

# A student-implemented elective to improve medical student confidence in providing diabetes self-management support

Maryam T Fazel<sup>1,2</sup>  
Mohammad Fazel<sup>3</sup>  
Nora L Bedrossian<sup>3</sup>  
Fernando Picazo<sup>3</sup>  
Merri L Pendergrass<sup>1,4</sup>

<sup>1</sup>Department of Pharmacy Practice and Science, University of Arizona College of Pharmacy, <sup>2</sup>Department of Medicine, University of Arizona College of Medicine -Tucson, <sup>3</sup>University of Arizona College of Medicine-Tucson, <sup>4</sup>Department of Medicine-Division of Endocrinology, University of Arizona College of Medicine-Tucson, Arizona, USA

**Background:** The purpose of this study was to develop a preclerkship elective and assess its effectiveness in supplementing medical students' education.

**Methods:** A group of medical students under the guidance of two faculty advisors developed an elective consisting of six sessions covering a variety of practical aspects of diabetes care/education taught by an interprofessional team. Following the course completion, a survey was emailed to the enrollees who attended at least one session. The results were analyzed using Wilcoxon signed-rank and descriptive analyses.

**Results:** A total of 14 medical students were enrolled (nine first year and five second year). An average of 4.4 sessions/student was attended. Thirteen students attended at least one session and were surveyed. The survey response rate was ~62% (8/13). All eight students indicated that the course was valuable and would recommend it to their colleagues. A Wilcoxon signed-rank test revealed a statistically significant increase in students' confidence in all five areas assessed following participation in the course,  $P < 0.05$  with a large effect ( $r > 0.5$ ).

**Conclusion:** This study suggests the feasibility of developing disease state-specific preclerkship elective courses and that such courses can be beneficial in supplementing medical student education with practical knowledge.

**Keywords:** medical student, supplemental education, interprofessional education, diabetes self-management

## Background

Diabetes is a common and complex chronic disease affecting ~415 million individuals worldwide in 2015.<sup>1</sup> If uncontrolled, diabetes can result in acute and long-term life-changing microvascular and macrovascular complications.<sup>2</sup> Comprehensive medical care and patient self-management education and support are needed for the effective treatment of this disease.<sup>3</sup> As of 2014, diabetes mellitus has affected 29.1 million people in the US.<sup>1</sup> In a previous report, the Centers for Disease Control and Prevention estimated that up to one in three US adults could have diabetes by 2050 if trends continue.<sup>4</sup> This growing medical burden necessitates more comprehensive diabetes education and training for medical students in preparation for managing the disease and serving the widely affected US population.

Previous studies have examined medical student and resident preparedness in treating diabetes in inpatient settings and identified important gaps in knowledge.<sup>5,6</sup> A study by the University of Exeter Medical School used an online resource to qualitatively improve new doctors' lack of confidence in managing patients with diabetes.<sup>7</sup>

Correspondence: Maryam Fazel  
Department of Pharmacy Practice and Science, University of Arizona College of Pharmacy, 1295 North Martin Avenue Room B211B, Tucson, Arizona 85721-0202, USA  
Tel +1 520 626 4291  
Email maryamfazel@pharmacy.arizona.edu

These examples demonstrate a recognized need to improve confidence in clinical diabetes mellitus management.

In 2015, the University of Arizona College of Medicine-Tucson (UACOM-T), had ~2.25 hours of formal lecture on clinical diabetes-specific topics during a 12-week “Digestion, Metabolism, and Hormones” block, including a session covering clinical diabetes cases, and an interactive lecture with diabetes patients. There was limited training provided to first and second year medical students on the practical aspects of diabetes care and factors related to self-management support as suggested by the American Diabetes Association National Standards.<sup>8</sup> To supplement the formal diabetes instruction, three medical students, in partnership with two UACOM-T and UA College of Pharmacy faculty advisors, developed an elective course for first and second year medical students focusing on the clinical aspects of diabetes care. The course included training in common types of diabetes, such as type 1 and type 2, with a focus on adults living with diabetes.

Previous studies have found preclerkship electives effective in improving subject-specific knowledge and perceptions.<sup>9-12</sup> The current study describes the implementation of a preclerkship elective in diabetes at UACOM-T and discusses the results of a course evaluation addressing student perception of the disease and confidence in discussing diabetes and providing self-management support to future patients.

