

## RESEARCH

# A Scale to Measure Pharmacy Students' Self-Efficacy in Performing Medication Therapy Management Services

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Submitted April 17, 2013; accepted June 12, 2013; published November 12, 2013.

**Objective.** To determine whether a college of pharmacy curriculum creates a sense of self-efficacy among students with respect to providing medication therapy management (MTM) services.

**Methods.** An electronic survey instrument was sent to all pharmacy students to elicit information on their perceived confidence in providing MTM services, and the results were reviewed.

**Results.** Of the 1,160 students targeted, 464 (40%) completed the survey instrument. Responses indicated that overall self-efficacy increased with each successive year of the curriculum that students completed. Fourth-year students completing an advanced pharmacy practice experience (APPE) in medication therapy management (MTM) had significantly higher self-efficacy than did other fourth-year students, whose self-efficacy was similar to that of third-year students.

**Conclusion.** In this study population, students' self-efficacy increased with each successive year in pharmacy school, with those who completed an APPE in MTM exhibiting the highest level of self-efficacy. These students may be more likely to pursue MTM opportunities in future careers.

**Keywords:** medication therapy management; student self-efficacy; advanced pharmacy practice experience

## INTRODUCTION

It has been nearly a decade since the creation of Medicare Part D under the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, which required that medication therapy management services (MTMS) be provided for qualified beneficiaries starting in 2006. The Centers for Medicare and Medicaid (CMS) medication therapy management fact sheets capture the evolution of MTM since its inception as well as the increasing demand for services. In 2008, approximately 13% of Medicare Part D beneficiaries were eligible for MTMS. From 2006 to 2008, the percentage of eligible Medicare Part D beneficiaries who participated in MTMS increased from 65.4% to 85.2%.<sup>1</sup> Several developments in 2010 have the potential to further expand MTMS, including the passage of the Affordable Care Act, which includes many provisions addressing pharmacists' patient-care

services and provision of MTMS even outside of Medicare Part D.<sup>2</sup> As opportunities in MTMS increase, so does the requirement for more comprehensive services and intensive interventions, which pharmacists are uniquely equipped to provide. It would benefit the profession for more pharmacists to participate in these programs, which could eventually further the transition of pharmacists from dispensers of medication to recognized providers of health care.<sup>3</sup>

A 2006 study by the University of Iowa College of Pharmacy first introduced the idea of assessing pharmacy students' intention to provide MTMS. The expectation was that with an increased curricular focus on providing patient-oriented services, each cohort of students entering the profession would move it toward greater provision of patient-oriented services.<sup>4</sup> After assessment of the students' attitudes and intention to provide MTMS, the results were not only discouraging but also concerning. Only 7% of students expressed strong agreement in response to the item regarding their intention to provide Medicare MTMS following graduation. The authors of this study concluded that students exhibited a lack of willingness to take the initiative to provide MTMS.

A 2005 study by the same authors that examined pharmacists' intention to provide MTMS found that while

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pharmacists considered MTM as beneficial for the profession and for patients, they believed there were substantial barriers to implementation.<sup>3</sup> A 2010 study attempted to explore the perceived barriers to providing MTMS and the likelihood of pharmacists to work in a pharmacy that provided MTMS.<sup>5</sup> The authors found that comfort level in provision of services to patients was the most important predictor of whether a pharmacist would be likely to work in a pharmacy that provided MTMS. A recurring theme in both the factor analysis and discriminant analysis results was the importance of pharmacist confidence and educational background as perceived facilitators to a pharmacist's provision of and desired involvement in MTMS.<sup>5</sup>

Before the advent of MTM, confidence was identified as a potential barrier to action. The theory was that if the mission of the profession of pharmacy was to provide pharmaceutical care, pharmacy graduates needed to possess not only a broad knowledge and skill base but also the confidence to use their abilities to optimally benefit the health outcomes of their patients. If pharmacists have knowledge but little or no self-confidence, predictably they will be poor practitioners because they will not transmit or use their knowledge and skills for the good of the patient.<sup>6</sup> The Accreditation Council for Pharmacy Education ACPE guidelines have been refined to ensure the development of students who can contribute to the care of patients and to the profession by practicing with competence and confidence in collaboration with other health-care providers.<sup>7</sup> This change in the guidelines introduces the idea of self-confidence, or self-efficacy, as it has been referred to in the literature since its development as a social cognitive theory in 1977.

