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INSTRUCTIONAL DESIGN AND ASSESSMENT

Simulated Medication Therapy Management Activities in a Pharmacotherapy Laboratory Course

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Objective. To measure the impact of medication therapy management (MTM) learning activities on students' confidence and intention to provide MTM using the Theory of Planned Behavior.
Design. An MTM curriculum combining lecture instruction and active-learning strategies was incorporated into a required pharmacotherapy laboratory course.
Assessment. A validated survey instrument was developed to evaluate student confidence and intent to engage in MTM services using the domains comprising the Theory of Planned Behavior. Confidence scores improved significantly from baseline for all items ($p < 0.00$), including identification of billable services, documentation, and electronic billing. Mean scores improved significantly for all Theory of Planned Behavior items within the constructs of perceived behavioral control and subjective norms ($p < 0.05$). At baseline, 42% of students agreed or strongly agreed that they had knowledge and skills to provide MTM. This percentage increased to 82% following completion of the laboratory activities.
Conclusion. Implementation of simulated MTM activities in a pharmacotherapy laboratory significantly increased knowledge scores, confidence measures, and scores on Theory of Planned Behavior constructs related to perceived behavioral control and subjective norms. Despite these improvements, intention to engage in future MTM services remained unchanged.

Keywords: medication therapy management, active learning, theory of planned behavior, laboratory course, student confidence, intention

INTRODUCTION

Passage of the Medicare Modernization Act in 2003 enabled pharmacists to be reimbursed for providing medication therapy management (MTM) services to Medicare Part D beneficiaries.[1] Since this time, strides have been made to establish profession-wide standards for pharmacist-provided MTM programs, including a joint initiative by the American Pharmacists Association and National Association of Chain Drug Stores Foundation, aimed at defining an MTM service model.[2,3] At a local level, the state professional organization (Pharmacy Society of Wisconsin) has partnered with healthcare organizations and pharmacies to form the Wisconsin Pharmacy Quality Collaborative. This consortium has created a quality-based MTM services demonstration project that aligns incentives for both pharmacists and payers to provide and support a standardized and sustainable MTM service model in Wisconsin.[4] The model splits services into 2 separate reimbursement categories labeled Level I and II. Level I services are defined as intervention-based services that are product-focused and reimbursed on a per intervention basis. Level II services are a comprehensive medication review and assessment and are considered value-added professional services.[4]

Pharmacists generally have a positive attitude toward and intent to provide MTM services, but lack of confidence and knowledge can be a barrier to widespread pharmacist provision of MTM programs.[5-9] A survey in West Virginia indicated that community pharmacists were least comfortable performing higher-level skills required for MTM services, including development of a medication action plan (MAP) and education about disease prevention services.[5] A 2006 survey conducted in Texas yielded similar results, with 80% or more of surveyed community pharmacists indicating that they would like to receive additional training in conducting a medication therapy review, creating a personal medication record (PMR), and developing and documenting a MAP, intervention, and follow-up.[6]

Student pharmacist knowledge of Medicare Part D and their attitudes toward and intention to provide Medicare

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MTM services using the Theory of Planned Behavior were assessed.[10] Overall, students were knowledgeable regarding Medicare Part D and had a positive attitude regarding MTM advancing the profession of pharmacy and resulting in a higher level of care to patients. Despite this, only 60% of surveyed students indicated an intention to provide MTM services, and when asked about initiating MTM programs, that percentage dropped to 37%. The investigators concluded that colleges and schools of pharmacy should make a concerted effort to encourage students to take on the service-provider role, which may require enhanced MTM instruction in the PharmD curriculum.[10]

The Accreditation Council for Pharmaceutical Education (ACPE) has stated that a PharmD program curriculum must develop students' knowledge, professional skills, attitudes, and values, and their ability to integrate and apply learning to both the present practice of pharmacy and the advancement of the profession.[11] Pharmacist participation in MTM services is an important step in advancing the pharmacy profession.[8,12] The provision of patient-centered care also has been identified by ACPE and the Center for the Advancement of Pharmaceutical Education (CAPE) as an outcome measure for PharmD programs.[11,13] According to ACPE standards, active-learning strategies that incorporate instructional technology, laboratory experiences, case studies, guided group discussions, simulations, and other practice-based activities should be used to develop critical-thinking and problem-solving skills.[11] Active-learning exercises focused on provision of MTM patient care are directly in line with these standards.

