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## Community pharmacists' interventions and documentation during medication therapy management encounters delivered face-to-face versus via telephone: The devil is in the details

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## ABSTRACT

**Background:** To date, no studies are available comparing in-person versus telephone-administered medication therapy management (MTM) encounters in a community pharmacy setting with respect to medication-related problems, interventions and documentation.

**Objective:** The objective of this study was to evaluate types of medication-related problems, interventions, and documentation among patients receiving MTM face-to-face versus over the telephone.

**Methods:** A retrospective analysis was performed on all completed comprehensive medication reviews (CMR) between 2011 and 2017 in 14 community pharmacies in Western Massachusetts, USA that belong to one district of a national chain. Medication-related problems were classified as: Beers criteria medications, untreated condition, dose too high or low, medication omission, duplicate therapy, drug-drug interaction, non-adherence, complicated dosing. Pharmacist's interventions were classified as education, medication reconciliation, and vaccination. Documentation of assessment, plan, discussion notes, and recommendations were evaluated as being present or absent.

**Results:** In total, 297 encounters (56.5% were over the telephone) were included in the analysis. There was no significant differences between clinical and demographic characteristics and types of medication-related problems and pharmacist interventions among patients who received face-to-face versus telephone MTM service. Assessment was documented among 28% of face-to-face and 42% of telephone CMR encounters ( $p < 0.05$ ). Plan was documented among 27% of face-to-face and 40% of telephone CMR encounters ( $p < 0.05$ ). Discussion notes were documented among 97% of face-to-face and 98% of telephone CMR encounters ( $p > 0.05$ ). Pharmacist recommendations were documented among 92% of face-to-face and 95% of telephone CMR encounters ( $p > 0.05$ ).

**Conclusions:** Pharmacists identify medication-related problems and provide education and medication reconciliation interventions independent of the mode of delivery. The overall low frequency of assessment and plan documentation raises concerns. It is imperative for pharmacists to document both instances of provider outreach and follow-up to ascertain resolutions of patients' medication-related problems.

### Introduction

Medication Therapy Management (MTM) became a recognized service in 2003 in the Medicare Prescription Drug, Improvement, and Modernization Act (MMA). The MMA required Medicare Part D prescription drug plans to adhere to quality and cost-savings standards and to establish MTM programs. The eligible patient populations were those with multiple disease states, taking multiple Medicare Part D covered

drugs, and those likely to incur a predetermined amount in annual drug costs based on historical data from insurance claims. The Centers for Medicare and Medicaid Services (CMS) required that programs be designed to increase patient adherence to medication regimens, enhance patient understanding of their medication therapy, and prevent drug complications and drug interactions.<sup>1</sup> In 2004, the American Pharmacists Association (APhA) and the National Association of Chain Drug Stores (NACDS) Foundation defined MTM as a distinct service or group

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of services that optimizes therapeutic outcomes for individual patients.<sup>2</sup> More recently in 2018, the Joint Commission of Pharmacy Practitioners (JCPP) Board of Governors revised the term and modified the definition to Medication Management Services (MMS).<sup>3</sup> MMS encompasses a broad spectrum of patient-centered, pharmacist-provided, collaborative services that focus on medication appropriateness, effectiveness, safety, and adherence with the goal of improving health outcomes. While the current evidence related to the outcomes of MTM/MMS services is inconsistent, research points to the high potential for these services to improve medication-related, patient-related, and healthcare use outcomes if these services are effectively coordinated between pharmacists and other healthcare professionals.<sup>4,5</sup> The five core elements of MTM services include comprehensive medication review (CMR), personal medication record (PMR), medication-related action plan (MAP), interventions and/or referral, and documentation and follow-up.<sup>2</sup> About half of the MTM services are delivered via telephone.<sup>6</sup> MTM delivered via telephone can be advantageous when patients are homebound, live in remote areas, have limited access to transportation or are non-English speaking and can be more easily accommodated by locating a pharmacist proficient in their language.<sup>7</sup> However, if the quality of phone-based encounter is inferior to that of a face-to-face one, the advantages can quickly disappear. To the authors' knowledge, no study to date compared the medication-related problems, pharmacist interventions and documentation during CMRs delivered face-to-face versus over the telephone. It is important to evaluate whether there are differences in drug-related problems, pharmacist interventions, and documentation completeness between the two modes of delivery. All of those can serve as indirect indicators of MTM quality. Studies to date examined the drug related problems identified and pharmacist interventions delivered during CMR encounters occurring solely by telephone,<sup>7-9</sup> solely face-to-face<sup>10,11</sup> or by both modes without comparing differences between the two delivery formats.<sup>1,12</sup> Therefore, the objective of this study was to evaluate types of medication-related problems, pharmacist interventions, and documentation among patients receiving CMR face-to-face versus over the telephone.