Self-efficacy has been described as a person's beliefs about his/her capabilities to organize and execute courses of action to attain designated levels of performance.<sup>8</sup> In a study designed to assess pharmacy students' self-confidence, this theory is summarized by the statement, "Self-efficacy is not concerned with the skills a person possesses, but a person's judgment of what he can do with those skills."<sup>6</sup> It also determines an individual's willingness to persevere when confronting obstacles.<sup>9</sup> Career choice and development exemplify the power of self-efficacy beliefs to affect the course of life paths. This theory has been applied to the career assessment of women, with the conclusion that strong self-efficacy beliefs facilitate a given career choice, and low or weak self-efficacy beliefs can act as barriers to career choices.<sup>10</sup> If graduating pharmacy students lack confidence in their ability to provide MTMS, it is doubtful that the expected outcome of expanding the practice of MTM will be realized. This investigation of pharmacy students'

self-efficacy regarding MTM is designed to increase understanding of the role of pharmacy curriculum in inculcating a sense of self-efficacy to perform MTMS.

This study was modeled after and used the scale of a previous study for the purpose of measuring student pharmacist self-efficacy in performing MTM at the University of Florida College of Pharmacy.<sup>11</sup> Prior studies have used self-efficacy scales with pharmacy students,<sup>6</sup> and others have examined pharmacy students' intention to provide MTMS after instituting an intervention, such as an elective course.<sup>12</sup> However, the available research in this area has often been limited by small sample sizes attributable to low survey-response rates. The University of Florida has 1 of the largest colleges and schools of pharmacy in the country, with nearly 300 students in each graduating class, which affords a large sample size. This study is also unique in that it is designed as a cross-sectional study over 1 year, with data collected from the 4 class-years of enrolled pharmacy students, capturing the sense of self-efficacy experienced at each stage of the University of Florida curriculum. Additionally, the University of Florida College of Pharmacy houses an MTM Communication and Care Center,<sup>13</sup> where almost a third of fourth-year students complete a 2-month advanced pharmacy practice experience (APPE), which presented a unique research opportunity for comparing a large number of fourth-year students who completed APPEs in MTM with those who did not have that opportunity.

The first objective of this study was to measure self-efficacy across 4 years of pharmacy students, which involved collecting baseline information in order to evaluate the curriculum before instituting changes to incorporate more MTM-related materials. Future survey instruments may then be able to evaluate the impact of any changes in the curriculum. The second objective was to evaluate the relationship between MTM practice experiences (APPEs) and self-efficacy by comparing fourth-year students who did and did not complete an MTM practice experience. A third objective was to examine differences in self-efficacy in all 4 professional classes to determine if there was a relationship between the level of curriculum and level of self-efficacy. Finally, using a survey instrument from a previous study, the fourth objective was to determine specific areas of MTM that may be barriers to graduating student pharmacists pursuing this avenue in their future careers, and if changes to the curriculum could be targeted to these areas.

## **METHODS**

The study sample consisted of all doctor of pharmacy (PharmD) candidates in the graduating classes of 2011-2014 at the University of Florida College of Pharmacy

(n=1,160). In early April 2011, an initial e-mail to introduce the study was sent to all students, followed soon after by an e-mail containing a Web link to the survey instrument. The demographic information collected included the student's year in the pharmacy program, number of ambulatory care or community-based APPEs completed (if a fourth-year student), whether an MTM practice experience had been completed, and if an MTM practice experience had been completed at the University of Florida MTM Communication and Care Center.

The survey instrument consisted of 33 items that were primarily derived from a previously used instrument.<sup>11</sup> The scale originally included 31 items based on the critical aspects of the Wisconsin Pharmacy Quality Collaborative MTM program. The scale in our study was adapted and adjusted so that all levels of students could understand the items. The final scale used in the University of Florida study divided the 33 items into the following 5 domains: identify and enroll patients (4 items), provide services (14 items), document and bill services (5 items), collaborating with others (2 items), and specific service tools (8 items). An 11-point Likert scale asked students to rate "how certain you are that you can do these activities," with response options ranging from 0=cannot do at all to 5=moderately certain can do, and 10= highly certain can do. As noted in the *Guide to Constructing Self-Efficacy Scales*, a scale ranging from 0 to 10 is a stronger predictor of performance than one with a 5-interval scale because it allows people to differentiate more in their responses and is therefore more sensitive and reliable.<sup>14</sup>

The beginning of the survey instrument contained CMS definitions explaining a comprehensive medication review, a personal medication record, reconciled medication list, medication action plan, and prescriber communication. Students were also given the ability to type in responses to what they considered the most important facilitators and barriers, as well as their considerations for the most important benefits expected to result from providing MTMS. Three reminder e-mails were sent to all students regarding the survey, and it was closed after 1 month. The study was granted an exemption from review by the University of Florida Institutional Review Board.

