Pharmacy Student Self-Perceived Confidence and Readiness to Provide Diabetes Education and Counseling

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Key Points:

What was already known:

- The need for pharmacists to be involved in disease state management grows as the American population becomes more riddled with chronic disease.

- Increasing student confidence regarding a knowledge set may increase their likelihood to partake in activities that draw upon said knowledge.

What this study adds:

- Impact of hybrid-style laboratory teaching composed of pre-recorded content and in-person activities on student confidence.

- Types of laboratory activities which students find most helpful in aiding their learning.

Background:

Pharmacists are uniquely qualified and positioned to provide impactful counseling and education to patients with diabetes. Many diabetes education programs have an emphasis on non-pharmacologic aspects not heavily addressed in many pharmacy school curriculums. The need for additional preparation is addressed at Purdue University through the Diabetes skills laboratory (DSL) session during students' second professional year. In addition to providing a hands-on chance to gain experience with injectable devices, this lab session seeks to equip students with tools to provide non-pharmacologic counseling regarding topics vital in diabetes management.

Objectives:

The primary objective of this study is to assess changes in students' self-confidence in providing both pharmacologic and non-pharmacologic counseling after completion of lab. Secondary objective is to identify common gaps in knowledge amongst the study population after participation in the DSL .

Methods:

Study data was collected via pre- and post-surveys delivered to students participating in the DSL . The survey utilized Likert scale items to assess student confidence in a variety of pharmacologic and non-pharmacologic diabetes education topics. Pre- and post-survey data was compared using Wilcoxon Signed Rank tests, and a data was analyzed using interquartile ranges of change in confidence, with p-values from Wilcoxon signed-rank non-parametric test for change.

Results:

121 second-year pharmacy students responded to both the pre- and post-surveys. Each area assessed showed a statistically significant increase in confidence after participation in the DSL. Additionally, there was a 100% pass rate on performance-based assessments (PBAs) addressing elements from the DSL.

Conclusions:

Data showed that despite changes to the DSL structure to accommodate COVID-19 restrictions, a significant increase in confidence was seen in every area assessed in the study. Ensuring adequate competence and confidence regarding disease state management is vital for preparing students to be effective members of the healthcare team as the pharmacist's role continues to advance.

Background

The U.S. Centers for Disease Control and Prevention (CDC) states that 6-in-10 adults in the U.S. have a

chronic disease, while 4-in-10 adults have two or more chronic disease.[1] Despite these alarming rates of

disease, in one 2018 survey almost 90% of U.S. primary care physicians who responded indicated that

they spend less than 25 minutes with each patient.[2] With the number of patients in need of chronic

disease increasing, and the time available to spend with primary providers already shortened, where can

patients be expected to receive disease management services? One might argue that the solution

already exists within 5 miles of home for 90% of the American population. [3]

Community pharmacies are the most accessible healthcare setting for a majority of Americans and many

of those pharmacies are staffed by pharmacists with clinical training, knowledge of disease

management, and a desire to provide care to the communities they serve. Community pharmacies

nationwide provide clinical services such as Medication Therapy Management (MTM) and

immunizations and there is mounting evidence to support use of community pharmacists in chronic

disease management.[3] The expansion of pharmacist-driven clinical services meets the growing needs of

patients while also advocating for the profession in the fight for fair reimbursement practices.[4] One such

area of chronic disease for pharmacists to make an impact is in diabetes education and management.

As of 2018, over 34 million people in the United States were diagnosed with diabetes.[5] Pharmacists have

the ability to assess patients with diabetes for medication treatment appropriateness and recommend

changes based on patient and provider health goals.[6] As the diabetes medication treatment landscape

evolves, the pharmacist must be knowledgeable about current medication treatment options.

Additionally, pharmacists must remain up-to-date on new medication devices (e.g. insulin pens, insulin

pumps, and injectable glucagon-like peptide 1 (GLP-1) receptor agonists) and diabetes point-of-care

25 testing devices (e.g. glucometers, continuous glucose monitoring (CGM) devices). Both medication and

26 point-of-care devices have product-specific counseling points for preparation and use that pharmacists

27 should be comfortable communicating to patients.[7]

28

29 While pharmacologic management of diabetes is an important factor in the management of disease, in

30 order for pharmacists to provide optimal care for their patients with diabetes they must be prepared to

31 provide pharmacologic and non-pharmacologic diabetes education and counseling. The American

32 Diabetes Association guidelines for diabetes care recognize "comprehensive lifestyle management" as a

33 component of first-line therapy.[8] As such, student pharmacists should be comfortable discussing non-

34 pharmacologic management of diabetes with patients they interact with.

