Pharmacist-delivered Patient Care Services
Evidence Examples

The pharmacist's role in delivering patient care services continues to evolve, with the body of evidence supporting pharmacists' impact growing daily. The American Pharmacists Association (APhA) convened a group of scientific experts and charged them with identifying examples of the best evidence of pharmacists' impact on patient medication–related and other health outcomes. In 2013, the first expert panel[1] limited the search of the medical literature to a 10-year period, from 2000 to 2010. Focusing on medication therapy management (MTM) outcomes, the panel extracted key examples from the literature and created summary statements supported by the research data. The 2014[2], 2015[3], and 2016[4] panels continued to evaluate newly published studies but with an expanded focus on pharmacists' patient care services, including MTM.

The articles below, organized topically, reflect some of the key examples identified by the expert panel. Each example includes a concise statement of key findings, title of the manuscript, and source from which the full manuscript can be obtained.

APhA recognizes the need for an ongoing effort to collect and summarize the best examples of pharmacist-provided patient care services, including MTM. Working closely with APhA's Science Officer, experts will continue to survey the literature for pharmacist-delivered patient-care outcome publications routinely. As the evidence expands, this compendium of pharmacist provision-of-care publications will grow. Have comments, inquiries, suggestions, and/or potential corrections? E-mail APhA's Science Officer, Patrick Clay, at PClay@aphanet.org.

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[1] Members of the 2013 Expert Panel are listed in Appendix A and publications reviewed are indicated by a superscript 1 at the end of the publication summary.

[2] Members of the 2014 Expert Panel are listed in Appendix B and publications reviewed are indicated by a superscript 2 at the end of the publication summary.

[3] Members of the 2015 Expert Panel are listed in Appendix C and publications reviewed are indicated by a superscript 3 at the end of the publication summary.

[4] Members of the 2016 Expert Panel are listed in Appendix D and publications reviewed are indicated by a superscript 4 at the end of the publication summary.

Section 1: Patients with Multiple Chronic Diseases

- This retrospective study evaluated the impact of telephonic medication therapy management (MTM) provided by pharmacists on total health care costs, inpatient visits, emergency department visits, and total days' supply of medication and medication adherence for patients with diabetes, hypertension, dyslipidemia, depression, and asthma. Pharmacists working within an employer group provided MTM at least 3 times over a 1-year period to patients. Researchers compared these patients (n = 2,250) to matching cases that did not receive services under this MTM model (n = 2,250). The researchers discovered those receiving MTM had a decrease in inpatient visits of 18.6% while those who did not participate saw an increase of 24%. Those participating also had statistically significantly lower admission rates, lower rates of ER visits, fewer physician outpatient visits, and higher medication adherence. This study looked at a real-world approach to delivering pharmacist services and appeared to provide economic and clinical benefit in this employer-based setting.[2]

  Moore JM, et al. Impact of a Patient-Centered Pharmacy Program and Intervention in a High-Risk Group. J Man Care Pharm 2013;19:228-36.

- This study described the economic impact of redesigning the healthcare system to help primary care patients achieve their drug therapy treatment goals. Using a team-based healthcare approach in which the pharmacists provided comprehensive medication therapy management (MTM) for patients with chronic medical conditions and coordinated patient-specific goals of therapy, researchers looked longitudinally at the cost to deliver care, drugs, and other care delivery quality benchmarks to see which differed between clinics using this model vs. those that did not. A few of the key findings in the intervention group (n = 823) were: (1) slowed growth in expenditures from 15% (in the 38 clinics not implementing this service) to 4% (11% less) in the 4 clinics where the service was implemented; (2) more than twice as many patients realized success (40% vs. 18%) across all 5 outcome measures examined; and (3) over 4,000 drug therapy problems were resolved in patients with high blood pressure, diabetes, and high cholesterol. This positive outcome study should not be over-interpreted. However, this report seems to give strong support to build care-based, pharmacist-involved systems in team based models.[2]

  Isetts BJ, et al. Managing drug-related morbidity and mortality in a patient-centered medical home. Med Care. 2012: 50;997-1001. DOI: 10.1097/MLR.0b013e31826ecf9a