The University of Wisconsin-Madison School of Pharmacy partnered with the Pharmacy Society of Wisconsin (PSW) to increase student exposure to MTM learning experiences within the curriculum. Active-learning activities have been incorporated into the required Pharmacotherapy Laboratory Course during the third year with the overall goal of increasing future MTM practice by improving students' educational background and confidence in providing MTM services during the training years.

Little has been published in the literature regarding the incorporation of MTM instruction into the PharmD curriculum. A publication by the South Carolina College of Pharmacy described a 1-semester MTM elective course that used active-learning strategies to prepare students to participate in real-life MTM counseling sessions.[14] North Dakota State University recently incorporated an MTM curriculum into a pharmaceutical care laboratory course, which included the completion of an actual MTM encounter.[15] Student confidence and perceived ability to practice MTM improved upon study completion.[14,15]

This paper is the first to report on the collaboration of a school of pharmacy and a state professional pharmacy organization to incorporate structured MTM learning activities into a required curricular course. The objective was to measure the impact of coordinated MTM instruction and learning activities on students' confidence and their intention to provide MTM services using the Theory of Planned Behavior. Theory of reasoned action and planned behavior posits that behaviors are primarily motivated by intentions which are a function of attitudes and subjective norms surrounding the behavior.[16,17(p11-39)] This article builds upon previous studies that used the Theory of Planned Behavior to assess pharmacist and student pharmacist intention to provide MTM services.[8,10]

DESIGN

During the 2007-2008 academic year, discussion began regarding the incorporation of MTM instruction into the third year of the pharmacotherapy laboratory course. Elsewhere in the curriculum, students received didactic MTM instruction but little practical application. At the start of the 2008-2009 academic year, laboratory faculty members partnered with the Pharmacy Society of Wisconsin to use the Wisconsin Pharmacy Quality Collaborative model to enhance the MTM curriculum. A step-wise lesson plan was developed to teach MTM services using a combination of expanded didactic instruction and active-learning strategies (Table 1).

Fall Semester (Level I MTM Activities)

Fall semester activities focused on defining MTM and the core elements of an MTM service model.[2,3] Students were introduced to the Wisconsin Pharmacy Quality Collaborative's MTM program, including the distinction between Level I and Level II services.[4] Learning objectives included identification, performance, documentation and billing for Level I services. To achieve these objectives, existing laboratory activities were modified to incorporate active-learning opportunities.

"Errors and Opportunities" involves performing the final verification of a prescription order in which students screen for potential errors and omissions and identify associated billable MTM interventions. Students completed 5 errors and opportunities throughout the fall and spring semesters. The overall goal was to help students develop a process of verification and identification of billable services that could be incorporated into future practice.

Two additional laboratory activities expanded upon errors and opportunities by allowing students to practice additional components of a Level I service. The first was a simulated interdisciplinary interaction in which students identified and then corrected a drug-related problem by

Table 1. Medication Therapy Management Pharmacotherapy Laboratory Curriculum[a]

Laboratory Topic	Activities	Learning Objectives
Fall Semester		
GI and Nutrition	-Overview presentation of MTM and WPQC -Practice Errors and Opportunities	(1) Develop a working definition of MTM. (2) Describe the 5 core elements of a MTM Service Model. (3) Differentiate between Level I and Level II MTM services. (4) Identify patient eligibility for Level I and Level II MTM services. (5) Identify and perform a billable Level I MTM service. (6) Devise interview questions to conduct a medication review. (7) Assess a patient's medication regimen for drug-related problems. (8) Formulate appropriate medication recommendations to solve drug-related problems. (9) Complete documentation and electronic billing for a Level I MTM service.
Fluids and Electrolytes	-Errors and Opportunities	
Anemia	-Errors and Opportunities	
Chronic Kidney Disease	-Prescription evaluation and intervention with provider telephone communication. -Demonstration of electronic billing for Level I MTM service.	
Diabetes	-Virtual patient medication review and SOAP note. -Electronic documentation and billing for Level I MTM service.	
Arthritis	-Errors and Opportunities	
Spring Semester		
Palliation and End of Life Care	-Errors and Opportunities	(1) Perform a patient interview to collect necessary information for a CMR/A. (2) Assess a patient's medication regimen for drug-related problems. (3) Formulate appropriate medication recommendations to solve drug-related problems. (4) Generate written faxes to communicate medications recommendations. (5) Create a MAP and PMR. (6) Demonstrate appropriate communication skills to educate a patient on medication assessments and recommendations. (7) Create an electronic SOAP note to document a CMR/A. (8) Complete electronic billing for a Level II CMR/A and additional Level I MTM interventions.
Patient Assessment I	-Patient interview portion of simulated CMR/A. -Faxed communication of medication recommendations to patient's prescriber(s). -Preparation of MAP and PMR.	
Patient Assessment II	-Patient education portion of simulated CMR/A. -Documentation of CMR/A as an electronic SOAP note. -Electronic billing for Level II CMR/A and additional Level I MTM interventions.	

