **Figure 1**.

Analysis

As our analysis was purely qualitative in nature and served to assess the cost and implementation feasibility of the assignment and IPEC's strengths/weaknesses, no power analysis was conducted. Two researchers reviewed student learning outcomes using an inductive approach and manual coding. The researchers coded the reflective statements individually, met to discuss any differences in coding, resolved any conflicts in coding, and then recorded all the reflective statements, developing themes and subthemes. Assignment rubrics were used to score students for thoroughness of assignment 1-3 as part of the course. Thematic analysis of the students' clinical notes identified common traits of professional narrative notes, and student IPE reflective statements identified themes associated with the IPE interaction experience.

RESULTS

Assignment #1: Teaching Plan

A thematic analysis of assignment #1, the teaching plan, revealed differences in patient care provided by Health Studies students compared to Nutrition students. Health Studies students contrib-

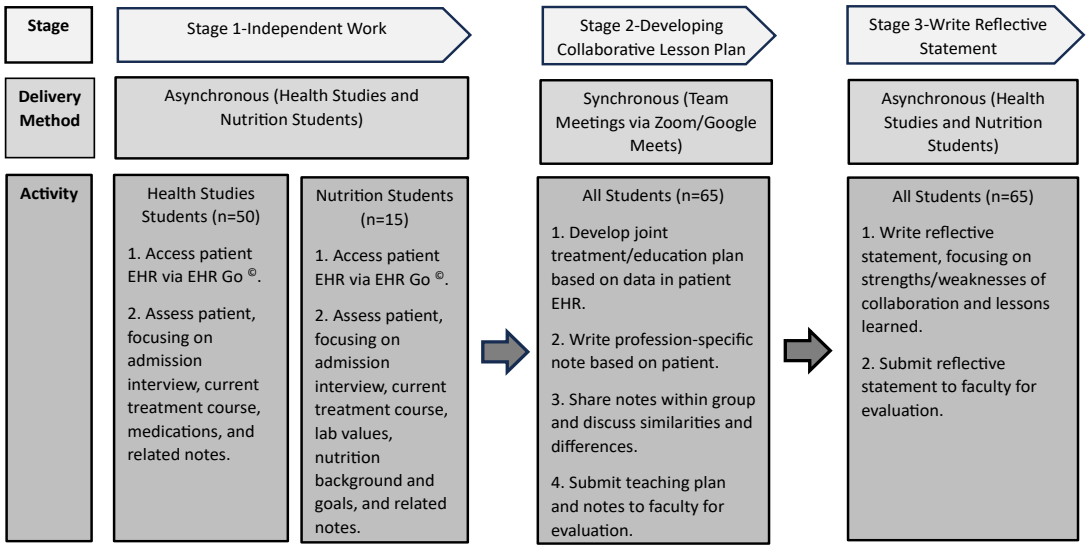


Figure 1. Flow of Electronic Health Records-Based Interprofessional Education Assignment

uted to smoking cessation through health teaching, coaching, and tool skills, and nicotine replacement therapy (NRT). Health Studies Students' described their contributions to IPEC teaching as:

•Teaching how smoking can affect health and providing statistics on the rate of health issues associated with smoking. Examples: cancer, heart disease, stroke, lung diseases, diabetes, chronic obstructive pulmonary disease (COPD), emphysema, or chronic bronchitis.

•Coaching on methods of satisfying craving sensations can help quit smoking. For example, using lip balm to satisfy the hand-to-mouth motion or chewing gum to give an oral sensation. Other products, such as nicotine patches, can also help decrease the craving to smoke.

•Recommendations for NRT include nicotine pouches, Nicotine nasal spray, inhalers, lozenges, Varenicline (Chantix), or Bupropion (an Antidepressant and smoking cessation aid).

Nutrition students contributed to the teaching plan by discussing appetite, weight gain, diet recommendations, and hand-to-mouth motion replacements. **Figure 2** describes the Nutrition students' contributions to IPEC teaching.

Assignment #2: Profession-specific Chart Documentation

Assignment #2 was the profession-specific chart documentation of the virtual teaching session. Students generally performed well on this assignment, using an established and known grading rubric. Health Studies students performed at a fundamental level; for many of these students, this was their first exposure to narrative note-writing. Nutrition students, having more experience with narrative note writing, incorporated more medical terminology and abbreviations into their teaching while writing more concise notes.

