Proximity of Medication Therapy Management Pharmacist to Physician Site May Impact the Degree of Collaboration (BRIDGE Study Phase I)

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Abstract

Background: Research has shown that collaboration between physicians and pharmacists improves health outcomes and prevents adverse drug events. Pharmacists providing medication therapy management (MTM) services in local stand-alone MTM clinics have experienced significant difficulty collaborating with physicians. However, MTM pharmacists who practice in the same facility with the physician self-rate their practices as highly collaborative. The purpose of this study is to determine if collaboration varies based on MTM practice location.

Methods: A convenience sample of 15 physicians who had received documentation of patient care from both an internal and external MTM pharmacist was surveyed to assess pharmacist-physician collaboration. Each physician was asked to complete the same survey for both an internal and an external MTM pharmacist, and to provide background and demographic information.

Results: Eleven surveys were returned by physicians for a 73% response rate (11/15). Four surveys were completed in their entirety. Seven surveys were returned with only the internal MTM pharmacist portion completed. The total score for external MTM pharmacists ranged from 52 to 87 with a mean score of 73.25 and standard deviation (SD) of 15.28. The total score for internal MTM pharmacists ranged from 74 to 98 with a mean score of 87.90 and SD of 9.12. Total mean scores resulting from summing items for the three domains of trustworthiness, role specification, and relationship initiation were higher for internal MTM pharmacists versus external MTM pharmacists (*p* = .03).

Conclusion: Based on our results, it appears the level of collaboration between physicians and MTM pharmacists tends to be higher when they practice in the same facility.

Keywords: Medication therapy management; Physician pharmacist collaboration; Interprofessional relationships

Introduction

In the United States, the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) created Medicare Part D, which provided reimbursement to health professionals contracted to provide Medication Therapy Management (MTM) [1].

As stated by the Centers for Medicare and Medicaid Services, the Medicare Part D program requires Part D sponsors to provide MTM services to selected beneficiaries [2]. As of 2010, patients who qualify for benefits must have two or more chronic diseases, take two or more chronic medications, or be likely to incur an annual cost of greater than $3,000 on Part D medications (eligibility criteria are defined annually by the Centers for Medicare and Medicaid Services) [3]. This Act afforded pharmacists an opportunity to be reimbursed for providing MTM services as part of the

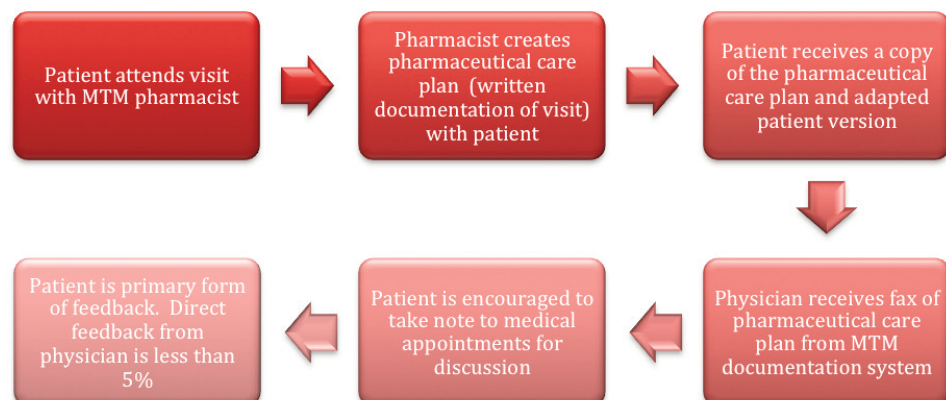effort to improve patient care and reduce overall costs of health care [4-8].

There was a lack of standardization within Part D about how to deliver MTM services, and considerable variation in MTM practices exist [9]. One notable area of difference is MTM service location, which can be within a clinic or pharmacy, over the telephone, or in a stand-alone MTM clinic. To ensure the best possible patient outcomes, collaboration between MTM pharmacists and physicians needs to occur in all types of practice settings.