[a] Abbreviations: MTM = medication therapy management; WPQC = Wisconsin Pharmacy Quality Collaborative; CMR-A = comprehensive medication review and assessment; MAP = medication action plan; PMR = personal medication record.

communicating a recommendation to a prescriber via a telephone call. The second was a virtual diabetes case that walked students through the documentation and billing components of a Level I MTM service. The diabetes case was developed using a course management system to mimic a patient electronic medical record.

Spring Semester (Level II MTM Activities)

The MTM curriculum during spring semester focused on comprehensive medication review and assessment services. Students participated in 2 sequential laboratory sessions termed Patient Assessment I and Patient Assessment II (Table 1), and a 50-minute discussion detailing

the definition, purpose, patient eligibility criteria, and necessary components of a billable comprehensive medication review and assessment. The purpose of this laboratory sequence was to guide students through the completion of a comprehensive medication review and assessment, including documentation and billing. Prior to the patient assessment laboratories, each student created a unique patient case that met the requirements for a billable comprehensive medication review and assessment to portray during the laboratory.

During Patient Assessment I, students conducted a patient interview, and a faculty member or pharmacy resident evaluator provided feedback. After the laboratory, students performed a medication review to identify actual or potential drug-related problems, prioritize the problems, and develop a recommendation to address each. Electronic faxes were created to communicate recommendations to the patient's prescriber. Students received faxed responses from laboratory faculty members and pharmacy residents who acted as prescribers to approve or deny recommendations. After reviewing the prescriber responses, each student created a PMR and MAP for their patient.

During the Patient Assessment II laboratory held the following week, students provided education and medication recommendations to their patients using the PMR and MAP. Each student was given 20 minutes for patient interaction, and a faculty member or pharmacy resident evaluator provided feedback. After the laboratory, students documented the complete comprehensive medication review and assessment as a SOAP (subjective, objective, assessment, plan) note and billed for services.

Electronic Billing

During the 2009-2010 academic year the pharmacy school was granted access to the demonstration version of the RelayHealth MTM platform used by Wisconsin Pharmacy Quality Collaborative pilot pharmacies for patient identification, documentation, and billing. This is a Web-based MTM application developed in conjunction with McKesson Corporation. Students were able to login to the demonstration site to document and submit electronic claims for Level I interventions and the simulated comprehensive medication review and assessment. Faxed prescriber communication and the PMR also were generated electronically within RelayHealth.

Student learning was evaluated throughout the course using a combination of written assignments and in-class formative assessments. Worksheets were graded for each errors and opportunities activity. Written SOAP notes for patient cases and the simulated comprehensive medication review and assessment were evaluated using a standardized grading rubric. Evaluator feedback from instructors or teaching pharmacy residents was provided for in-class simulated patient and provider interactions. In addition, students were provided written feedback regarding their faxed medication recommendations during the comprehensive medication review and assessment activity.