## Methods

The UACOM-T provides students with the opportunity to join and/or form community service-based clubs under the umbrella of the Commitment to Underserved People program. In 2015, three first year medical students initiated a diabetes-based Commitment to Underserved People program entitled Diabetes Education, Prevention, and Outreach (DEPO). In order to supplement medical student education with practical knowledge about diabetes, the Diabetes Education, Prevention, and Outreach coordinators created a Diabetes Enrichment Elective under the umbrella of the Enrichment Elective system already in place at the College of Medicine.

The students worked with two faculty coadvisors (an endocrinologist and a pharmacist with expertise in diabetes care) to develop an interprofessional team of educators consisting of a pharmacist, nurse, dietitian, and endocrinologists. A course was developed that consisted of six sessions, 1 hour in length each, covering a variety of practical aspects of diabetes care from the perspective of various professionals. The topics covered in each session were based on the suggested curriculum for successful self-management education and support as specified by Standard 6 of American Diabetes Association’s National Standards

for Diabetes Self-Management Education and Support. The American Diabetes Association’s Standard 6 suggested topics included teaching about disease process, physical activity, nutrition, medications, blood glucose monitoring, and prevention as it relates to diabetes. As a result, the six sessions that were provided were focused on educating students on these aspects of diabetes.<sup>8</sup>

The course was advertised to first and second year medical students through an email to the medical student listserv. In addition, the course was introduced to medical students in person through a brief presentation at a meeting developed for those interested in enrichment electives. The first and second year medical students to which this course was advertised had minimal exposure to the practical aspects of diabetes care and self-management support at this point in their didactic training. This provided us the opportunity to further educate a group of students who would be able to benefit from the supplemental training provided through this diabetes-specific enrichment elective.

Following advertisement of the elective, first and second year medical students interested in enrolling in enrichment electives were asked to electronically rank their top elective choices. Subsequently, a lottery was conducted that electronically enrolled students in enrichment electives based on interest and course limitations. Following the lottery, the finalized course roster was emailed to the elective administrators (Table 1).

The elective included sessions focused on material, such as an overview of diabetes/diabetes prevention, diabetes medications, proper insulin use/administration, insulin pump therapy, healthy eating, and exercise/fitness (Table 2). Some of these sessions included hands-on experiences, including the ability to work with insulin pumps, insulin syringes, insulin pens, and techniques in checking blood sugar.

Following the completion of the elective, an anonymous and optional seven-question retrospective pre-/post-survey was emailed to all students enrolled in the elective who attended at least one session (Table 3). The survey was intended to assess the effectiveness of the elective in increasing medical student confidence with regard to assessing patients’ understanding of diabetes and discussing diabetes/diabetes self-assessment with patients. In addition, the survey was intended to assess if the course was valuable to students and if they would recommend it to their peers. Wilcoxon signed-rank and descriptive

**Table 1** Enrollees characteristics (N=14)

Characteristics	N (%)
Male	4 (29)
First year medical students	9 (64)
Second year medical students	5 (36)
Attended at least one session	13 (93)

**Table 2** Diabetes enrichment elective class schedule

	Session title	Instructor(s)
Week 1	Overview of diabetes/diabetes prevention	Endocrinologist
Week 2	Overview of diabetes medications	Pharmacist-certified diabetes educator
Week 3	Blood glucose (BG) Self-monitoring and insulin injection technique	Pharmacist- and nurse-certified diabetes educators
Week 4	Insulin pump therapy	Pharmacist and insulin pump company representative
Week 5	Diabetes nutrition and healthy eating	Dietitian-certified diabetes educator
Week 6	Diabetes and fitness/exercise: why is exercise good for diabetes	Endocrinologist

analyses were utilized to assess the results of the survey. The project was submitted to and approved by the University of Arizona Institutional Review Board.

## Results

A diabetes-specific elective course was developed consisting of six sessions taught by an interprofessional team of clinicians/educators specialized in diabetes care. The sessions covered a variety of practical aspects of diabetes care and education, including discussions and hands-on training (Table 2). The course was held once per week at lunchtime.