## Methods

The study was a retrospective analyses of CMRs completed in 14 pharmacies within one district of a national chain in Western Massachusetts, USA. All included CMRs were completed during 2011-2017. The analyses were conducted during fall 2016-spring 2017. All CMRs were captured from one MTM administrative platform, Mirixa®, as the majority of MTM services provided in this district utilized this platform. Types of medication-related problems and pharmacist interventions were extracted from the documentation of each completed CMR. Incomplete CMRs were not analyzed and consisted of the instances where patients declined the service or the service could not be delivered. Other components of MTM, including the therapeutic intervention program (TIP) and the targeted medication review (TMR) were not evaluated in this study. Classification of medication-related problems and interventions was adopted from the lists of medication-related problems and pharmacist's interventions used in previous studies.<sup>1,12,13</sup> Medication-related problems included Beers criteria medications, untreated condition, dose too high or low, medication omission, duplicate therapy, drug-drug interaction, non-adherence, complicated dosing. Pharmacist's interventions included education, medication reconciliation, and vaccination. While medication therapy optimization is one of the goals of MMS, the architecture of MTM platforms does not include a formal algorithm to flag Beers criteria medications or direct pharmacists' attention to addressing them. For this reason, we used patients' medication lists to quantify the Beers criteria medications independent of pharmacists' assessment and plan notes. Beers 2015 criteria were used to identify potentially inappropriate medications present independent of patients' diagnoses or conditions.<sup>14</sup> For the potentially inappropriate medications in the class

of antidepressants, medications included were selective serotonin reuptake inhibitors (SSRIs) and serotonin norepinephrine reuptake inhibitors (SNRIs). Tricyclic antidepressants were documented in a separate category.

Within each CMR, free-text comment boxes for pharmacist documentation titled "Assessment", "Plan", "Patient discussion notes" and "Pharmacist recommendations" were categorized as present or absent. Documentation by the pharmacist into "Assessment" and "Plan" text boxes can be populated into a provider-specific letter that details the MTM encounter. This letter can be printed and faxed to the provider. If there is no documentation in the "Assessment" or "Plan" comment boxes, the generated letter is a standard template stating that CMR occurred. Similarly, pharmacist documentation into "Patient discussion notes" and "Pharmacist recommendations" can be populated into a patient-specific letter and represents documentation of the discussion notes and recommendations provided to the patient.

The study was approved by the Western New England University Institutional Review Board. One author (JR) performed all data extraction from the MTM platform into an Excel spreadsheet. A sample of CMRs at the start of the study (10 CMRs) was concurrently examined by another author (KC) to validate completeness of extraction of pharmacist-identified medication-related problems and accuracy of Beers criteria medications. All data were then imported into SAS Enterprise Guide 7.1 (Cary, North Carolina) for analyses. Descriptive analyses (means, frequencies) were performed on all variables. Comparisons between groups (telephone and face-to-face CMRs) were performed using t- and chi-squared tests (or Fisher's exact test) as appropriate. An alpha level of 0.05 was adopted.

## Results

Between 2011 and 2017, there were 925 MTM encounters captured in the examined MTM administrative service platform. Of those 925 cases, 297 were completed CMRs. Table 1 presents descriptive and bivariate analyses of clinical and demographic variables from all completed cases and by mode of encounter. The patients with completed CMRs were on average 68.4 years old and female (69%). Slightly over half of all included CMRs (56.6%) were delivered via telephone. Larger proportion of encounters were completed face to face in 2013 as compared to other years. Patients on average were taking 11.7 medications, with an average of 2.4 Beers criteria medications. Over 85% of patients had at least one Beers criteria medication, with over a quarter (28.3%) taking four or more medications where expected harm may have exceeded the expected benefit. The majority of patients with Beers criteria medications were taking agents from the following therapeutic classes: antidepressants (58.3%), proton pump inhibitors (45.1%), and benzodiazepines (26.6%) (Table 2). There was no difference between patients who received MTM face-to-face versus via telephone by age, gender, average number of medications, or Beers criteria medications.