- Researchers compared two levels of medication therapy management (MTM) activities to each other and standard of care in elderly patients with complicated medical problems. These patients had at least 3 chronic conditions and were on at least 6 medications. Patients were randomly assigned to receive basic MTM (n = 211), enhanced MTM (n = 218) or no MTM (n = 208). The difference between basic and enhanced was that the basic MTM group did not have access to clinical information from medical providers. The MTM model consisted of pharmacists completing comprehensive medication reviews and medication related problem assessment, and sending recommendations to the patients' physicians. Both MTM interventions reduced medication-related problems. There were no measurable differences in adverse drug events and

health care visits over time between the MTM groups and the no MTM group. Physicians responded to approximately half of pharmacist recommendations. When they responded, they accepted the recommendation or altered therapy 94% of the time in the basic MTM and 87% of the time in enhanced MTM groups, suggesting the original therapy was not optimal. Importantly, rejection of recommendations occurred with less than 10% of all recommendations. The researchers encourage development of patient centered models that engage the patient and pharmacist at the point of prescribing rather than afterwards.[2]

> *Touchette DR, et al. Safety-focused medication therapy management: A randomized controlled trial. JAPhA 2012;52:603-12. DOI: 10.1331/JAPhA.2012.12036*

- In a systematic review of 298 published studies, pharmacist-provided MTM services resulted in significantly improved outcomes in disease management, cost savings, or quality of life measures.[1]

> *Chisholm-Burns MA, Kim Lee J, Spivey CA, et al. US pharmacists' effect as team members on patient care: systematic review and meta-analysis. Med Care 2010;48(10):923–33.*

- An analysis of 10 years of results demonstrated the benefit of pharmacist-delivered MTM to more than 9,000 patients. Pharmacists resolved nearly 40,000 drug-related problems with a calculated savings to the health care plan of $750,000. This translated to $1.29 in benefit for every $1 invested in MTM, an excellent rate of return.[1]

> *Ramalho 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(3):185–95.*

- A 1-year study of a pharmacist-directed MTM in a managed care system demonstrated that for every $1 spent on MTM, $12 was saved. Of importance is that these savings occurred along with significant improvements in cholesterol and blood pressure control. Expansion of similarly structured, targeted, pharmacist-provided MTM to all Minnesota's Medicare recipients projects a savings of $7.8 million.[1]

> *Isetts BJ, Schondelmeyer SW, Artz MB, et al. Clinical and economic outcomes of medication therapy management services: the Minnesota experience. J Am Pharm Assoc. 2008;48(2):203–11.*

- In a study involving more than 2,500 medically complicated patients, a collaborative pharmacist–physician MTM program demonstrated a significant increase in those patients who were able to achieve their therapy goals.[1]

> *Isetts BJ, Brown LM, Schondelmeyer SW, Lenarz LA. Quality assessment of a collaborative approach for decreasing drug-related morbidity and achieving therapeutic goals. Arch Int Med. 2003;163(15):1813–20.*

- Following completion of a major systematic review of medication therapy management (MTM) literature performed for AHRQ, the same authors published a description citing the positive findings of pharmacist-provided clinical services. Notably, medication appropriateness, adherence (measured either by doses taken or achieving a threshold percent adherence level that is disease appropriate), and reduced medication dosing (reduced number of doses per day) were all significantly improved via MTM intervention from the studies included in final analysis. There were positive economic measures identified including reduced health plan expenditures, a reduced risk for hospitalization in persons with diabetes or heart failure and reduced costs for diabetes-related hospitalizations. The findings also illustrate the critical need for consistency in MTM interventional study design (prospective methodologies) and in reported outcomes (such as adherence changes and 1-year outcomes) even with the acknowledged broad diversity in 'usual care'. Future studies should include outcomes such as impact on hospitalizations; consistently report on clinical intermediate outcomes and adverse drug effects; report patient-centered outcomes; distinctly define the role (actions) of the pharmacist and clearly defend why information on morbidity and mortality is not present (if applicable). The authors call for researchers and program evaluators to "specify and design MTM interventions based on existing definitions, taxonomies, and service models."[3]