Assignment #3 IPE Reflection Paper

Assignment #3 was a reflection paper, which added insight into the students' experiences designing the teaching plan and writing the chart note. Students were asked to answer five questions about the IPEC experience. Responses were thematically analyzed. Reflective statement questions and themes are detailed in Table 1. IPE Reflective Statements and Thematic Results

Thematic Evaluation of Reflective Statments

Analysis of students' reflective statements led to the development of five themes. Each theme was associated with a specific question asked by faculty as part of the reflective statement assignment. These themes, and associated exemplar statements, are described here.

1. What was it like to work with a profession you had not previously worked with?

Students reported it was a new experience being exposed to different ideas and seeing others' professional points of view. They described it as a valuable collaboration, working toward the best treatment plan.

Student exemplars

One Health Studies student explained, "The strength of the IPE assignment was insight. Both courses involved in the group assignment were great at putting the missing pieces together. It was also very interesting to see how we perceived the case study differently, and how our thinking strategies were different and helped us excel in finding conclusions for the patient. For example, I was very focused on the mindset of the patient and how to keep my patient motivated, while my colleague focused on the mental health of the patient. Together, these are both very important aspects."

A Nutrition student elaborated, "Personally, I was hyper-fixated on the nutritional impacts of long-term smoking and the challenges I anticipated the patient would experience as she reduces her nicotine intake. My teammates provided additional perspectives, like replacement behaviors and the impact of

• Changes in **appetite** are common in those who are quitting smoking. This is due to improved taste and smell, metabolism [affects], increased appetite, comfort, and reward association.

•**Weight gain** is common and normal after quitting smoking

•Diet recommendations:
- •Focus on consuming a general, healthful diet
  - •10-35% calories from protein (including plant proteins)
  - •45-65% calories from carbohydrates
  - •20-35% calories from fats
  - •Antioxidants/n-3 fatty acids
- •Choose whole-grain cereals, bread, pasta, and rice
- •Consume >5 servings of fruits and vegetables per day
- •Choose reduced-fat dairy products
- •Eat breakfast
- •Eat slowly, allowing you to notice when you're full
- •Choose healthful snacks, like fruit, nuts, or plain popcorn
- •Swap the cigarette hand-to-mouth motion with straws, toothpicks, carrot sticks, or sipping water

Figure 2. Nutrition Students' Self-Described Role in Smoking Cessation

smoking on oral health...it was interesting to see the benefits of collaboration and additional attention on a patient like [simulated patient]."

2. What did you learn about smoking cessation from your fellow health

Students reported learning about pharmacotherapeutics, how difficult it is to quit, the link between tobacco and mental health, and dietary interventions to assist smoking cessation symptoms.

Student exemplars

A Health Studies student reported, "I learned that nicotine acts like an appetite suppressant, and this is why individuals tend to eat more and gain weight when they stop smoking. Vitamin C is recommended for smokers at 35mg more per day than non-smokers. I also learned that both professions spend time listening to the patient and try to actively engage the patient in the development of a teaching plan."

However, a nutrition student found that "The emotional impact of smoking cessation is incredibly important, as this health-reducing habit is truly a behavioral issue and isn't necessarily due to lack of knowledge on the part of the patient. Identifying triggers is incredibly important, and replacement behaviors like chewing gum can be very helpful in suppressing cigarette cravings."

3. What were the strengths of your interaction with other students?

Interacting with other professionals was beneficial for idea-building and problem-solving, comparing work and feedback, and exploring different roles and views. Students also expressed affirming cooperation with the team experience and communication.

Student exemplars

A Health Studies student said, "The strengths of this assignment were having people from different classes all add to the assignment. Everyone added something beneficial to the assignment and that allowed it to be more in-depth and created a good plan for [simulated patient]." This was congruent with a statement from a nutrition student, who said, "The strength of the group and this assignment was the teaching plan. That is where I learned the most and got the most out of this assignment. I enjoyed seeing how what we have learned can be put into tangible practice in dietetics, but also from the Health Studies students."

4. What were your struggles with interacting with others students?

Students described struggles with scheduling meetings and communicating via virtual means. They also reported not knowing who was responsible for each assignment task and having issues understanding assignments.