Varimax rotated principle component analysis was performed to confirm the factor structure of the 33-item instrument. This analysis was conducted using JMP V4.0.4 (SAS Institute Cary, NC). Varimax rotation was selected because the different domains of the survey instrument were believed to be independent. Application of the Kaiser rule of eigenvalues greater than 1 suggested 4 factors to be extracted and rotated. A 4-factor solution was interpretable and confirmed the structure assumed in the questionnaire. Two items under the heading "collaboration with others"

did not highly load onto any of the 4 factors and thus may be interpreted as their own factor. The principal component analysis for educational experience items revealed 3 dimensions, which, based on the eigenvalues, can be combined into a single composite measure. The principal component analysis for the self-efficacy items confirmed the structure of the original questionnaire. Communalities ranged from 0.59 to 0.96, suggesting that the items were highly reliable in explaining the variance. After factor rotation, 85% of the variance could be explained by the 4-factor solution. The results of the principal component analysis confirmed the self-efficacy measure as valid and interpretable and also justified using it as a composite measure.

Response rates were calculated to assess selection bias between the groups of students that chose to complete the survey instrument. Self-efficacy scores were summed for each student across the 33 survey items to create a composite measure in order to compare an overall self-efficacy for each class. Through the creation of a composite measure, the data were transformed from ordinal into quantitative, and both means and medians were calculated to compare the groups. Self-efficacy scores were also calculated for each of the 5 domains within each class to determine how specific aspects of MTMS contribute to self-efficacy. Furthermore, data containing free responses to benefits of MTMS were reviewed and categorized on a thematic basis under the headings of benefits to patients, benefits to pharmacists, benefits to healthcare system, benefits to society, and benefits to physicians. The response count for each theme was then used to determine which ideas were the most prevalent among all the responses. A similar process was conducted for the free responses regarding facilitators and barriers in order to determine the top 3 facilitators and barriers to performing MTMS and any observational differences among class levels. The data were analyzed using descriptive statistics, whereas differences in self-efficacy scores among groups were analyzed using a 1-way ANOVA test.

## RESULTS

A total of 691 students across all 4 years of the pharmacy program opened the survey link. Approximately 93% (646/691) of those students consented to participating in the study; however, only 464 students sufficiently completed enough of the survey instrument to render the results usable. Based on previous survey research studies,<sup>3</sup> a rule to minimize missing data and maintain the study population was applied. If more than 3 responses were left blank among the 33 items, the entire data set was deleted. For any data set with fewer than 3 responses missing, the average response within the factor was used to fill in the

response, which helped differentiate between students with survey errors and those who did not complete the survey instrument after starting. Only 6 survey instruments were excluded for missing data, and 37 had missing data filled in with the average response within the specific factor. Overall, 464 students (40%) from the college of pharmacy completed the survey instrument. Approximately 51% of the fourth-year students completed the survey instrument, followed by 42%, 32%, and 35% of third-, second-, and first-year students, respectively.

Within the 283 fourth-year students, 90 were randomly assigned to an MTM practice experience, with 69 of those assigned specifically to the University of Florida MTM Communication and Care Center. Other MTM sites were located throughout the state of Florida. MTM practice experience sites were defined as sites at which students spent more than 50% of their time engaged in providing MTMS. Forty-one of the 69 University of Florida MTM Center APPE students completed the survey instrument, and 12 of the 21 students at other MTM APPE sites completed the survey instrument. Students completing any MTM practice experience had a 59% response rate, whereas students not completing an MTM practice experience had only a 47% response rate. For each student, self-efficacy scores for the 33 items were summed; scores could range from 0-330 in order to calculate a composite measure. Means and medians of these data were calculated for each class (Table 1). For the 53 fourth-year students who completed any MTM practice experience, the average self-efficacy score was 239.3 with a median of 250. As the data were slightly skewed to the right, the median was a more accurate reflection of the center. The median value for the fourth-year students who did not complete any MTM practice experience was 216. The third-year data appeared more evenly distributed, with a median of 198 and mean of 194.7. The second- and first-year median scores were lower at 139 and 68, respectively.