35

36 The Purdue University College of Pharmacy provides students hands-on application of pharmacologic

37 and nonpharmacologic diabetes management in the Diabetes Point of Care skills laboratory (DSL)

38 delivered during the second-year of the PharmD curriculum. Students are introduced to medication and

39 point-of-care devices (e.g. injectable medications, insulin pumps, glucometers), educated on non-

40 pharmacologic management of diabetes (e.g. diet, exercise), and evaluated on their ability to

41 appropriately counsel patients on diabetes medications and devices. Based on social-cognitive theory,

42 increasing student confidence in their knowledge and skills may correlate with increased use of them in

43 the future.[5,6,7] This study aims to assess student self-confidence and self-perceived readiness to provide

44 diabetes education and counseling both before and after participation in the DSLDSL session. This

45 information will be used to assess the effectiveness of the current DSLDSL structure as well as provide

46 insight into best education practices.

47

48 **Objectives**

49 The primary study objective is to assess student confidence in their ability to provide diabetes education

50 before and after participation in the DSL. The secondary study objectives are to identify DSLareas of

51 diabetes management covered in the DSL which illicit lower relative increases in confidence, as well as

52 identifying which activities students thought to be most helpful to their learning.

53

54 **Methods**

55 *Theoretical Framework*

56 This study is guided by the application of social-cognitive theory (SCT). SCT contends that a person's self-

57 efficacy and behaviors are influenced by environmental factors personal/cognitive factors and

58 behavioral factors In theory the DSL should act as an environmental factor to provide observational

59 learning opportunities and chances for reinforcement of ideas. These environmental factors would then

60 feed into the individual students' personal/cognitive factors including knowledge and expectations of

61 how counseling a patient may proceed. These personal/cognitive factors in turn feed into behavioral

62 factors such as self-confidence in the ability to provide education and counseling. The end result would

63 then, in theory, be an increased likelihood to participate in behaviors that draw upon the knowledge set

64 forth during the lab session.

65

66 *Study Population*

67 The study population consisted of second year professional students within Purdue University College of

68 Pharmacy who participated in the DSL.

69

70 *Study Design*

71 This study took place during Purdue's Pharmacy Professional Program Laboratory series. This lab series

72 focuses on building students' confidence and abilities to apply pharmacy skills such as counseling,

73   compounding, and more. Students partake in this lab series each semester of their didactic PharmD

74   education. This study, specifically, was based around participation in the Diabetes Skill Lab during the

75   second year of the PharmD curriculum. Students were assigned a pre-survey preceding review of any lab

76   materials. Students then viewed posted pre-lab materials and recorded slideshows before participating

77   in the in-person portion of the lab. After completion of the in-person lab students were assigned a post-

78   survey which asked many of the same questions asked during the pre-survey, as well as asked students

79   to evaluate which activities in the lab were most helpful in their learning. Data was analyzed

80   retrospectively.

81

82   This lab plays an important role in Purdue's PharmD curriculum by reinforcing the balance of

83   pharmacologic and non-pharmacologic utilized to provide patients with optimal diabetes care.

84   The conveyance of these ideas, however, faced a challenge as the DSL session underwent many changes

85   for the Fall, 2020 semester due to restrictions and precautions put in place in light of the COVID-19

86   pandemic. The first major hurdle to cross in planning for the Fall, 2020 DSL was social distancing. Instead

87   of accommodating 35-plus students and facilitators during a single session, the lab space was restricted

88   to no more than 16 students and two facilitators in the largest room at any given time. In order to

89   maintain that each student would still have the opportunity for in-person lab time, the amount of in-

90   person time had to be cut to 80 minutes. The reduction of in-person instructional time then led to a

91   decision to adopt a hybrid model for the DSL, and discussions regarding which material traditionally

92   covered in the lab may be best suited to shift to virtual content, and which material was vital to be

93   continued in-person. While non-pharmacologic changes are vital in the management of diabetes, topics

94   such as meal planning and exercise goals were deemed the most effective options to be shifted to a

95   recorded, pre-lab format. The in-person lab time was comprised of four breakouts sessions that

96   consisted of (1) a medication and device showcase, (2) a discussion of insulin pump settings and

97   components, (3) an insulin self-injection simulation, and (4) a practice performance-based assessment

98   (PBA) during which students were to practice counseling a facilitator on the use of an insulin pen,

99   glucometer, or a GLP-1 receptor agonist medication device.