Collaboration between physicians and pharmacists who provide MTM improves health outcomes [4-8] and prevents adverse drug events [10]. Previous studies have reported physicians' perceptions of MTM service benefits to include: a complete medication list, identifying drug therapy problems, and working to improve patients' adherence to their medications [11].

In the Duluth, Minnesota, region there are two main models of MTM practice—the internal model, where the pharmacist is physically located in the clinic with the rest of a patient's healthcare team, and the external model, where the pharmacist is not in the clinic with the rest of the patient's team. The pharmacist in the external model may be located in a stand-alone MTM clinic, a community pharmacy, or a different clinic than where the patient receives the rest of his/her primary care. Local MTM pharmacists embedded in physician practices (e.g., internal medicine or family practice) self-rate their practices as being highly collaborative. However, local MTM pharmacists practicing in stand-alone clinics have voiced their frustration in collaborating with physicians. This may be a result of not having an adequate pharmacist-physician relationship.

At the start-up of a stand-alone clinic at the University of Minnesota Duluth, local physician groups were introduced to the MTM pharmacists and their services and were asked their preferred method of communication regarding joint patients. Physicians expressed that the best way to communicate with them was by fax. Currently, after each patient encounter, the pharmacist summarizes the visit and recommendations in a note called the "pharmaceutical care plan," which is faxed to the patient's primary physician (Figure 1).

Figure 1
Diagram of current practice in stand-alone/external clinic.

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There are a few drawbacks about the external model. First, in our experience, MTM pharmacists receive direct feedback from physicians infrequently. Second, it is unknown to the MTM pharmacist whether physicians have received or implemented the recommendations contained within pharmaceutical care plans. Typically, the MTM pharmacist is informed of any medication change by the patient at the next follow-up MTM visit. Finally, based on feedback to the external MTM pharmacists, it appears patients are the primary form of communication between physicians and MTM pharmacists. These concerns have led the local MTM pharmacists to find ways to improve communication and collaboration between MTM pharmacists and physicians.

Collaboration between health professionals is defined as a "joint communicating and decision-making process with the goal of satisfying the patient's wellness and illness needs while respecting the unique qualities and abilities of each professional" [12, p. 63]. In 1999, the Institute of Medicine (IOM) identified the need for co-ordination of care in our healthcare system [13]. The IOM estimated that approximately 7,000 medication-error-related deaths occur each year in the hospital setting. From 1983 to 1993, there was an 8.5-fold increase in medication-related deaths. When extrapolated to the outpatient setting, it is estimated that an error occurs in up to 7.4% of all prescriptions dispensed. The IOM issued a written statement that "all health professionals should be educated to deliver patient-centered care as members of an interdisciplinary team" [14, p. 62].

Co-ordinating care to meet patient needs has been increasingly embraced within the healthcare community. Teamwork and collaboration between pharmacists and physicians helps to increase medication safety and resolve medication therapy problems [5].

The IOM's statements, a call to action for increasing collaboration among healthcare professionals, are evidenced-based. When pharmacists, nurses, and physicians collaborate effectively on medication reconciliation, medication errors decrease significantly [16]. When pharmacists and physicians collaborate, care quality and patient outcomes improve [17-19]. Collaboration in the primary care setting improves management of uncontrolled hypertension [17] and major depressive disorder [18]. Adding a pharmacist to the patient care team in the critical care setting has been shown to decrease preventable adverse-drug-event rates by two-thirds [19].

Optimal patient care is difficult to achieve without collaboration, which is why pharmacists, physicians, nurses, and other healthcare providers need to work as interdisciplinary teams [20]. Most providers, however, are isolated in their roles, making relationships difficult to build. Previous studies have examined relationship building among healthcare providers [21]. Both clinic and community pharmacists were found most likely to initiate collaboration with physicians. Research also shows physicians who collaborate with pharmacists must perceive that the collaboration contributes to their practice's workflow. Brock and Doucette found that physicians are less willing to enter or maintain pharmacist collaborations they view as costing too much time or other resources [21].