Within each class, the summed results were sorted from lowest to highest scores and then categorized into a 1-10 scale. Students whose total self-efficacy ranged from 0-33 points (essentially responding with either 0 or 1 to all questions) were categorized as a 1 and so forth.

The frequencies of students in each category were calculated for each class. Results were then grouped into low, moderate, or high self-efficacy. A score of less than 4 was determined to represent low self-efficacy, a score of 5-7 was considered moderate, and a score of 8-10 was considered to represent high self-efficacy. The percentages of students in each category within the classes were calculated. For the fourth-year students, these data were calculated for those students completing any MTM practice experience and those who did not complete an MTM practice experience (Figure 1). Only 1 student completing a practice experience in the MTM Center had low self-efficacy, and the majority had high self-efficacy. For fourth-year students not completing a practice experience in MTM, the majority had moderate self-efficacy. Figure 2 illustrates these results for all 4 classes. First- and second-year students had predominately low self-efficacy, with almost none having high self-efficacy. Third-year students had predominately moderate self-efficacy. Overall, fourth-year students had slightly more high than moderate self-efficacy but substantially higher self-efficacy than did any other class.

To determine if the differences between the fourth-year students who had an MTM APPE and those who did not were significant, 1-way ANOVA was performed (Table 2), with an alpha level set at 0.05. The post-hoc Bonferroni test was significant, indicating that a difference did exist between the 2 groups of fourth-year students. The mean difference in self-efficacy scores between fourth-year students with and without an MTM APPE was 37.02 ( $p=0.002$  [11.28 to 62.76]). Likewise the mean difference between fourth-year students without and MTM APPE and third-year students was 7.65 ( $p=1.00$  [-12.97 to 28.27]), indicating that these 2 groups were not significantly different.

In order to determine if specific areas of MTM contribute to self-efficacy more than others and to evaluate potential areas for curricular change, self-efficacy scores were calculated for each class within the factor structure of the survey instrument. Table 3 shows the difference in self-efficacy scores among students within the domains of MTM. These differences showed particular areas or

Table 1. Self-Efficacy Scores in a Survey of Pharmacy Students From Each Year of the Curriculum

Scores	Fourth-Year Students (n=143)		Third-Year Students (n=123)	Second-Year Students (n=95)	First-Year Students (n=103)
	Completed MTM APPE (n=53)	No MTM APPE (n=90)			
Self-efficacy, mean	239.3	202.3			
Self-efficacy, median	250	216	198	139	68
Range (0-330)	61-315	14-315	14-330	14-275	14-330

Abbreviations: MTM=medication therapy management; APPE=advanced pharmacy practice experience.

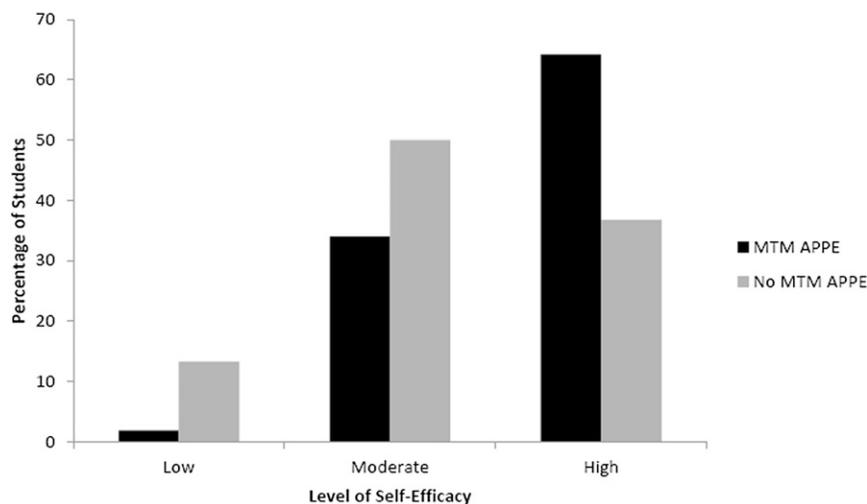


Figure 1. Comparison of self-efficacy between fourth-year pharmacy students completing a medication therapy management advanced pharmacy practice experience (MTM APPE) and those who did not.

aspects of MTM that may contribute to higher and lower self-efficacy. The domains of “provide services” and “specific service tools” were not greatly different between the 2 groups of fourth-year students, indicating that self-efficacy related to these items may be gained during the curriculum of pharmacy school. Whereas the categories of “identify and enroll patients,” “document and bill services,” and “collaborate with others” did show differences between the 2 groups, suggesting that self-efficacy in these areas may be influenced by experiencing the activity during an MTM APPE.