Medication-related problems identified included Beers criteria medications (86.2%), medication omission (36.4%), drug-condition interaction (36.4%), duplicate therapy (34.0%), medication non-adherence (32.0%), drug-drug interactions (28.6%), untreated condition (3.4%), dose too low (2.7%), and dose too high (2.0%) (Table 1). The types of pharmacists' interventions included medication reconciliation (100%), medication education (99.7%), education regarding vaccinations (67.0%), vaccine administration (14.0%) (Table 1). There was no statistically significant relationships between types of medication-related problems identified and pharmacists interventions delivered by mode of service delivery ( $p > 0.05$ ). However, the presence of documentation in "Assessment" section of CMR was higher when MTM was delivered via the phone as compared to face-to-face: 42% versus 28% ( $p < 0.05$ ). Similarly, the presence of documentation in "Plan" section of CMR was higher when MTM was delivered via the phone as compared to face-to-face: 40% versus 27%, respectively ( $p < 0.05$ ). There was no difference in assessment and plan documentation across the

**Table 1**  
Patient demographics, medication-related problems, pharmacist interventions and documentation by mode of CMR delivery.

Characteristic	All CMR recipients n = 297 (100%)	Face-to-face N = 129 (43.4%)	Phone N = 168 (56.6%)
Mean age (SD; range)	68.4 (11.5; 36–93)	68.2 (12.0)	68.4 (11.2)
Gender			
Male, n (%)	92 (31.0)	37 (28.7)	55 (32.7)
Female, n (%)	205 (69.0)	92 (71.3)	113 (67.3)
Year of CMR Encounter <sup>a</sup>			
2011	1 (0.3)	1 (0.8)	0 (0)
2012	14 (4.7)	8 (6.2)	6 (3.6)
2013	87 (29.3)	53 (41.1)	34 (20.2)
2014	70 (23.6)	24 (18.6)	46 (27.4)
2015	42 (14.1)	20 (15.5)	22 (13.1)
2016	44 (14.8)	15 (11.6)	29 (17.3)
2017	39 (13.1)	8 (6.2)	31 (18.5)
Mean number of prescription medications (SD; range)	11.7 (4.0; 3–26)	11.6 (4.0)	11.7 (4.0)
Mean Beers criteria medications (SD, range)	2.4 (1.6; 0–6)	2.5 (1.7)	2.4 (1.6)
<b>Medication-related problems</b>			
Medication from Beers list			
0	41 (13.8)	17 (41.5)	24 (58.5)
1	51 (17.7)	22 (43.1)	29 (56.9)
2	71 (23.9)	35 (49.3)	36 (50.7)
3	50 (16.8)	17 (34.0)	33 (66.0)
≥ 4	84 (28.3)	38 (45.2)	46 (54.8)
Medication omission	108 (36)	49 (38)	59 (35)
Drug-condition interaction	108 (36)	49 (38)	59 (35)
Duplicate therapy	101 (34)	36 (28)	65 (37)
Medication non-adherence	95 (32)	40 (31)	55 (33)
Drug-drug interactions	85 (29)	34 (26)	51 (30)
Untreated condition	10 (3.4)	4 (3)	6 (4)
Dose too low	8 (3)	3 (2)	5 (3)
Dose too high	6 (2)	3 (2)	3 (2)
<b>Pharmacist's Interventions</b>			
Medication reconciliation	297 (100)	129 (100)	168 (100)
Medication education	296 (99.7)	129 (100)	167 (99.4)
Education regarding vaccination			
Yes	199 (67)	83 (64)	116 (69)
No	98 (33)	46 (36)	52 (31)
Vaccine administration	–	18 (14)	–
<b>Pharmacist's Documentation</b>			
Assessment documented <sup>b</sup>	106 (36)	36 (28)	70 (42)
Plan documented <sup>c</sup>	102 (34)	35 (27)	67 (40)
Patient discussion notes documented	290 (98)	125 (97)	165 (98)
Pharmacist recommendations to the patient documented	278 (94)	119 (92)	159 (95)

CMR = Comprehensive Medication Review.

p > 0.05 for comparisons between baseline demographic and medication characteristics and mode of CMR encounter unless marked otherwise.