McDonough and Doucette's conceptual model for pharmacist-physician collaborative working relationships (CWR) places CWRs on a continuum from stage 0

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(professional awareness) to stage 4 (commitment) [15]. Three factors influence this continuum: individual characteristics (practitioners' demographics, knowledge, attitudes, and beliefs), context characteristics (practitioners' practice features and setting), and exchange characteristics (communication, trust, power and justice, and role development within the CWR).

Zillich, et al. identified exchange characteristics as the most dominant drivers in pharmacist-physician collaboration and grouped these characteristics into three domains that often contribute to positive CWRs: initiation, trustworthiness, and role specification [20,22]. If these three domains are present, it can be assumed a positive collaborative relationship between pharmacists and physicians exists or will be formed and can be attributed to exchange characteristics. Relationship initiation is defined as the beginning of professional relationships [22], and most often pharmacists begin this process [21]. As physicians learn about pharmacists' knowledge and expertise, they develop trust, which can contribute to relationship growth [22]. McDonough and Doucette identified role specification as the CWR domain that most influences relationship success [15]. Once the pharmacist's CWR role and responsibilities are defined, collaboration can grow. Zillich et al. quantified collaboration levels with the Pharmacist-Physician Collaborative Index (PPCI), a validated Likert scale survey of 14 questions that measure collaboration within the domains of relationship initiation, trustworthiness, and role specification (Appendix A) [20]. The 14-item PPCI was evaluated for internal consistency reliability using Cronbach's alpha and for construct validity by correlations between PPCI factors and previously validated satisfaction and collaboration scales [20]. PPCI scores can range from 14 to 98. A higher score indicates a greater extent of collaboration between physicians and pharmacists [20,22,23].

Using the PPCI to study CWRs among community pharmacists and physicians showed that pharmacists most often initiated the relationship, and early communication was essential for effective collaboration [24]. They also found that successful CWRs depend on pharmacists making high-quality patient-care contributions. These results were based on research conducted with community pharmacists. It is not clear if the same exchange characteristics and relationship development process would apply to MTM pharmacists building a patient care practice.

To our knowledge, there have not been any studies examining collaboration among physicians and MTM pharmacists based on different practice settings. As previously noted by Zillich et al., exchange characteristics between physicians and pharmacists appear to be the most potent drivers in collaboration [22]. It is reasonable to posit that such relationships are more difficult to establish when the pharmacist practices in a setting different than the physician. The purpose of BRIDGE Phase I is to determine if physicians' perceived level of collaboration varies based on MTM pharmacist practice location.

Methods
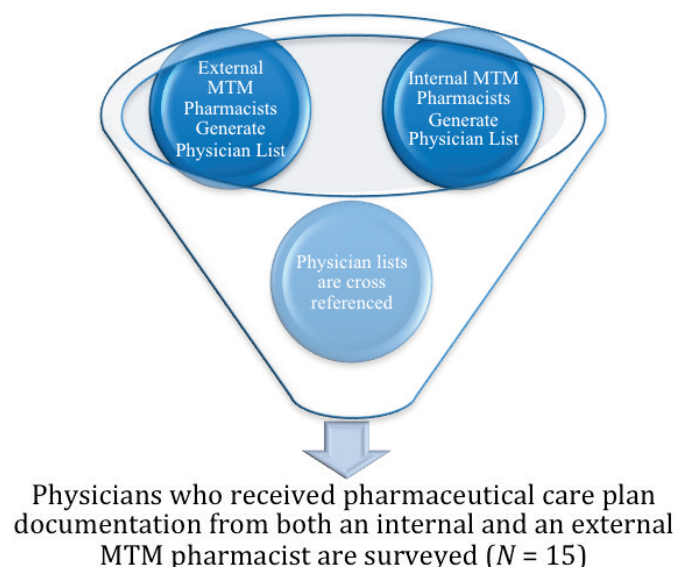### Study Design and Participant Recruitment
The hypothesis being tested in BRIDGE Phase I is whether physicians' perceived