100   The pre-survey collected baseline demographic information. Both the pre- and post-survey presented

101   participants with a number of statements related to pharmacologic and non-pharmacologic diabetes

102   counseling and education commonly provided by pharmacists. Participants were asked to respond to

103   those statements with the level of confidence in their current ability to accomplish each statement.

104   Students were contacted approximately two weeks prior to participating in lab to allow ample time to

105   complete the pre-survey. Similarly, students were allowed two weeks to complete the post-survey after

106   participating in the DSL. Pre-lab results were then compared to post-lab data in order to assess changes

107   in confidence after completing the skill laboratory session. Additionally, at the end of the post-survey

108   students were asked to respond to Likert-scale items regarding how different activities from the skill

109   laboratory session aided in their understanding of the material covered.

110

111   *Data Analysis*

112   Demographic data and primary and secondary outcomes were measured and reported as descriptive

113   statistics garnered via multiple-choice and Likert-scale items. Wilcoxon Signed Rank tests for paired data

114   were employed in order to assess changes in participant responses to Likert scale items at different

115   points in time. A 5% significance level was used for all tests. Biostatisticians from Indiana University

116   assisted with data analysis.

117

118   **Results**

119   *Demographics*

120   A total of 121 participants responded to both the pre- and post-survey. The majority of participants

121   reported having community pharmacy experience, and nearly half of participants reported themselves

122   or a close family member having been diagnosed with diabetes (Table 1).

123

124   *Likert-Scale Confidence Results*

125   A statistically significant increase in confidence was shown for each domain assessed in the surveys

126   (Table 2). The greatest change in confidence was seen regarding Glucagon-like \Peptide-1 Receptor

127   agonists (GLP-1RA), basic insulin pump settings, and insulin administration using vial and syringe. The

128   smallest increase in confidence was seen regarding dietary recommendations and exercise goals,

129   although those increases were still statistically significant. This data is also shown graphically as medians

130   of change (interquartile ranges) in Table 2.

131

132   *Likert-Scale Activity/Understanding Results*

133   Students indicated that in-lab insulin injection simulations were the most helpful in aiding

134   understanding of material, while pre-lab recorded presentations were least helpful. Full results can be

135   seen in Table 2.

136

137   **Discussion**

138   The purpose of this study was to assess student confidence in the topics covered during the DSL The

139   topics and ideas built upon during the DSL are vital to ensuring that student pharmacists are competent

140   and confidence enough to provide diabetes education and counseling to patients when they enter the

141   practice setting- be it through experiential education or the workforce. By assessing student confidence

142   regarding this knowledge set we are able to critically assess lab structure and the degree to which

143   students feel comfortable in these areas. Other studies have evaluated lab activities and their impact on

144   student confidence[12] or applied SCT when assessing the effect of team-based learning on student

145   confidence.[13] These previous studies, however, did not take place in learning situations that employed a

146   hybrid of in-person and recorded lab materials or evaluate the topic of diabetes management.

147   It was encouraging to observe an increase in confidence amongst the study population for each area

148   assessed in the study. As was the theme for most of the year 2020, many changes were required to

149   allow the DSL to proceed. Despite some of the diabetes management topics being shifted to pre-lab

150   recordings as opposed to in-person, statistical significance was seen in each area. This finding justified

151   difficult planning decisions that were made related to which topics could have their traditional place

152   altered amidst the COVID restrictions.

153   . DSLDSL

154

155   While each of the areas assessed in the study showed a significant increase in confidence, each area did

156   not see the same degree of increase. The largest increase was seen regarding topics covered during the

157   in-person session, while the smallest increase was seen regarding topics only covered during pre-lab

158   recordings. The degree of increase would be more effectively compared between topic if each had been

159   presented in the same manner, but this was not able to be accomplished during this lab session due to

160   COVID restrictions that were in place.

161

162   In addition to the increased confidence observed from topics covered in-person, these were the

163   activities that students deemed the most impactful for their learning experience. The self-injection and

164   practice counseling experience were each given a dedicated breakout session and students were able to

165   experience these in small groups with only another student and a facilitator in the room with them.