<sup>a</sup> p = 0.0002 (Chi-squared test (df = 6) = 25.8).

<sup>b</sup> p = 0.0142 (Chi-squared test (df = 1) = 6.0191).

<sup>c</sup> p = 0.0218 (Chi-squared test (df = 1) = 5.26).

years (p > 0.05, data not shown). Frequency of documentation in “Patient discussion notes” and “Pharmacist recommendations” did not differ by mode of service delivery and was nearly always present.

## Discussion

About one-third of eligible MTM cases within one district of a community pharmacy chain successfully completed a CMR. A recent analysis of national Medicare Part D MTM files showed that 18% of beneficiaries meeting criteria for MTM received a CMR.<sup>15</sup> It is unknown why two-thirds of cases in this study were either declined or not served for other reason. Thus far, research has not identified solid predictors of willingness to participate in MTM.<sup>16</sup> Farris et al. examined whether the

**Table 2**  
Beers criteria medications used by study patients (n = 297).

Medication classes/agents	N (%)
Antidepressants	173 (58.3)
Proton pump inhibitors	134 (45.1)
Benzodiazepines	79 (26.6)
Gabapentin	79 (26.6)
Opioids	60 (20.2)
Anticholinergics	37 (12.5)
Zolpidem/eszopiclone	30 (10.1)
Antipsychotics	28 (9.4)
Tramadol	28 (9.4)
Tricyclic antidepressants	20 (6.7)
Anticonvulsants	17 (5.7)
Pregabalin	15 (5.1)
Stimulants	3 (1.0)
Antianxiety	3 (1.0)
Alpha-blockers	2 (0.7)
Antihistamines	2 (0.7)

intention to obtain a CMR together with other factors may predict the receipt, and all variables except patient's health status were unrelated to obtaining a CMR.<sup>17</sup> Coe et al. showed that in the 2014 national sample of CMR-eligible population, patients with higher number of comorbidities, Medicare and Medicaid dual eligible patients, and those with a history of hospitalization or emergency room visit were less likely to receive a CMR.<sup>18</sup> Studies point towards older patients, females, and patients who are not comfortable speaking with their pharmacist as being more likely to accept MTM.<sup>19</sup>

Our study participants appear to represent typical patients who accept MTM – older patients and females. To our knowledge, no studies of MMS compared medication-related problems and completeness of documentation by mode of service delivery, while a few studies compared outcomes between the two modes of delivery for services other than medication management.<sup>20–22</sup> Pinnock et al. evaluated the impact of offering a telephone-based asthma clinic on uptake and outcomes of asthma reviews and found that the phone option increased the uptake of reviews and improved patients' confidence in self-management that was not significantly different from a face-to-face delivery mode.<sup>20</sup> Schmidt et al. evaluated the difference in glycemic control outcomes among VA diabetes patients by mode of delivery (face-to-face versus phone appointment with a clinical pharmacy specialist) and found no difference in absolute HbA1c reduction.<sup>21</sup> Williams et al. compared a lifestyle program delivered face-to-face versus telephone to improve metabolic indicators among patients newly diagnosed with type 2 diabetes and found that both programs were effective in improving metabolic indicators.<sup>22</sup> On the other hand, a study by Smith et al. conducted predominantly in federally qualified health centers in Connecticut with pharmacists embedded in primary care clinics had most of the patients receive MMS face-to-face.<sup>23</sup> The authors point that face-to-face initial medication management service episodes coupled with face-to-face follow-ups and co-location of pharmacists within medical practices were likely significant predictors of successful resolution of nearly 80% of medication-related problems in their study.<sup>23</sup> On the other hand, Winston and Lin compared medication costs pre- versus post-MTM among patients who received the service from community pharmacists face-to-face versus over the phone and found greater cost decrease among phone-based MTM recipients (\$29 versus \$40 mean monthly cost decreases).<sup>24</sup>

Among older adult population who took an average of 11 medications in this study, the need for and importance of MTM is evident. More than 85% of all patients were on at least one Beers criteria medication that has the potential to cause harm. This reinforces the critical need for pharmacist evaluation regarding the necessity and appropriateness of therapy, a key component of MTM. However, only 36% and 34% of completed CMRs in this study included “Assessment” and “Plan” documentation, respectively. Even assuming that for all

patients with Beers criteria medications, the “Assessment” and “Plan” notes addressed these medications’ risks, a significant proportion of patients likely remained under-evaluated.