EVALUATION AND ASSESSMENT

A 3-section survey assessment tool was developed to evaluate: (1) student knowledge of MTM terminology and requirements, (2) student confidence in performing necessary components of a MTM service, and (3) the domains comprising the Theory of Planned Behavior (attitudes, subjective norm, perceived behavioral control, behavioral beliefs, and intention). Knowledge was assessed using a combination of 7 multiple-choice and fill-in-the-blank items. Items were written to assess basic knowledge of MTM terminology, core elements of an MTM service model, and Wisconsin Pharmacy Quality Collaborative MTM services. Confidence levels were assessed using a 7-point Likert scale (1 = not at all confident; 2 = not very confident; 3 = somewhat confident; 4 = confident; 5 = very confident; 6 = extremely confident; 7 = outstandingly confident). Assessment items for the Theory of Planned Behavior domains were adapted with permission from the survey instrument described previously in 2 publications from Urmie and colleagues and Herbert and colleagues.[8,10] Students were asked to rate their level of agreement with each assessment item using a 5-point Likert Scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). The assessment tool was administered to students in the second and third years at the beginning of the 2008 fall semester (N=214). These data were used to validate the assessment tool via exploratory factor analysis (ie, principal factors analysis). The survey was approved as an exempt study by the University of Wisconsin-Madison Educational Research Investigation Review Board.

During the 2009-2010 academic year, students were asked to complete the survey assessment tool electronically prior to participating in any MTM-related laboratory activities. The same cohort of students completed the survey instrument again upon completion of all MTM activities at the end of spring semester. The survey instrument took 10-15 minutes for students to complete. Student identifiers were collected to allow for comparison of survey results before and after the educational intervention (pre- and post-implementation survey responses). Students were informed that survey responses would not impact course grades, and consent was obtained for inclusion of student data.

Analyses of completed pre- and post-implementation surveys were performed using Stata (version 11.0, 2009, STATA Corp, College Station, TX). The *t* test for paired samples was used to compare changes in mean scores before and after the educational intervention. Two-sided *p* values of < 0.05 were regarded as significant.

One hundred thirty of 133 students provided usable responses on both the pre- and post-implementation surveys, for a response rate of 97.7%. The average age of students in the surveyed class was 24.9 years at the beginning of the fall 2009 semester. Sixty percent of students were female and 16.2% had received a degree prior to admission to pharmacy school.

Knowledge scores were relatively low at baseline, with a mean score of 2.9 $\pm$ 1.3 out of 7 (range 0 - 7). The mean score was improved to 4.7 $\pm$ 1.4 (range 2 - 7) following MTM laboratory instruction and activities. The percentage of students answering correctly increased for each individual item, with the greatest improvement on items assessing the core elements of an MTM service model, patient eligibility criteria for MTM services, and components of a Level II comprehensive medication review and assessment service.

Confidence scores on the pre- and post-implementation surveys are summarized in Table 2. Following participation in MTM laboratory activities, confidence scores improved significantly from baseline for all MTM component items ($p < 0.00$). At baseline, 90% or more of students indicated they were less than confident (score of less than 4) in identifying an MTM billable service, identifying patient eligibility, and determining the correct current procedural terminology code(s) to use when billing. After completion of laboratory activities, less than 20% of students continued to indicate that they were less than confident in performing these items. On the pre-implementation survey, 86% and 88% of students,

Table 2. Student Confidence Levels Before and After Completing a Medication Therapy Management Pharmacotherapy Laboratory[a]

MTM Service Component	Pre-implementation Score, Mean (SE)	Post-implementation Score, Mean (SE)[b,c]
Identifying a MTM billable service.	2.2 (0.1)	4.4 (0.1)
Identifying a patient that is eligible for Level I MTM Services.	2.2 (0.1)	4.7 (0.1)
Identifying a patient that is eligible for Level II MTM Services.	2.0 (0.1)	4.4 (0.1)
Gathering patient specific data necessary to bill for MTM services.	2.9 (0.1)	4.7 (0.1)
Performing a patient specific medication review.	3.5 (0.1)	4.9 (0.1)
Assessing a patient's medications for potential drug-related problems.	3.6 (0.1)	4.8 (0.1)
Formulating a recommendation to resolve an identified drug-related problem.	3.4 (0.1)	4.8 (0.1)
Establishing a care plan to achieve the goals of therapy.	3.4 (0.1)	4.8 (0.1)
Appropriately documenting the identified drug-related problems.	3.3 (0.1)	4.8 (0.1)
Appropriately documenting drug-therapy recommendations.	3.4 (0.1)	4.8 (0.1)
Scheduling appropriate follow-up to evaluate patient specific outcomes.	3.7 (0.1)	4.7 (0.1)
Communicating drug therapy recommendations to other health care providers.	3.8 (0.1)	4.8 (0.1)
Communicating drug therapy recommendations to a patient.	4.0 (0.1)	5.2 (0.1)
Determining the correct CPT code(s) to use when billing for MTM services.	2.0 (0.1)	3.5 (0.1)
Locating ICD-9 codes.	2.9 (0.1)	3.9 (0.1)
Determining the appropriate ICD-9 code(s) to use when billing for MTM services.	2.6 (0.1)	3.7 (0.1)
Completing the appropriate documentation necessary to bill for MTM services.	2.2 (0.1)	4.2 (0.1)
Submitting an electronic MTM services claim.	2.0 (0.1)	4.2 (0.1)