level of collaboration with internal versus external MTM pharmacists differs as determined by their PPCI scores. (H_0 = There is no difference in PPCI scores between internal and external MTM pharmacists.) An internal MTM pharmacist is defined as a pharmacist who communicates with a physician in the same practice location (e.g., embedded within an internal medicine department). An external MTM pharmacist is defined as a pharmacist who communicates with a physician but does not practice at the same location (e.g., stand-alone MTM clinic). BRIDGE Phase II aims to identify specific factors that influence physician-MTM pharmacist collaboration via structured interviews with the BRIDGE Phase I respondents. From data gathered in BRIDGE Phase I & II, we plan to identify and measure an interventional strategy to improve physician-MTM pharmacist collaboration.

The first step in determining the level of collaboration based on practice location between local MTM pharmacists and physicians was to determine which physicians have experienced communication from both internal and external MTM pharmacists.

Meetings were held by study investigators with local MTM pharmacists to gain insight and interest in helping implement the study. From these meetings, a non-random convenience sample of primary care physicians from a local health system was selected to obtain baseline data on the level of collaboration with internal and external MTM pharmacists (Figure 2).

Figure 2
Diagram of process conducted to generate physician lists.

Physicians who received pharmaceutical care plan documentation from both an internal and an external MTM pharmacist are surveyed (*N* = 15)

To be included in the study, physicians also had to be actively employed, actively practicing medicine, and have been sent a pharmaceutical care plan from both an internal and external MTM pharmacist. The study protocol was approved by the University of Minnesota Institutional Review Board.

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Pharmacist-Physician Collaborative Index

The 15 physicians who met the inclusion criteria were sent a letter requesting their participation. Physicians were asked to complete the Pharmacist-Physician Collaborative Index [20,22,23] considering their relationship with both an internal and an external MTM pharmacist (Appendix A). This allowed for both an individual level assessment of collaboration and pooled analysis based on practice location. To maximize the response rate, a personal invitation letter was delivered to the 15 physicians by the physicians' shared medical assistant. Physicians had the option of completing the survey via Qualtrics using a web link provided (http://z.umn.edu/bridgestudy) or via a paper copy that was delivered in the recruitment letter. In an effort to increase the participation rate, a $50 Amazon.com gift card was included with the initial invitation letter. The $50 incentive to participate was selected because lesser amounts are less effective in eliciting physician responses [25]. Physicians were asked to return gift cards in return postage-paid envelopes if they chose not to participate. One month after recruitment letters were delivered, the medical assistant hand-delivered a reminder postcard to all eligible physicians who received letters.

Data Collection

Each physician was asked to complete the PPCI survey for both internal and external MTM pharmacists, either via an online survey link through Qualtrics or using a paper copy that was enclosed with the invitation letter. After completing the PPCI for both an internal and an external MTM pharmacist, physicians were asked to complete a survey section about their backgrounds and demographic information, including population of community served, type of practice, specialty, number of patients seen per week, number of hours spent on patient care per week, total number of hours worked per week, and if they directly train medical students or residents (Table 1). After the surveys were completed, researchers asked permission to contact physicians regarding participation in Phase II of the BRIDGE study, a 45-minute one-on-one structured interview conducted by an independent third party.