> *Viswanathan M, Kahwati LC, Golin CE, Blalock SJ, Coker-Schwimmer E, Posey R, Lohr KN. Medication therapy management interventions in outpatient settings: a systematic review and meta-analysis. J Amer Med Assoc Intern Med 2014;Online:E1-12. DOI: 10.1001/jamainternmed.2014.5841*

Section 2: Chronic Conditions

Cardiovascular Disease

- Over a 6-month period, pharmacists provided a variety of medication therapy management (MTM) services to patients with heart disease as a 'no-cost-to-patient' part of an employer's health plan. Researchers compared clinical and economic outcomes for those who received MTM (n=63) with a matched group of patients who did not receive MTM (non-MTM, n=62). Economically, the MTM group's total direct healthcare expenditures were significantly lower ($359/patient) and revealed a return-on-investment of 1.67. Clinically, those who received MTM had higher rates of meeting their blood pressure and body mass index goals. The specific scope of MTM service provided was adapted according to individual patient needs and it showed that in less than one year, pharmacists had a positive financial and clinical impact on patients with cardiovascular disease.[2]

> *Wittayanukorn S, et al. Evaluation of medication therapy management services for patients with cardiovascular disease in a self-insured employer health plan. J Manag Care Pharm 2013;19(5):385-95.*

- A study demonstrated that pharmacists providing MTM for more than 5,500 older adult veterans with congestive heart failure reduced hospitalizations by 45% compared with those veterans who received only physician-based care.[1]

    Roughead EE, Barratt JD, Ramsay E, et al. The effectiveness of collaborative medicine reviews in delaying time to next hospitalization for patients with heart failure in the practice setting: results of a cohort study. Circ Heart Fail. 2009;2(5):424–8.

- A group of 56 community pharmacies in Alberta, Canada were evaluated to determine if pharmacist-provided medication therapy management delivered to patients who were at high-risk for a major cardiovascular event would be able to lower patient risk in just 3 months. Compared to the group that did not receive the pharmacist's intervention, statistically significant greater reductions in bad cholesterol (LDL-c) and uncontrolled high blood pressure were achieved as well as greater improvements in persons with diabetes and smoking cessation. Overall, patients receiving medication therapy management from the pharmacists experienced a 21% reduction in estimated cardiovascular risk, again confirming the valuable benefit of having community pharmacists provide care to patients with multiple medical conditions.[4]

    Tsuyuki RT, Hammarneh YN, Jones CA, Hemmelgarn BR. Effectiveness of community pharmacist prescribing and care on cardiovascular risk reduction: randomized controlled RxEACH trial. J Amer Coll Cardiol 2016;16:2846-54. DOI: 10.1016/jack.2016.03.52

High Blood Pressure (Hypertension)

- Patients with diabetes who had uncontrolled high blood pressure and received MTM from a community pharmacy supplementing their physicians' care were nearly 13 times more likely to achieve their health care goals compared with those who did not take part in the program.[1]

    Planas LG, Crosby KM, Mitchell KD, Farmer KC. Evaluation of a hypertension medication therapy management program in patients with diabetes. J Am Pharm Assoc. 2009;49(2):164–70.

- A study of a pharmacist–physician collaborative approach to managing high blood pressure demonstrated that within a year and a half, nearly *twice as many patients had control of their blood pressure* when pharmacists helped the patients manage their medications, compared with those not assisted by pharmacists.[1]

    Wentzlaff DM, Carter BL, Ardery G, et al. Sustained blood pressure control following discontinuation of a pharmacist intervention. J Clin Hypertens. 2011;13(6):431–7.

- Over the course of a year, a clinical trial demonstrated a statistically significant improvement in blood pressure control and maintenance through community pharmacy–based MTM services.[1]

Weber CA, Ernst ME, Sezate GS, Zheng S, Carter BL. Pharmacist-physician comanagement of hypertension and reduction in 24-hour ambulatory blood pressures. Arch Int Med. 2010;170(18):1634–9.