A total of 14 students were enrolled consisting of nine first year and five second year medical students. This included ten female and four male participants, with all four male participants being first year medical students. Thirteen students attended at least one session. The survey response rate

was ~62% (8/13). Among the survey participants, an average of 4.4 sessions was attended ranging from three to six sessions. The most highly attended sessions were the “Overview of Diabetes” and the “Overview of Diabetes Medications” classes with attendance rates of 86% and 71%, respectively.

Statistical analyses were performed using SPSS version 23 (IBM Corporation, Armonk, NY, USA). A Wilcoxon signed-rank test revealed a statistically significant increase in students’ confidence in all five areas assessed following participation in the elective program,  $P < 0.05$  with a large effect ( $r > 0.5$ ) (Table 3).

All eight students who completed the survey indicated that the course was valuable and that they would recommend the course to their colleagues (Table 4).

## Discussion

The objective of this study was to implement a preclerkship elective and assess students’ perception of its efficacy in supplementing medical student knowledge and confidence with regard to the practical aspects of diabetes care and self-management support.

Numerous studies have shown preclerkship medical student electives to be well received by students and effective in their outcomes.<sup>13</sup> In a study by Keating et al, a peer-designed elective for medical students geared toward career exploration

**Table 3** Survey questionnaire and results (N=8)

Questions	Pre-course (n)					Post-course (n)					P-value	Z-value
	Low	Moderate	High	Very high	Median (range)	Low	Moderate	High	Very high	Median (range)		
1. How would you describe your confidence level in talking to patients about diabetes?	1	6	0	1	2 (1–4)	0	1	5	2	3 (2–4)	0.011	(–2.530)
2. How would you describe your confidence level in assessing patients understanding of diabetes?	1	5	2	0	2 (1–3)	0	2	3	3	3 (2–4)	0.023	(–2.271)
3. How would you describe your confidence level in discussing monitoring/managing blood glucose with patients?	2	5	1	0	2 (1–3)	1	0	6	1	3 (1–4)	0.011	(–2.530)
4. How would you describe your confidence level in discussing lifestyle modifications with patients with diabetes?	0	3	4	1	3 (2–4)	0	0	5	3	3 (3–4)	0.025	(–2.236)
5. How would you describe your confidence level in discussing diabetes self-management with patients?	2	4	2	0	2 (1–3)	1	0	5	2	3 (1–4)	0.025	(–2.271)

**Table 4** Satisfaction questions and results (N=8)

Questions	Yes, n (%)	No, n (%)
Did you find this course valuable?	8 (100)	0 (0)
Would you recommend this course to your colleagues?	8 (100)	0 (0)

was found to be effective in providing students with meaningful experiences and was valued by those who participated.<sup>14</sup>

In line with these studies, the results of our pre-/post-course survey suggest that medical student knowledge of diabetes can be effectively supplemented with a medical student-developed preclerkship elective taught by an inter-professional team of educators. Furthermore, our experience suggests that similar disease-specific preclerkship electives may be utilized to supplement formal didactic curricula for other prevalent and commonly encountered diseases. This would provide medical students with additional autonomy to explore disease states of interest. In doing so, medical students stand to gain an increased level of comfort and confidence in discussing specific diseases with patients during clerkships, as suggested by the present assessment. In addition, this study demonstrated the feasibility of designing and implementing such a course and how it can provide leadership opportunities for medical student coordinators.

We had several limitations in the assessment of the elective, including a small sample size and lack of full participation in the pre-/post-course survey. The lack of full participation in the pre-/post-course survey introduced some potential bias as to the difference between those who chose to participate in the survey versus those who did not. In addition, it is important to point out that our questionnaire was not validated; rather, it was simply a tool to assess students' perception regarding the knowledge gained during the course as well as how valuable they found the course. However, our experience demonstrated that by working closely with medical professionals and educators, medical students can successfully develop and implement a disease-specific elective course. The experience of developing this course was both educational and rewarding for the medical student coordinators involved, and the course was found to be effective and valuable by the participants.

## Conclusion

Our study suggests that a diabetes-specific elective was successful in improving first and second year medical students' knowledge/confidence with regard to diabetes care and self-management support. Further evaluation is necessary to

determine if similar disease-specific courses in prevalent disease states are successful in supplementing medical student education and improving knowledge/confidence in managing patients with such diseases. Future studies are also needed to determine the effect of such electives on patient care during clerkships and future practice.

## Disclosure

The authors report no conflicts of interest in this work.

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