Data Analysis

Descriptive statistics were used to describe: physician age, gender, years in practice, degree (MD, DO), type of practice, specialty, number of patients seen per week, hours spent on patient care per week, total hours worked per week, student training site, residency training site, PPCI score, mean, and range. PPCI scores between internal and external MTM pharmacists were tabulated and analyzed. A one-tailed Mann-Whitney U test was used to compare PPCI scores between the groups based on the following:

> Because of the limited size of the sample and the unequal number of respondents who provided ratings of MTM pharmacists external to the respondent's practice site vis-à-vis pharmacists providing MTM services at the respondent's practice site (i.e., internal MTM pharmacists), rating scores for external and internal MTM pharmacists were treated as coming from independent samples of respondents (scores were not matched by respondent).

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Table 1
Physician responses to demographic questions

Physician characteristics	Options	Number of responses	Mean PPCI score internal	Mean PPCI score external	Median PPCI score internal	Median PPCI score external	Range PPCI score internal	Range PPCI score external
Age in years N = 9	36–40	2	94.0	NA	94.0	NA	90–98	NA
	41–45	1	77.0	52.0	77.0	52.0	77	52
	46–50	1	81.0	87.0	81.0	87.0	81	87
	51–55	1	98.0	NA	98.0	NA	98	NA
	56–60	1	77.0	73.0	77.0	73.0	77	73
	>60	3	91.3	81.0	84.0	81.0	84–98	81
Gender N = 9	Male	7	85.6	70.6	84.0	73.0	77–98	52–87
	Female	2	98.0	81.0	98.0	81.0	98	81
Number of years in practice N = 9	6–10	1	90.0	NA	90.0	NA	90	NA
	11–15	3	85.3	69.5	81.0	69.5	77–98	52–87
	16–20	1	98.0	NA	98.0	NA	98	NA
	>20	4	87.8	77.0	88.0	77.0	77–98	73–81
Degree Held N = 9	Doctor of Medicine (MD)	9	88.3	73.3	90.0	77.0	77–98	52–87
	Doctor of Osteopathic Medicine (DO)	0	NA	NA	NA	NA	NA	NA
Population of Community Served N = 11	0–10,000	1	98.0	NA	98.0	NA	98	NA
	10,001–49,999		NA	NA	NA	NA	NA	NA
	50,000–499,999	10	86.9	58.8	87.0	73.0	74–98	1–87
Type of Practice N = 10	Private	10	86.9	53.3	87.0	62.5	74–98	1–87
	Academic	0	NA	NA	NA	NA	NA	NA
Specialty N = 11	Family practice	1	98.0	NA	98.0	NA	98	NA
	Internal medicine	10	86.9	58.8	87.0	73.0	74–98	1–87
Number of patients seen per week on average N = 11	21–40	2	91.0	NA	91.0	NA	84–98	NA
	41–60	2	95.0	81.0	95.0	81.0	92–98	81
	61–80	5	88.0	62.5	90.0	62.5	77–98	52–73
	81–100	1	74.0	1.0	74.0	1.0	74	1
	101–120	1	81.0	87.0	81.0	87.0	81	87
Number of hours spent on patient care per week on average N = 11	11–20	1	98.0	NA	98.0	NA	98	NA
	21–30	2	80.5	73.0	80.5	73.0	77–84	73
	31–40	2	95.0	NA	95.0	NA	92–98	NA
	41–50	5	88.8	73.3	90.0	81.0	77–98	52–87
	>50	1	74.0	1.0	74.0	1.0	74	1
Total number of hours you work per week on average N = 11	31–40	4	69.5	1.0	88.0	1.0	74–98	1
	41–50	4	88.5	80.3	79.0	73.0	77–98	73–87
	>50	3	88.3	52.0	90.0	52.0	77–98	52
Directly train medical students N = 11	Yes	6	88.7	62.5	91.0	62.5	77–98	52–73
	No	5	87.0	84.0	0	84.0	74–98	81–87
Directly train medical residents N = 11	Yes	2	91.0	NA	91.0	NA	84–98	NA
	No	9	87.2	58.8	90.0	73.0	74–98	1–87

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Each respondent's individual item scores rating external MTM pharmacists were combined into a total score for that respondent. The same approach was used for a respondent's scores rating internal MTM pharmacists. This yielded mean total scores and associated standard deviations for the two respondent groups.