Since the study completion, the Beers criteria medication list was updated with several medications excluded from the list and new agents added.<sup>25</sup> The study findings appear unaffected by these changes. H2-blockers were removed from the list, while in our sample there were no H2-blocker users. SNRIs were added to the list in 2019, while we already classified them as part of the list based on risk criteria from lists similar to Beers.

Pharmacists’ recommendations to patients’ healthcare providers regarding deprescribing the medications where the risks may outweigh benefits can and should be an important avenue to improve health outcomes. Studies have shown that pharmacists can be part of or lead initiatives to discontinue potentially harmful therapies.<sup>26,27</sup> On the other hand, qualitative evidence from Australia showed that deprescribing can be challenging as general practitioners (GPs) disregarded pharmacists’ recommendations to stop anticholinergics and sedatives stating it was the specialists’ responsibility, while specialists in turn thought that was the GPs’ role.<sup>28</sup> The processes and policies are yet to be created to facilitate deprescribing by pharmacists in real-world settings. These can include assigning deprescribing into a specific focus area of medication optimization within MTM platforms and creating financial incentives such as a specific billing code for deprescribing.<sup>29</sup> Expanding the business model of community pharmacies away from dispensing and towards cognitive services that improve patients’ health outcomes can also facilitate deprescribing. A recent study examining association between CMR completion rates and medication use quality measures further corroborates the need to facilitate deprescribing during CMRs.<sup>6</sup> The authors among other findings report that CMR completion rates were associated with increased use of antipsychotics among nursing home residents.<sup>6</sup> Since antipsychotics belong to Beers criteria medications and are important targets for discontinuation in older adults, pharmacists’ efforts in facilitating deprescribing of these agents can improve medication use and patients’ quality of life.

In order to have the MTM encounter processed for billing, Mirixa® neither imposed requirements on minimal documentation nor had processes in place to verify the quality and completeness of pharmacists’ records. Similarly, there was no requirement to notify, document, and follow-up with patients’ healthcare providers when provider authorized medication changes such as removal of duplicate therapy or discontinuation of inappropriate therapy were needed. Over 30% of patients in this study had duplicate therapy, medication omission, drug-condition or drug-drug interaction. This is similar to results of an earlier study of phone-based MTMs by Perera et al. where 27% of MTM encounters required treating physician’s approval of pharmacist’s recommendations.<sup>30</sup> Previous studies have shown that between 35% and 50% of pharmacists’ recommendations to modify therapy were accepted by prescribers.<sup>30-32</sup> There was no evidence of provider notification to modify therapy in our study. It is however possible that face-to-face CMR patients who received a paper summary of pharmacist recommendations could have followed-up with their providers, shared pharmacist recommendations, and had their medication regimens modified as suggested. Alternatively, pharmacists may have called or faxed notes to providers to notify them of needed medication changes, even though no fax or call records were available as documentation. It is therefore unknown whether the medication-related problems requiring provider action among studied patients received the needed attention and were resolved or remained unaddressed.

For each MTM encounter, there were multiple medication-related problems identified and pharmacist’s interventions provided during any given CMR. Medication reconciliation and education occurred in nearly every encounter. These two interventions may not warrant communication to the prescriber if no therapy modifications are required. The presence of documentation in the comment boxes of “Patient discussion notes” and “Pharmacist recommendations” too occurred in nearly every