When comparing the classes, self-efficacy clearly increased in each domain with each successive year in school. The 2 domains that showed the most change during school before practice experiences were “provide services” and “specific service tools,” suggesting these are MTM elements that the curriculum covered well, such that by the third year, students felt confident in these areas. “Document and bill services” did not appear to be an

element in the curriculum contributing to self-efficacy, nor did practice experiences appear to give students additional experience and confidence. Finally, “Identify and enroll patients” and “collaborate with others” also did not appear to be learned in the curriculum, except perhaps minimally during the third year (increase from 1 to 5, and 2 to 5 respectively). It appeared that self-efficacy in those areas was best provided by an MTM practice experience.

The survey instrument included the free-response question, “What would you say are the 5 most important benefits you expect will result from providing MTM services?” Approximately 70% of respondents provided at least 1 answer to this question. The 1,272 responses were interpreted and determined to fit into 1 of 5 major categories: benefits to patients, pharmacists, the health-care system, society, and physicians. Benefits to patients and to pharmacists were determined to have several sub-categories. Responses were interpreted and categorized

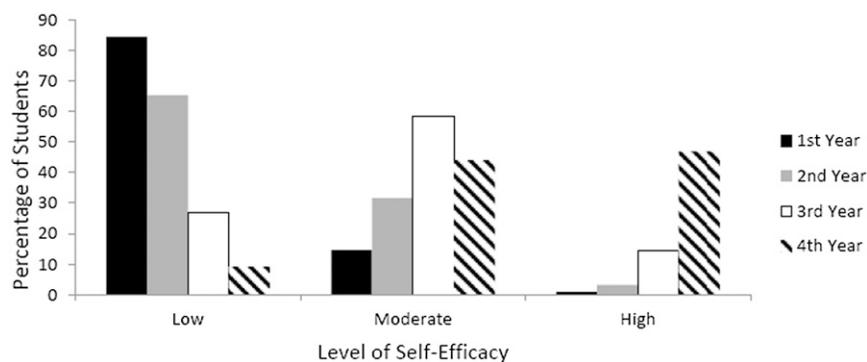


Figure 2. Overall self-efficacy among all classes of doctor of pharmacy students.

Table 2. Posthoc Bonferroni ANOVA Test Results

Students	Mean	Standard Error	Significance	95% Confidence Interval	
				Lower Bound	Upper Bound
Fourth-year with MTM APPE					
Fourth-year with no MTM APPE	37.0 <sup>a</sup>	10.7	0.002	11.28	62.76
Third-year	44.7 <sup>a</sup>	10.1	<0.001	20.24	69.09
Fourth-year with no MTM APPE					
Fourth-year with MTM APPE	-37.0 <sup>a</sup>	10.7	0.002	-62.76	-11.28
Third-year	7.7	8.6	1.00	-12.97	28.27
Third-year					
Fourth-year with MTM APPE	-44.7 <sup>a</sup>	10.1	<0.001	-69.09	-20.24
Fourth-year no MTM APPE	-7.7	8.6	1.00	-28.27	12.97

Abbreviations: MTM=medication therapy management; APPE=advanced pharmacy practice experience.

<sup>a</sup> The mean difference is significant at the 0.05 level.

among the categories, as well as according to year in school.

Overall, the highest number of responses from all students fell in the category of “patient benefits”; specifically, patient education. The second-highest response overall was also in the category of patient education but related more to identifying problems. Students responded frequently that MTM would benefit patients by identifying drug-drug interactions, drug-disease interactions, and therapy duplications better, as well as by reducing pill burden and medication errors. The third-highest response among all students was a benefit to pharmacists. Students felt that MTM would benefit pharmacists by expanding the role of pharmacists and pharmacy services: incorporating the role of community pharmacists as part of the healthcare team, pharmacist empowerment, increased demand for services and job security, and an improved perception and respect for the pharmacist.