Based on the practice experiences of the authors, an assumption was made that survey respondents would assign higher ratings to pharmacists providing MTM services at the respondent's practice site than to pharmacists providing MTM services elsewhere (i.e., internal MTM pharmacists would receive higher PPCI scores).

An interactive web-based statistics program [26] was used to conduct the statistical analysis.

Results
Sample
Eleven physicians (73%) responded. All participants used the paper copy of the survey. Hand-delivered invitation letters asked physicians who did not participate to return the $50 gift cards. Three physicians did not respond to the survey and did not return the gift card. One physician returned both the paper survey and the gift card. The 11 surveys returned by participating physicians were fully completed ($N = 4$) or partially completed ($N = 7$). In the seven partially completed surveys, only the internal MTM pharmacist portion was completed. Additionally, seven physicians provided contact information for participating in Phase II of the BRIDGE Study.

Table 2
PPCI mean scores and ranges

PPCI score (possible range)	Mean	Median	Range
External pharmacists, $N = 4$			
Total score (14–98)	73.25	77.00	52–87
Domain			
Trustworthiness (6–42)	33.50	34.50	25–40
Role specification (5–35)	24.00	25.50	17–28
Relationship initiation (3–21)	15.75	17.00	10–19
Internal pharmacists, $N = 11$			
Total score (14–98)	87.90	90.00	74–98
Domain			
Trustworthiness (6–42)	39.90	41.00	36–42
Role specification (5–35)	28.45	27.00	21–35
Relationship initiation (3–21)	19.54	21.00	15–21

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PPCI Scores
The total score for external MTM pharmacists ranged from 52 to 87 with a mean score of 73.25 and standard deviation (SD) of 15.28. The total score for internal

MTM pharmacists ranged from 74 to 98 with a mean score of 87.90 and SD of 9.12. Total mean scores resulting from summing items for the three domains of trustworthiness, role specification, and relationship initiation were higher for internal MTM pharmacists versus external MTM pharmacists (p = .03) (Table 2).

Two surveys came back with written notations. On one survey, "N/A" was written on the external MTM portion. On another, "I don't recall having interactions with the above pharmacist so I cannot comment," was written on the external MTM portion.

Discussion

Based on the PPCI score findings for this limited sample of prescribers, there appears to be a difference in the level of collaboration between MTM pharmacists and physicians based on MTM practice location. The higher mean total ratings assigned to internal MTM pharmacists than to external MTM pharmacists, and the differing number of surveys completed about each group of pharmacists (11 internal MTM, 4 external MTM) suggests that physicians may collaborate more often with MTM pharmacists who practice at the same clinic as prescribers. Lack of response about collaborations with MTM pharmacists external to the prescriber's practice site (N = 4) may show that physicians are less familiar with, less willing to work with, or perhaps have never received communication from external MTM pharmacists. One physician's survey included a written comment saying he did not respond to the external MTM portion because he did not recall working with an external MTM pharmacist.

A number of factors could contribute to physicians collaborating most often with internal MTM pharmacists. Although both practice models provide medication therapy management, components of the internal MTM practice appear to increase the level of collaboration with physicians. Internal MTM pharmacists practice in the same clinic as the physicians and have face-to-face communication with them. The MTM pharmacists are more easily accessible and can communicate a patient's pharmacotherapy plan directly with the physician on a daily basis. In internal MTM settings, shared documentation systems within the health system allow the internal pharmacist to write directly in the patient's medical record notes that may be viewed by the patient's physician. As evidenced by the CWR model, the more pharmacists and physicians communicate with one another, the higher the level of collaboration [24].