encounter which may indicate the pharmacist documented the medication reconciliation and education activities and communicated this with the patient. Medication-related problems such as duplicate therapy, medication omission, drug-drug-interactions, and drug-condition interactions occurred in approximately one-third of patients in both the face-to-face and telephone encounter groups. These medication-related problems warrant communication to the prescriber to resolve and possibly modify medication therapy. However, the presence of documentation in the “Plan” comment text box, which would populate the template letter to the prescriber, was not consistent with the number of activities that warranted prescriber communication. The reasons behind lower frequency of documentation in the “Assessment” and “Plan” comment text boxes in face-to-face encounters versus telephone encounters was likely workload related. It is possible that face-to-face encounters took longer time to complete and consequently left less opportunity for documentation due to time constraints. The types of activities performed by the pharmacist did not vary by mode of encounter. Both the face-to-face and telephone groups were provided the same services. This finding may lead to an increased number of completion of cases knowing that the extent of services provided does not depend on the mode of encounter. One would surmise that it is more efficient to provide these services via telephone and avoid the need for the patient to travel to the pharmacy. In addition, it is possible that some patients may be more likely to discuss medication related issues via telephone than in person.<sup>7,33</sup> In the face-to-face group, 14% of the patients received an immunization following the completion of CMR. Since there was no difference in proportion of patients receiving vaccine education in the two groups (64% in the face-to-face group versus 69% in the telephone group ( $p > 0.05$ )), it is possible that after receiving a vaccine recommendation via telephone, a patient had the vaccine administered at a subsequent visit.

Documentation in the “Assessment” and “Plan” was missing 64.6% and 65.7% of the time, respectively. This is in contrast with the study by Smith et al. where results of an audit of 190 MTM claims of Minnesota Medicaid patients showed that the majority of MTMs had good documentation.<sup>34</sup> In this study, in cases where documentation was present, there was still no documentation of provider communication. It cannot be determined if a letter was generated and faxed to the provider, or if other modes of communication to the provider occurred. The Minnesota Medicaid MTM audit form in Smith et al. study includes a specific section titled ‘Recommendations given to primary care physician.’<sup>34</sup> If the MTM claims submitted for encounters examined in this study were to be audited, the auditor would not be able to confirm the PCP contact section of the audit form. In contrast to the lack of documentation to the provider, for almost all of the completed CMRs the pharmacist provided documentation of “Patient discussion notes” and “Pharmacist recommendations.” Documentation in these comment boxes results in an automatically generated summary letter as well as the medication action plan (MAP). Both of these documents can be provided to the patient as educational materials to be used at home as a resource and reference of what was discussed during the MTM encounter. Based on system constraints, it cannot be determined if the summary letters were printed or provided to the patient.

One limitation of this study is lack of evaluation of both the quality of the documentation (accuracy, meaningfulness) and whether or not the documentation matched the activity. This would be difficult to perform retrospectively without having the pharmacist and the patient chart available. In addition, while at the time of the study several MTM platforms were available, this study analyzed the CMRs from one platform in the district that included the greatest number of CMR cases. Finally, one trained community pharmacy resident performed all data extraction, with only initial sample of 10 CMRs co-evaluated with another clinical faculty pharmacist.



## Conclusion

Pharmacists identify equivalent number of medication-related problems and provide similar MTM interventions regardless of the mode of service delivery. It appears that MTM provider education regarding documentation of the “Assessment” and “Plan” is needed due to low level of documentation, especially during face-to-face encounters. It is also critical for MTM providers to close the communication loop between the patient and the prescriber, to ensure timely resolution of medication-related problems that are in the prescriber domain, which is accompanied by thorough documentation. Without the latter, the care provided during face-to-face or phone MTM encounter is unlikely to significantly improve medication use processes and subsequent outcomes.

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## CRediT authorship contribution statement

**Jasmine Rivera:** Conceptualization, Data curation, Writing - original draft. **Natalia Shcherbakova:** Conceptualization, Formal analysis, Writing - original draft. **Christine Vala:** Conceptualization, Writing - original draft. **Kam Capoccia:** Conceptualization, Data curation, Writing - original draft.