[a] Abbreviations: MTM = medication therapy management; SE = standard error; CPT = current procedural terminology; ICD = International Classification of Diseases.

[b] Confidence scale: 1 = not at all confident; 2 = not very confident; 3 = somewhat confident; 4 = confident; 5 = very confident; 6 = extremely confident; 7 = outstandingly confident).

[c] $P < 0.00$ for all pre- and post-implementation comparisons.

respectively, indicated they were less than confident in completing the appropriate documentation necessary to bill and in submitting an electronic claim. Confidence levels on the post-implementation survey were improved for these 2 items, with only 30% of students reporting a confidence score less than 4.

Mean pre- and post-implementation scores for constructs of the Theory of Planned Behavior are summarized in Table 3. All measures related to perceived behavioral control and subjective norm were significantly improved following participation in the laboratory activities. Measures related to attitude, intent, and behavioral beliefs all trended toward improvement, but only certain individual items within each construct showed significant improvement.

Prior to participation in MTM laboratory activities, student responses were the most positive for attitude-related items. Mean pre-implementation survey scores exceeded 4 for all items within this construct, with the exception of the item "Pharmacists will be the main professional providers of MTM," which scored 3.9. On the post-implementation survey, mean scores for individual attitude-related items were not changed significantly.

Responses related to perceived behavioral control items were the most negative prior to participation in laboratory activities, with all individual items scoring below 4. Having necessary knowledge and skills to provide MTM was the lowest-scored item within this construct (3.0). Overall, only 42% of students agreed or strongly agreed that they had the necessary knowledge and skills to provide MTM to patients at baseline. Mean scores for all the individual perceived behavioral control items were significantly increased from baseline. The post-implementation survey score for perceived knowledge and skill increased significantly to 3.8, with 82% of students now agreeing or strongly agreeing that they had the necessary knowledge and skills.

Mean baseline scores for construct items related to intent ranged from 3.3 to 3.7. The highest scoring item within this category was intention to provide MTM (3.7), with 70% of students indicating that they intended to provide MTM to patients. In contrast, the item related to taking the initiative to get approval to offer MTM services was scored lowest (3.3). This equates to only 38% of students indicating that they would take the initiative to offer MTM if an employer was not already doing so. Four out of 5 measures of intent demonstrated small nonsignificant improvements from baseline. The only individual item within this construct to demonstrate a significant increase was related to knowing other students or pharmacists who intended to provide MTM services.

Two items within the behavioral belief construct showed significant improvement. At baseline the mean score for the belief pharmacists would be adequately reimbursed for providing MTM to patients, which was relatively low at 2.9, increased significantly to 3.2 following participation in the laboratory activities. The belief pharmacists have an opportunity to change patient behavior by providing MTM was scored positively at baseline (3.9) and improved further to 4.1 on the post-implementation survey. There were no significant changes in the mean pre- and post-implementation scores for any other individual behavioral belief items.

Items within the subjective norm construct had mean baseline scores ranging from 3.4 to 3.9. Following participation in laboratory activities, mean scores increased significantly for all individual items.

DISCUSSION

This manuscript describes the implementation of coordinated MTM instruction and learning activities into a pharmacotherapy laboratory course. Based on the Theory of Planned Behavior, the hypothesis was that expanded didactic instruction combined with active-learning strategies would increase students' knowledge, confidence, and intention to provide MTM services.