Physician-pharmacist relationships are most often initiated by pharmacists [21]. Relationship initiation scores were higher for internal MTM pharmacists than external MTM pharmacists. Even though prior to the start-up of an external (stand-alone) MTM clinic physicians were educated on the services that would be provided, the collaborative relationship appears to be lacking, and new methods to initiate a relationship need to be explored. External MTM pharmacists need to examine how to demonstrate their value and how to contribute positive workflow to a physician's practice, otherwise the collaborative relationship may not be formed. A general lack of awareness by physicians about the services provided by external MTM pharmacists could contribute to the difference in the level of collaboration.

Trustworthiness is an important factor in collaborative relationships [20], and expertise in one's field can help build trustworthiness [27,28]. Internal MTM pharmacists were given higher trustworthiness scores. This could be due to a variety of reasons. Relationships between internal MTM pharmacists and physicians could have been developing before relationships with external MTM pharmacists. In addition, a form of camaraderie and teamwork may exist between internal pharmacists and physicians related to their patient care activities. With external pharmacists, trustworthiness is difficult to perceive for many reasons, including lack of proximity and daily contact, and possible communication challenges inherent in relying on fax and other distance-based methods.

Between pharmacists and physicians, role specification has been found to be the most influential factor in determining the level of collaboration [22]. The results from this study suggest that internal MTM pharmacists' scores tended to be higher for role specification than external MTM pharmacists. The services provided by internal pharmacists and the roles they serve within the physician's practice may be more clearly defined than external pharmacists' roles. A physician may not know the services provided by external pharmacists. With a direct response rate of less than 5% from physicians after a pharmaceutical care plan is sent from an external MTM clinic, one may infer there is a communication failure, and the physician may not know the role the external MTM pharmacist is playing in a patient's health care.

Seven physicians provided contact information for participating in the BRIDGE Study Phase II, which consists of structured one-on-one interviews. The plan for Phase II is to determine the characteristics that facilitate or enable collaboration. This research is currently in progress.

Limitations

The study was designed to survey physicians from one clinic, and the sample was intentionally not random because researchers knew the clinic's physicians had been contacted by both internal and external MTM pharmacists. The goal was to observe if there is was difference in collaboration between MTM practice locations and to expand to further studies to see if collaboration improvements can be implemented.

The survey sample size was too small ($N = 15$) to conduct meaningful statistical analyses of PPCI subscale scores to assess collaboration.

Eleven surveys were completed for internal MTM pharmacists while only four surveys were completed for the external MTM pharmacists. The discrepancy could be due to physicians not recognizing or receiving communication from external MTM pharmacists, but a direct comparative analysis was impossible without equal numbers of responses.

Conclusion

The degree of collaboration levels among physicians and MTM pharmacists tends to be higher when they practice in the same physical location. How MTM pharmacists who practice at sites external to where prescribers are located can build collaborative working relationships with physicians remains to be explored.

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BRIDGE Study
Phase I

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Appendix A
Physician–Pharmacist Collaboration Index (PPCI) Items

Trustworthiness:

1) The pharmacist is credible.
2) I trust this pharmacist's drug expertise.
3) I can count on this pharmacist to do what he/she says.
4) Communication between this pharmacist and me is two-way.
5) I intend to keep working together with this pharmacist.
6) My interactions with this pharmacist are characterized by open communication of both parties.

Role Specification:

7) This pharmacist and I negotiate to come to agreement on our activities in managing drug therapy.
8) This pharmacist and I are mutually dependent on each other in caring for patients.
9) I will work with this pharmacist to overcome disagreements on his/her role in managing drug therapy.
10) In providing patient care, I need this pharmacist as much as this pharmacist needs me.
11) This pharmacist depends on me as much as I depend on him/her.

Relationship Initiation:

12) This pharmacist has spent time trying to learn how he/she can help provide better care.
13) This pharmacist has provided information to me about a specific patient.
14) This pharmacist has shown an interest in helping me improve my practice.

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