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## References

- Barnett MJ, Frank J, Wehring H, et al. Analysis of pharmacist-provided medication therapy management (MTM) services in community pharmacies over 7 years. *J Manag Care Pharm.* 2009;15:18–31. <https://doi.org/10.18553/jmcp.2009.15.1.18>.
- American Pharmacists Association. National Association of Chain Drug Stores Foundation. Medication therapy management in pharmacy practice: core elements of an MTM service model (version 2.0). *J Am Pharm Assoc.* 2003;48:341–353. <https://doi.org/10.1331/JAPhA.2008.08514> 2008.
- JCPP approves new medication management services definition. <https://www.prnewswire.com/news-releases/jcpp-approves-new-medication-management-services-definition-300615345.html>; 2018, Accessed date: 21 January 2019.
- Viswanathan M, Kahwati LC, Golin CE, et al. Medication therapy management interventions in outpatient settings: a systematic review and meta-analysis. *JAMA Intern Med.* 2015;175:76–87. <https://doi.org/10.1001/jamainternmed.2014.5841>.
- Rosenthal M, Holmes E, Banahan 3rd B. Making MTM implementable and sustainable in community pharmacy: is it time for a different game plan? *Res Soc Adm Pharm.* 2016;12:523–528. <https://doi.org/10.1016/j.sapharm.2015.07.006>.
- Wang Y, Farley JF, Ferreri SP, Renfro CP. Do comprehensive medication review completion rates predict medication use and management quality? *Res Soc Adm Pharm.* 2019;15:417–424. <https://doi.org/10.1016/j.sapharm.2018.06.010>.
- DeZeeuw EA, Coleman AM, Nahata MC. Impact of telephonic comprehensive medication reviews on patient outcomes. *Am J Manag Care.* 2018;24:e54–e58.
- Moczygomba LR, Barner JC, Lawson KA, et al. Impact of telephone medication therapy management on medication and health-related problems, medication adherence, and Medicare Part D drug costs: a 6-month follow up. *Am J Geriatr Pharmacother.* 2011;9:328–338. <https://doi.org/10.1016/j.amjopharm.2011.08.001>.
- Fitzpatrick RM, Witry MJ, Doucette WR, et al. Retrospective analysis of drug therapy problems identified with a telephonic appointment-based model of medication synchronization. *Pharm Pract.* 2019;17:1373. <https://doi.org/10.18549/PharmPract.2019.2.1373>.
- Brummel A, Carlson AM. Comprehensive medication management and medication