The last part of the survey instrument asked students to rank by free response the top 3 facilitators and barriers for MTM services. Responses were collected from 244 students, providing 606 answers for facilitators, and 250

students providing 659 answers for barriers. Among all 4 classes, the top 3 facilitators of MTM services identified were: (1) pharmacist knowledge and skill (22.6%); (2) support staff (technicians and other pharmacists) (12.9%); and (3) patient willingness and interest in the program (11.8%). A high percentage of students (41.4%) ranked “time/high prescription volume” as the number 1 barrier to MTM services. “Patient participation/don’t understand the program” was ranked second with 15%, and “no reimbursement/poor compensation” was listed as the third-highest barrier to MTM by 8% of students.

## DISCUSSION

This study, which had a cross-sectional descriptive design, reviewed the results of a survey instrument measuring pharmacy students’ self-efficacy in performing MTMS, which allowed the University of Florida College of Pharmacy an opportunity to evaluate how well our curriculum instilled a sense of self-efficacy in providing MTMS. The survey was offered to students in each successive year of pharmacy school in order to collect a baseline set of data so that future survey instruments could

Table 3. Differences in Self-Efficacy of Pharmacy Students Self-Efficacy, by Survey Factors

Student Groups	N	“Identify and Enroll Patients” (4 items)		“Provide Services” (14 items)		“Document and Bill Services” (5 items)		“Collaborate with Others” (2 items)		“Specific Service Tools” (8 items)	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Fourth-year students with MTM APPE	53	6.5	8	8.2	9	3.3	3	6.1	7	8.7	9
Fourth-year students with no MTM APPE	90	4.2	4	7.1	8	2.4	1	4.2	4	8.3	9
Third-year students	123	4.7	5	6.7	7	2.8	2	4.9	5	7.3	8
Second-year students	95	2.5	1	4.8	5	1.4	0	2.8	2	4.7	5
First-year students	103	2.4	1	3.2	2	1.4	0	2.8	2	2.6	1.5

Abbreviations: MTM=medication therapy management; APPE=advanced pharmacy practice experience.

transform the data into a cross-sectional longitudinal study. This study will also serve as a baseline to assess curricular change. Class populations were assumed to be generally homogenous, and the curriculum did not change significantly over the 4 years preceding the survey.

Though lower than expected, overall survey response from students provided a large amount of data; 464 complete responses may represent the largest population data in this area of research thus far. A 50% response rate among fourth-year students, the primary study population, is notable for survey research and other studies surveying pharmacy students. As the survey instrument was intended to assess students' self-efficacy, students who did not complete the survey instrument may have reflected a low level of self-efficacy. The response rates also demonstrated a factor of sample or respondent bias, given that students essentially decided whether they wanted to complete the survey instrument.

The median self-efficacy for fourth-year students completing an MTM practice experience was larger and had less variation in the range of scores compared with other fourth-year students, suggesting that these 2 groups were different. The observed difference in the distribution of students falling into the categories of low, moderate, or high self-efficacy demonstrated the dissimilarity between these 2 populations. The most significant finding in the data was in the comparison of the median composite self-efficacy for fourth-year students who did not complete an MTM practice experience with that of the population of third-year students. These 2 populations had the smallest difference between median scores compared with any other group, indicating they were somewhat similar in their level of self-efficacy to perform MTMS. This could lead to the conclusion that a fourth-year student who completed a year of APPEs but not an MTM practice experience had a similar confidence level to that of a third-year student. These results were confirmed to be significant by the ANOVA test. These results showed it was necessary to experience the activity in order to derive confidence, as suggested by social cognitive theory.<sup>8</sup>

The results of this survey provided a baseline assessment of students' self-efficacy and a method to identify areas of confidence deficit that could potentially be impacted by the curriculum. The data suggested that there was a big change from first-year to second-year students in the areas of "providing services" and "specific service tools," and students continued to increase self-efficacy in these areas into the third year. In the areas "identify and enroll patients" as well as "collaborate with others," there was no change from first year to second year, suggesting a potential area for curriculum improvement. The data suggested that with the current curriculum, students not

completing an MTM practice experience would graduate with only a moderate level of self-efficacy. Finally, "document and bill services" demonstrated a low level of self-efficacy irrespective of year in school, even with practice-experience exposure. Students who do not perceive themselves as confident in documenting and billing may be less likely to participate in MTMS in future careers. Considering that providing MTMS may be best learned in an experiential setting, increased opportunities for MTM APPEs may be more beneficial than overall curriculum change. The increase in the number of MTM APPEs at University of Florida from 5 sites in 2010 to 11 sites in 2012 is promising.