- A systematic review of 39 randomized, controlled hypertension trials with 14,225 outpatients was performed to investigate the effect of pharmacist care on blood pressure control, whether delivered alone or through collaborative practice agreements with other health care professionals. In these studies, pharmacists' interventions consisted of patient education (lifestyle, medication adherence), feedback to health care professionals, and medication adjustments. There were clinically meaningful decreases in systolic and diastolic blood pressures. Reflecting highly diverse patient groups and pharmacist interventions types, this broad literature evaluation suggests that the best outcomes result from: (1) interventions occurring more than once a month, (2) led by pharmacists, or (3) conducted in the community pharmacy setting. One important issue left to be determined is if the specific intervention should be predefined by a narrow protocol or flexibility provided to the pharmacist.[2]

Santschi V, et al. Improving blood pressure control through pharmacist interventions: a meta-analysis of randomized controlled trials. J Amer Heart Assoc 2014;3e000718. DOI:10.1161/JAHA.113.000718

- Patients using home blood pressure (BP) telemonitoring with pharmacist case management in 8 clinics (n=228) were compared to patients receiving usual care in 8 different primary care clinics (n=222) over an 18-month period. Working with physicians in a collaborative practice model, pharmacists assessed and adjusted antihypertensive drug therapy, and emphasized importance of lifestyle modifications and medication adherence. At both 6 and 12 months, BP control was greater in the pharmacist group than the usual care group by nearly a 2-fold difference. Also, a difference in BP control remained between groups 6 months after the program ended (72% vs. 57%). Using a very rigorous scientific approach – including randomization - this study demonstrated the positive initial, intermediate, and enduring impact of pharmacist case management using home BP telemonitoring across many different physician practice sites.[2]

Margolis KL, et al. Effect of home blood pressure telemonitoring and pharmacist management on blood pressure control: a cluster randomized clinical trial. J Amer Med Assoc 2013;310:46-56. DOI: 10.1001/jama.2013.6549

- A large (625 patients), multi-site (32 clinics), prospective (up to 24 months), cluster-randomized trial of a collaboration between a physician and pharmacist to improve short and long term blood pressure control demonstrated important positive outcomes. The patients that were assigned to the pharmacists' group were more likely to have a meaningful reduction in blood pressure at 9 months and this reduction continued 13-months after the patients' formal meetings (intervention) with the pharmacists stopped. Of importance, this trial showed this impact was possible in a population that was majority minority, had either diabetes or chronic kidney disease, and nearly all over 55 and 60% female. In addition to the clinical findings, the project, a comparative effectiveness design enabled evaluation of consistency in interventions provided by the pharmacists as well as incorporated provider attitudes on these services and should be emulated to the extent possible in future studies.[3]

Carter BL, Coffey CS, Ardery G, Uribe L, Ecklund D, James P, Egan B, Vander Weg M, Chrischilles E, Vaughn T. Cluster-randomized trial of a physician/pharmacist collaborative model to improve blood pressure control. Circ Cardiovasc Qual Outcomes 2015.8:235043. DOI: 10.1161/CIRCOUTCOMES.114.001283.

- Though entirely conducted outside the US healthcare system, this research note was notable for several key aspects that are instructive to US-based healthcare providers and systems considering evaluating the role of pharmacists on healthcare teams. This planned, secondary analysis, with data drawn from a randomized, controlled clinical trial, specifically assessed for changes made to antihypertensive regimens by pharmacists in patients with diabetes. Diabetes (average age 60) patients (n=200) cared for by a healthcare team including a pharmacist were more likely to have their antihypertensive medications changed with the change most often consisting of a blood pressure medicine added that brought the elderly patients more in-line with US-based hypertension and diabetes guidelines. In those healthcare teams with pharmacists, patients who had change made to their regimen were statistically more likely to have improvement in blood pressure control compared to those with changes on the teams that increased adherence was observed in the patients receiving care from the healthcare team including a pharmacist whereas a decrease was seen in the other teams.[3]

Omran D, Majumdat SR, Johnson JA, Tsuyuki RT, Lewanczuk RZ, Guirguis LM, Makowsky M, Simpson SH. Pharmacists on primary care teams: effect on antihypertensive medication management in patients with type 2 diabetes. J Amer Pharm Assoc 2015;55:e301-4. DOI: 10.1331/JAPHA/2015.14225.