Student exemplars

A Health Studies student described the communication issue as follows: "Everyone in my group had different schedules and obligations that interfered with meeting times, which made it difficult to collaborate at the beginning of the process. Luckily, the two weeks gave us enough time to adequately collaborate and meet at specific dates."

Table 1. IPE Reflective Statements and Thematic Results

Question	Thematic Results
What was it like to work with a profession you had not previously worked with?	Students reported it was a new experience being exposed to different ideas and seing others' professional points of view. They described it as a valuable collaboration, working toward the best treatment plan.
What did you learn about smoking cessation from your fellow healthcare students?	Students reported learning about pharmacotherapeutics, how difficult it is to quit, the link between tobacco and mental health, and dietary interventions to assist smoking cessation symptoms.
What were the strengths of your interaction with the other students?	Interacting with other professionals was beneficial for idea-building and problem-solving, comparing work and feedback, and exploring different roles and views. Students also expressed affirming cooperation with the team experience and communication.
What were your struggles with interacting with the other students?	Students described struggles with scheduling meetings and communicating via virtual means. They also reported not knowing who does what tasks and having issues understanding assignments.
How did your interaction with other professional students affect your own work, evaluations, and documentation?	Students reported an increased awareness of the importance of documentation. They reported that IPEC is effective/efficient and provides a safer quality of care. They also described a new awareness of what knowledge other professionals had.

A Nutrition student reflected on their struggles: "The weakness is that they [another student] didn't share how they made their SOAP note or how their process works. We each did our parts and submitted them. We also had one partner come in at the last minute, which is typical for jobs as well."

5. How did your interaction with other professional students affect your own work, evaluations, and documentation?

Students reported an increased awareness of the importance of documentation. They also reported that IPEC is more effective and efficient and provides a safer quality of care. They also described a new awareness of what knowledge other professionals had.

Student exemplars

One Health Studies student focused on quality, stating, "...my thoughts on IPEC are beneficial and prepare health professional students from different professions to work in a collaborative, team environment to provide highly effective patient- and population-centered care. Interprofessional teams enhance the quality of patient care, lower healthcare costs, decrease patients' length of stay, and reduce medical errors. Because of this understanding, patients receive safer, high-quality care when health professionals work effectively in a team, communicate productively, and understand each other's roles."

A nutrition student described the benefits of working with other disciplines by stating, "One big strength of using an interdisciplinary team is that it helps provide additional insight, background, and ideas that we may not have thought of on our own. A big part of helping a patient reach their goals and improve their health is by initiating and supporting behavior change. It was interesting to see how students in other disciplines would tackle something like smoking cessation and where they would start to help meet the patient where they are at.

DISCUSSION

Our research led to two important findings. First, using an online EHR platform to implement an IPE activity between student dietitians and healthcare administrators was determined to be feasible because of the advantages of location and availability, while having a reasonable price. Secondly, students from different professions and levels of education were able to collaborate effectively in the simulated treatment of a patient trying to stop smoking.

According to the American Speech-Language-Hearing Association (n.d.), the purpose of a feasibility study is to determine the strengths and weaknesses of the study design before a large study is launched, which requires considerable time, effort, and funding. The faculty on the research team found this assignment to have manageable instructional time and effort, as well as to be fiscally responsible. We found that the IPEC smoking cessation project using EHR Go© met an underserved need of providing access, engagement, and simulation activities for health professional students from different backgrounds and locations. The teaching strategy employed a format that can successfully compete with traditional educational practices, as demonstrated through faculty and student feedback. This strategy did not produce any insurmountable obstacles such as capital requirements or high-tech purchases. This information supports further study.

The use of an online mock EHR platform to teach IPEC proved to be feasible with our students. Our platform of choice (EHR Go©) has been used previously in studies involving IPEC education (Stickley & Gibbs, 2021). As the majority of healthcare facilities use EHRs to document patient care, early exposure to EHRs in healthcare curricula can prove highly beneficial for students. In one study (Miller et al., 2021), medical residents granted extended EHR access in simulated ICU rounds performed better than residents granted minimal EHR access. Additionally, access to simulated EHRs significantly improved pharmacy students' confidence in using EHRs in everyday work functions (Smith & Scholtz, 2018). Conversely, limited exposure to EHRs during training can hinder preparation for clinical practice (Welcher et al., 2018). Providing mock EHR training to future dietitians helps prepare them for the use of actual EHRs in the field. While healthcare administrators may use EHRs infrequently in daily work tasks, they are often heavily involved in the choice of the EHR their facility uses. Having a basic understanding of the functionality and importance of EHRs in improving staff performance and collaboration may help administrators choose EHRs that best assist their providers in providing top-notch care for patients.