As in other surveys of pharmacists in community practice, students in the current study tended to indicate a low level of baseline confidence in completing the necessary documentation (PMR, MAP, and SOAP note), which suggests that practice experience in these areas during the training years is of benefit.[5,6] The RelayHealth demo site provided practice experience by creating a platform in which students could bill electronically for services in a realistic fashion and generate electronic documentation items, including a PMR and MAP. Pharmacy programs without access to an electronic billing platform can simulate electronic billing and documentation using a course management system.

Student confidence levels at baseline were highest for performing a medication review, identifying and resolving drug-related problems, communicating drug therapy recommendations to patients and providers, and scheduling follow-ups. These findings may reflect numerous patient care-related activities that students were exposed to in the pharmacotherapy laboratory during the second year. Students indicated a low baseline level of confidence in indentifying billable services and patient eligibility, which suggests that although students had previously been exposed to the types of patient care services pharmacists are qualified to provide, they had not linked this learning activity to reimbursement opportunities. Creating simulations in which students identified and performed medication interventions and then directly documented and billed for services may have allowed students to make the connection between everyday patient care and billable services.

Table 3. Theory of Planned Behavior Construct Items

Survey Items for Each Construct	Pre-implementation Score, Mean (SE)[a]	Post-implementation Score, Mean (SE)[a]
Attitude		
Pharmacist participation in providing MTMS is an important step in moving the profession of pharmacy forward	4.3 (0.1)	4.3 (0.1)
Participation in MTMS will help to establish pharmacists as important members of the healthcare team	4.1 (0.1)	4.1 (0.1)
Pharmacy is the healthcare profession best qualified to provide MTMS to patients	4.1 (0.1)	4.2 (0.1)
Participation in MTMS will allow me to provide a higher level of care to patients	4.2 (0.1)	4.2 (0.1)
Pharmacists will be the main professional providers of MTMS	3.9 (0.1)	4.0 (0.1)
Subjective Norm		
Pharmacists will have some role in deciding the specific provisions of MTMS programs	3.9 (0.1)	4.2 (0.1)[b]
Patients would like to see pharmacists provide MTMS	3.7 (0.1)	3.9 (0.1)[b]
Other healthcare providers will appreciate pharmacists providing MTMS to patients	3.7 (0.1)	3.9 (0.1)[b]
Insurers will reimburse pharmacists for providing MTMS to patients	3.4 (0.1)	3.5 (0.1)[b]
Pharmacy employers will support the development of MTMS programs	3.4 (0.1)	3.6 (0.1)[b]
Perceived Behavioral Control		
I have the necessary knowledge and skills to provide MTMS to patients	3.0 (0.1)	3.8 (0.1)[b]
It will be entirely up to me whether or not to provide MTMS	3.0 (0.1)	3.3 (0.1)[b]
It will be feasible for me to provide MTMS to patients	3.6 (0.1)	3.7 (0.1)[b]
I will be able to identify and recruit patients for a MTMS program	3.6 (0.1)	3.8 (0.1)[b]
Intent		
I intend to look for a pharmacist position where I will be able to provide MTMS	3.6 (0.1)	3.7 (0.1)
I intend to seek further training on providing MTMS	3.6 (0.1)	3.6 (0.1)
Other pharmacy students or pharmacists I know intend to provide MTMS to patients	3.6 (0.1)	3.8 (0.1)[b]
If my employer does not plan to offer MTMS, I will take the initiative to get approval to offer these services at my place of employment	3.3 (0.1)	3.4 (0.1)
I intend to provide MTMS to patients	3.7 (0.1)	3.8 (0.1)
Behavioral Beliefs		
Providing MTMS is not likely to be profitable for pharmacists.	2.5 (0.1)	2.6 (0.1)
Pharmacists providing MTMS will be viewed as intrusive by patients	2.7 (0.1)	2.7 (0.1)
Pharmacists will be adequately reimbursed for providing MTMS to patients	2.9 (0.1)	3.2 (0.1)[b]
I have an opportunity to change patient behavior by providing MTMS	3.9 (0.1)	4.1 (0.1)[b]
I can help decrease health care costs by providing MTMS to my patients	4.1 (0.1)	4.1 (0.1)
Providing MTMS will give me the ability to improve medication outcomes for my patients	4.2 (0.0)	4.2 (0.1)

Abbreviations: MTMS = medication therapy management services; SE = standard error.
[a] Scale: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.
[b] Indicates $P < 0.05$ for comparisons of pre- vs. post-implementation scores.