- adherence for chronic conditions. *J Manag Care Spec Pharm.* 2016;22:56–62. <https://doi.org/10.18553/jmcp.2016.22.1.56>.
- Moczygomba LR, Alshehri AM, Harlow 3rd LD, et al. Comprehensive health management pharmacist-delivered model: impact on healthcare utilization and costs. *Am J Manag Care.* 2019;25:554–560.
  - Ramvalho de Oliveira D, Brummel AR, Miller DB. Medication therapy management: 10 years of experience in a large integrated health care system. *J Manag Care Pharm.* 2010;16:185–195. <https://doi.org/10.18553/jmcp.2010.16.3.185>.
  - Shcherbakova N, Tereso G. Clinical pharmacist home visits and 30-day readmissions in Medicare Advantage beneficiaries. *J Eval Clin Pract.* 2016;22:363–368. <https://doi.org/10.1111/jep.12495>.
  - By the American geriatrics society Beers criteria update expert P. American geriatrics society 2015 updated Beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2015;63:2227–2246. <https://doi.org/10.1111/jgs.13702>.
  - Adeoye O, Farley TM, Coe A, et al. Medication therapy management delivery by community pharmacists: insights from a national sample of Medicare Part D beneficiaries. *J Am College Clin Pharm.* 2019. <https://doi.org/10.1002/jac5.1160>.
  - Clay PG. MTM economics 101: supply vs. demand. *J Am Pharm Assoc.* 2003;58:228–229. <https://doi.org/10.1016/j.japh.2018.01.010> 2018.
  - Farris KB, Salgado TM, Aneese N, et al. Effect of clinical and attitudinal characteristics on obtaining comprehensive medication reviews. *J Manag Care Spec Pharm.* 2016;22:388–395. <https://doi.org/10.18553/jmcp.2016.22.4.388>.
  - Coe AB, Adeoye O, Pestka D, et al. Patterns and predictors of older adult Medicare Part D beneficiaries' receipt of medication therapy management. *Res Soc Adm Pharm.* 2019. <https://doi.org/10.1016/j.sapharm.2019.12.007>.
  - Barragan NC, DeFosset AR, Torres J, Kuo T. Pharmacist-driven strategies for hypertension management in los angeles: a community and stakeholder needs assessment, 2014–2015. *Prev Chronic Dis.* 2017;14:E54. <https://doi.org/10.5888/pcd14.160423>.
  - Pinnock H, Adlem L, Gaskin S, Harris J, Snellgrove C, Sheikh A. Accessibility, clinical effectiveness, and practice costs of providing a telephone option for routine asthma reviews: phase IV controlled implementation study. *Br J Gen Pract.* 2007;57:714–722.
  - Schmidt K, Caudill JA, Hamilton T. Impact of clinical pharmacy specialists on glycemic control in veterans with type 2 diabetes. *Am J Health Syst Pharm.* 2019;76:S9–S14. <https://doi.org/10.1093/ajhp/zxy015>.
  - Williams M, Cairns S, Simmons D, Rush E. Face-to-face versus telephone delivery of the Green Prescription for Maori and New Zealand Europeans with type-2 diabetes mellitus: influence on participation and health outcomes. *N Z Med J.* 2017;130:71–79.
  - Smith M, Giuliano MR, Starkowski MP. In Connecticut: improving patient medication management in primary care. *Health Aff.* 2011;30:646–654. <https://doi.org/10.1377/hlthaff.2011.0002>.
  - Winston S, Lin YS. Impact on drug cost and use of Medicare part D of medication therapy management services delivered in 2007. *J Am Pharm Assoc.* 2003;49:813–820. <https://doi.org/10.1331/JAPhA.2009.09066> 2009.
  - By the American Geriatrics Society Beers Criteria Update Expert P. American geriatrics society 2019 updated AGS Beers criteria(R) for potentially inappropriate medication use in older adults. *J Am Geriatr Soc.* 2019;67:674–694. <https://doi.org/10.1111/jgs.15767>.
  - Tannenbaum C, Martin P, Tamblyn R, Benedetti A, Ahmed S. Reduction of inappropriate benzodiazepine prescriptions among older adults through direct patient education: the EMPOWER cluster randomized trial. *JAMA Intern Med.* 2014;174:890–898. <https://doi.org/10.1001/jamainternmed.2014.949>.
  - Martin P, Tamblyn R, Benedetti A, Ahmed S, Tannenbaum C. Effect of a pharmacist-led educational intervention on inappropriate medication prescriptions in older adults: the D-PRESCRIBE randomized clinical trial. *J Am Med Assoc.* 2018;320:1889–1898. <https://doi.org/10.1001/jama.2018.16131>.
  - Kouladjian L, Gnjidic D, Reeve E, Chen TF, Hilmer SN. Health care practitioners' perspectives on deprescribing anticholinergic and sedative medications in older adults. *Ann Pharmacother.* 2016;50:625–636. <https://doi.org/10.1177/1060028016652997>.
  - Conklin J, Farrell B, Suleman S. Implementing deprescribing guidelines into frontline practice: barriers and facilitators. *Res Soc Adm Pharm.* 2019;15:796–800. <https://doi.org/10.1016/j.sapharm.2018.08.012>.
  - Perera PN, Guy MC, Sweaney AM, Boesen KP. Evaluation of prescriber responses to pharmacist recommendations communicated by fax in a medication therapy management program (MTMP). *J Manag Care Pharm.* 2011;17:345–354. <https://doi.org/10.18553/jmcp.2011.17.5.345>.
  - Doellner JF, Dettloff RW, DeVuyst-Miller S, Wenstrom KL. Prescriber acceptance rate of pharmacists' recommendations. *J Am Pharm Assoc.* 2003;57:S197–S202. <https://doi.org/10.1016/j.japh.2017.03.002> 2017.
  - Mann A, Esse T, Abughosh SM, Serna O. Evaluating pharmacist-written recommendations to providers in a Medicare advantage plan: factors associated with provider acceptance. *J Manag Care Spec Pharm.* 2016;22:49–55. <https://doi.org/10.18553/jmcp.2016.22.1.49>.
  - Car J, Sheikh A. Telephone consultations. *BMJ.* 2003;326:966–969. <https://doi.org/10.1136/bmj.326.7396.966>.
  - Smith S, Cell P, Anderson L, Larson T. Minnesota Department of Human Services audit of medication therapy management programs. *J Am Pharm Assoc.* 2003;53:248–253. <https://doi.org/10.1331/JAPhA.2013.12165> 2013.