166   These smaller group exercises with more direct interaction from facilitators carried much more impact

167   in the eyes of the students than pre-recorded lectures or other activities. Previous studies have

168   suggested that pharmacy students perform better and are more satisfied with their learning experience

169   when participating in small-group learning.[14] In the case of the DSL these shifts to smaller-group sessions

170   were put in place out of necessity to meet COVID protocols, but further use of this facilitation style

171   could continue to be considered to aid in student learning in future iterations of the lab.

172

173   **Conclusion**

174   This study demonstrated that presenting students with pharmacologic and non-pharmacologic aspects

175   of diabetes management in the skill laboratory setting resulted in significant increases in confidence

176   regarding the material. By applying Social Cognitive Theory, it can be theorized that the increased

177   confidence may correlate with an increased likelihood that students will partake in activities that draw

178   upon the material covered in the lab session. Further, while all areas covered in the lab's various

179   methods saw a significant increase in student confidence, a smaller increase was seen for material

180   covered via pre-lab recordings. Because the role of the pharmacist in disease state management is likely

181   to continue to grow it is important to instill confidence in students regarding topics such as diabetes

182   hinge upon a mixture of pharmacologic and non-pharmacologic management.

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184

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221   Table 1: Respondent Demographics (n=122)

Demographic	# yes (%)
Gender	
--Female	79 (65.3%)
--Male	41 (33.9%)
--Prefer not to answer	1 (0.08%)
Do you have community pharmacy experience?	98 (81.0%)
Do you have other pharmacy experience?	36 (29.8%)
Have you or a close family member been diagnosed with diabetes?	55 (45.5%)
Have you participated in any elective diabetes management activities?	4 (3.3%)

222

223

224 Table 2: Survey Results – Changes in Confidence and Impact of Activities on Learning

I feel confident in my ability to counsel a patient regarding:		
Prompt:	Change as Medians (interquartile ranges) of change in Likert scale (range 1-5)	p-value (from Wilcoxan signed-rank non-parametric test for change)
GLP-1 Receptor Agonist Administration	2 (1,3)	< 0.0001
Basic Insulin Pump Settings	2 (1,3)	< 0.0001
Insulin administration using vial and syringe	2 (1,3)	< 0.0001
Troubleshooting glucometer issues	1 (1,2)	< 0.0001
Proper glucometer technique	0 (0,1)	< 0.0001
Insulin administration using an insulin pen	2 (1,2)	< 0.0001
When to recommend pharm. Vs non-pharm interventions	1 (0,2)	< 0.0001
Carbohydrate counting	1 (0,2)	< 0.0001
Effects of exercise on blood glucose	0 (0,1)	< 0.0001
Exercise goals in diabetes	1 (0,2)	< 0.0001
Dietary recommendations	1 (0,1)	< 0.0001
_____ Activity aided in my understanding of lab material.		

Activity and Response	Frequency (percentage)
Pre-lab device demonstration	
Strongly agree	73 (60.3)
Somewhat agree	42 (34.7)
Neither agree nor disagree	5 (4.1)
Somewhat disagree	0 (0)
Strongly disagree	1 (0.8)
Pre-lab recorded PowerPoint presentation	
Strongly agree	40 (33.1)
Somewhat agree	65 (53.7)
Neither agree nor disagree	11 (9.1)
Somewhat disagree	4 (3.3)
Strongly disagree	1 (0.8)
In-lab insulin injection simulation	
Strongly agree	89 (73.6)

Somewhat agree	29 (34.0)
Neither agree nor disagree	1 (0.8)
Somewhat disagree	1 (0.8)
Strongly disagree	1 (0.8)
In-lab diabetes device counseling	
Strongly agree	80 (66.1)
Somewhat agree	34 (28.1)
Neither agree nor disagree	4 (3.3)
Somewhat disagree	1 (0.8)
Strongly disagree	2 (1.7)
In-lab diabetes device discussion	
Strongly agree	79 (65.3)
Somewhat agree	29 (24.0)
Neither agree nor disagree	9 (7.4)
Somewhat disagree	3 (2.5)
Strongly disagree	1 (0.8)
In-lab insulin pump discussion	
Strongly agree	70 (57.9)
Somewhat agree	35 (28.9)
Neither agree nor disagree	10 (8.3)
Somewhat disagree	5 (4.1)
Strongly disagree	1 (0.8)

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