The observed increase in confidence related to the provision of MTM services did not translate into a significant change in all the individual Theory of Planned Behavior construct items used to predict the likelihood of students engaging in future MTM practice. However, items in the areas of subjective norm and perceived

behavioral control did improve significantly. This finding indicates that simulated activities can produce a positive influence on student perceptions of patient, other healthcare provider, insurer, and employer acceptance of pharmacist-provided MTM, as well as the personal control they have in deciding whether to practice MTM.

Items in the constructs of behavioral beliefs and attitudes were rated positively at baseline and remained favorable but unchanged on the post-implementation survey. Students entering the third year of pharmacy school already appear to see the potential benefits of MTM related to patient behavior, decreased healthcare costs, improved medication outcomes, and the advancement of the pharmacy profession. This conclusion is reinforced by the study by Urmie and colleagues in which 93% of surveyed students agreed or strongly agreed that pharmacist participation in providing MTM services is an important step in advancing the profession of pharmacy.[10] The percentage in the current study was comparable at 88% agreement. In both studies, over 90% of students felt that participation in MTM would allow them to provide a higher level of care to patients.[10] Overall attitudes and beliefs toward MTM do not appear to be a barrier to MTM practice. An exception is the belief that pharmacists will receive adequate reimbursement for MTM activities. Although the belief related to reimbursement potential was significantly improved, the overall score remained neutral at 3.2, indicating that the simulated billing opportunities did not convince students of the profitability of MTM services.

As in the study by Urmie and colleagues, in which 60% of students indicated an intention to provide MTM services, the current study demonstrated that at baseline, students were neutral regarding intent to engage in future MTM practice.[10] An unexpected finding of the current study was that intent construct items remained virtually unchanged despite significant improvements in confidence performing MTM services. Improvements in the areas of perceived behavioral control and subjective norm also did not translate into a change in student intent to engage in MTM practice. Future studies are warranted to explore why students lack intention to practice MTM despite possessing the necessary skills and knowledge to do so as well as positive attitudes and beliefs regarding the value of MTM. Theoretically, third-year students have already spent a great deal of time in practice shadowing and interning. Many pharmacy sites have not yet implemented an MTM program, and therefore, the majority of students may have not been exposed to MTM in actual practice. It may be necessary for students to experience MTM in a real-life scenario to help them realize the feasibility and financial benefit of providing services. Partnering with the experiential courses in the curriculum to place students in sites providing MTM services would give them an opportunity to observe MTM services, practice providing these services in a simulated classroom environment, and then perform MTM in actual practice.

The ultimate goal of classroom instruction is to positively influence the future practice of students. A limitation of this study is that the assessment method used is only a surrogate marker for future practice. Measures of knowledge, confidence, attitude, subjective norm, perceived behavioral control, behavioral beliefs and intent may predict the likelihood of MTM practice. However, to accurately assess the effectiveness of the MTM curriculum, it would be necessary to evaluate students' MTM practice outside of the classroom in actual pharmacy sites. Continued research is needed to follow students' MTM practice upon graduation.

SUMMARY

Among a cohort of pharmacy students, simulated MTM activities significantly increased knowledge scores, confidence measures, and scores on Theory of Planned Behavior constructs related to perceived behavioral control and subjective norms. Despite these improvements, students' intention to engage in future MTM services remained unchanged. Implementation of coordinated MTM instruction and learning activities into a pharmacotherapy laboratory course is an effective way to enhance student confidence and skill in providing services, but further study is needed to identify factors limiting student intent to engage in MTM practice. Exposure to the provision of MTM services within a real-life pharmacy setting may be necessary for students to visualize the incorporation of these programs into actual practice. The MTM curriculum and simulated activities will be continued at the University of Wisconsin-Madison School of Pharmacy, with future aspirations for the incorporation of real-life MTM practice experiences. Similar MTM instruction with opportunities for active-learning activities is encouraged for other schools and colleges of pharmacy.

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