Secondly, students collaborated effectively in the simulated treatment of a patient trying to stop smoking. The students developed a strong appreciation for the importance of IPEC and how skills development around IPEC is an important part of their education as healthcare workers.

There were lessons in both problem-solving and communication learned using this teaching strategy. This scenario contributed to student development by requiring them to interact with other professional health students, leading to idea-building and problem-solving. Students collaborated by planning and assigning patient-related activities, contributing to discipline-specific independent perspectives and feedback, and exploring not only their own, but also other disciplines' roles and views. The students expressed affirming cooperation with the team experience. These findings are congruent with the findings of Cresswell et al. (2023), as the students and faculty found the IPEC teaching strategy relevant to practice and a quality learning experience. This study also supports the findings of Stickley and Gibbs (2021), who reported that these types of activities focused on clarifying roles and responsibilities, communication, coordination of care, and, most critically, that the experience was perceived as an important experience.

Communication was not always in real-time, and students needed creativity in planning and problem-solving team meetings. The use of technology was a requirement for communication, as both classes were delivered online. Ideas for improving group communication via technology included using communication features in programs provided to students. The University of Central Missouri, like many other universities, provides some programs free-of-charge, such as Google Email, Chat, and Drive, and the university's electronic learning platform, Blackboard. The electronic medical record system EHR Go© also has communication features, which are included in the student user fee. Anecdotally, a student recommended a joint IPE lecture from the professors to address student assignment feedback and role modeling IPE as faculty.

Interprofessional case studies involving mock EHR platforms have been examined previously (Cresswell et al., 2023; Titzer et al., 2015). However, most of these previous studies involved only healthcare professionals who provide direct patient services, and not healthcare administrators (like managers and executives) who may have little to no experience with direct patient treatment. Our findings are unique in that students who do not plan to interact directly with patients in their careers (the Health Studies students) were able to successfully collaborate with students who were currently training to interact directly with patients (the Nutrition students). This is an important collaborative skill for both future healthcare administrators and healthcare providers. Previous research has displayed difficulties for healthcare managers to implement collaborative practice techniques into clinical infrastructure (Bronstein, 2003; Valentijn et al., 2013). If future healthcare administrators can learn early in their education the important role interprofessional collaboration plays in patient care, they may be willing to put forth more effort in establishing an interprofessional collaborative environment in their workplaces. This, in turn, could lead to improved patient outcomes (Barr et al., 2008) and reduced costs (Freeth et al., 2008).

Limitations

This study was limited by a small sample size over two semesters. We also noted differences in undergraduate/graduate student skill levels and medical terminology familiarity. In the spirit of making lemonade out of lemons, the faculty considered this an opportunity to establish professional precepting expectations. Further developing a mentor/mentee model for the graduate Nutrition and Dietetics program would promote advanced students' preparation for a future preceptor role.

We noted that our EHR-based case study does not have the demographics representing a diverse patient population or emphasize the social determinants of health. These would be considerations for designing an updated patient.

Summary

This instructional study used a virtual patient in an EMR as an innovative IPE teaching strategy for smoking cessation education. This study concluded that using an online EHR platform to implement an interprofessional activity between future dietitians and healthcare administrators was feasible. Students from differing professions and levels of education provided evidence of competence in collaborating effectively by producing a teaching plan, a discipline-specific chart note, and an IPE reflection in smoking cessation care. The students reported a strong appreciation for the importance of IPEC and skill development. The results of this instructional study have implications impacting both future healthcare providers and administrators. When both future healthcare providers and administrators are exposed to IPEC, both fields can better understand each others' role in healthcare, which may lead to better patient care.

The importance of IPEC for all healthcare professions was succinctly described by one student, who stated, “I think I actually learned more doing this assignment with a group than I would have by myself. Having a group helped open my mind to new ideas that I would not have thought of before. Even though there were some difficulties working with a group, it helped ease the documentation and evaluation process and dispersed it over multiple people.”

Author Note

The authors declare no potential conflicts of interest.

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