Results were categorized within the classes to determine if year in pharmacy school correlated with any particular response. The majority of benefit responses from fourth-, third-, and second-year students, respectively, were increased patient education, identifying problems/interactions, improving health outcomes, and decreased healthcare costs. The most frequent responses from the first-year students also involved patient benefits, but first-year students responded with improved compliance/adherence more than did the other classes. These results may suggest that fourth-year students have a more realistic view of what MTMS can accomplish. Students who have not yet experienced APPEs may be more idealistic about what they think or hope MTMS can accomplish with respect to improved health outcomes.

When categorized by year in school, there were similar response rates among the top 3 facilitators across year. Almost a fourth of students in each class ranked the pharmacist as the No. 1 facilitator of MTMS, and equal percentages across year ranked support staff second and patient willingness third. The largest difference in response rate within the facilitators was the response of "references." Almost 12% of fourth-year students listed references as a facilitator of MTMS compared with 10%, 4.3%, and 3.2%, respectively, for each class, suggesting that fourth-year students appreciate the benefit of having good references handy to conduct MTMS, whereas lower-year students may not understand the references or may not have had an adequate opportunity to use them at that point in the curriculum.

There were not large differences among classes for the top 3 barriers. Interesting differences were noted among other identified barriers. Fourth-year students did not perceive their knowledge as a barrier to providing MTMS (0.67% listed as a barrier), which would be expected. However, first-year through third-year students responded that knowledge was a barrier (12.4%, 6.6%, and 7.1%, respectively). This finding suggests that lower-year students may recognize the limits of their knowledge, lack

confidence in their knowledge, or be unaware what knowledge is needed to perform MTMS. This result directly correlates with social cognitive theory of self-efficacy: when something is perceived as a barrier, it contributes to lower self-efficacy and explains why younger students scored lower on the survey.<sup>10</sup> More fourth- and third-year students responded that physicians were a barrier to performing MTMS (3.7% and 3.5%, respectively) compared with second-year and first-year students (0.9% and 1.1%, respectively), suggesting that there is a difference when actually participating in MTMS, experiencing the interaction with physicians, and learning about MTMS in school. Because of the method of survey administration and students having the option to choose to complete the survey instrument, the data did not represent a random sample of University of Florida College of Pharmacy students but rather a specific population. Thus, the results may not be generalizable to all the University of Florida pharmacy students. Since students who did not complete the survey instrument may not have done so because of their low levels of self-efficacy, the results of these data may be an overestimation of students' confidence levels to perform MTMS. There was limited demographic information collected from students that could have explained other variables affecting self-efficacy. The predominant independent variable was year in school and MTM experience for fourth-year students. Other variables not captured in this study, such as GPA, work or internship experience, and extracurricular activities, potentially could have been sources of self-efficacy and identified differences in groups of students.

For these data to have practical significance, it would be important to know whether level of self-efficacy influenced pharmacy career choice and whether students were more likely to practice MTMS after graduation. The survey did not ask if students intended to provide MTMS in their practice; thus, no conclusions could be drawn about a relationship between self-efficacy level and students' intentions. These elements could be incorporated into future surveys. Another potential limitation is that questions were not arranged in a particular order. Constructing questions in order of difficulty would have provided the ability to capture variance in the level of difficulty of tasks that students felt they were able to surmount. Having this information might have established a relationship between the amount of self-efficacy needed to overcome an obstacle or barrier of MTMS. Items with high means and low variance may indicate barriers capable of being overcome.<sup>12</sup> Based on the results of this survey, it is not known at what level of self-efficacy a student would be able to overcome perceived barriers to provide MTMS.

## CONCLUSION

To make MTM programs successful and impact patient care through MTM services, graduating pharmacy students should possess a high degree of self-efficacy. Given this study population, the amount of self-efficacy experienced by students increased with each successive year in pharmacy school. Upon completion of their APPEs, fourth-year students without an MTM APPE had a confidence level similar to that of third-year students. Students who completed an APPE in MTM exhibited the highest level of self-efficacy.

## ACKNOWLEDGEMENTS

The authors thank Diane Beck, PharmD, Elenora Bird, and David Angaran MS, FCCP, FASHP for their part designing and administering the survey. The authors also thank Douglas Hepler, PhD, Professor Emeritus, for his assistance with factor analysis.

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