High Cholesterol

- More than 200 Florida Medicare Part D enrollees took part in a study evaluating pharmacist-provided MTM focused on cholesterol management. After 1 year, over *two-thirds had reached their goal* for cholesterol levels compared with just half of those not receiving MTM. Even more powerful was the finding that this group used *less* medicine and *reduced* their *out-of-pocket expenses*. If all 3 million of Florida's Medicare Part D enrollees participated in focused, pharmacist-provided MTM, using 2012 population figures, the *projected out-of-pocket savings* for these seniors is nearly *$12 million.*[1]

Fox D, Ried LD, Klein GE, Myers W, Foli K. A medication therapy management program's impact on low-density lipoprotein cholesterol goal attainment in Medicare Part D patients with diabetes. J Am Pharm Assoc. 2009;49(2):192–9.

Diabetes

- A 1-year pharmacist-led program evaluated outcomes among patients with diabetes who received medication therapy management (MTM). The results compare those receiving MTM (n = 121) with those who did not (non-MTM, n = 103). The MTM group achieved greater diabetes

control than the non-MTM group using the 5-component optimal diabetes care measures (glucose levels, cholesterol, blood pressure, tobacco use, and daily aspirin use). Greater diabetes control and better cholesterol results were especially seen in those MTM group patients who participated in five or more MTM visits in a year – reinforcing the importance of retention in care models. Notably, one year after the program's discontinuation, the diabetic patients who received MTM regressed to baseline, thereby highlighting the benefits of sustaining a MTM program with regular pharmacist follow-up. This study's main limitations were self-referral of a motivated population and a retrospective source of data for the non-MTM group data.[2]

> *Brummel AR, et al. Optimal diabetes care outcomes following face-to-face medication therapy management services. Popul Health Manag 2013;16:28-34. doi:10.1089/pop.2012.0023*

- African Americans make up 51% of the 23 million Americans battling diabetes. This one group (11.7 million African-Americans with diabetes) accounts for $90 billion in annual health care costs, or $7,600 per African American. In a year-long study of a pharmacist-provided MTM program for persons with diabetes, more than half (56.3%) of the African Americans with diabetes significantly improved their diabetes control. This control made them less likely to develop costly complications like dialysis, amputations, and transplants. If MTM were applied to all African Americans with diabetes, reducing their health care costs by even $1 per patient would save $6.6 BILLION annually.[1]

> *Jameson JP, Baty PJ. Pharmacist collaborative management of poorly controlled diabetes mellitus: a randomized controlled trial. Am J Manag Care. 2010;16(4):250–5.*

- Patients participating in a pharmacist MTM diabetic program for 1 year had significant improvement in their *blood pressure, cholesterol, and diabetes*. In addition, because pharmacists also taught the patients how to care for themselves, significantly more had their annual eye examinations and diabetic foot checks and received influenza vaccinations, resulting in significant cost savings.[1]

> *Fera T, Bluml BM, Ellis WM. Diabetes Ten City Challenge: final economic and clinical results. J Am Pharm Assoc. 2009;49(3):383–91.*

- In a 2009 pilot study, 50 type 2 patients with diabetes patients receiving pharmacist-directed MTM made significant and sustained improvement in blood glucose, weight loss, and blood pressure. While these patients spent an additional $300 on medications over this period, they actually reduced their total health care costs from the previous year by approximately $2,500 per patient or $125,000 overall.[1]

> *Monte SV, Slazak EM, Albanese NP, Adelman M, Rao G, Paladino JA. Clinical and economic impact of a diabetes clinical pharmacy service provided in a university and primary care–based collaboration model. J Am Pharm Assoc. 2009;49(2):200–8.*

- An accountable care organization (ACO) evaluation of 23 pharmacists (representing 44 distinct clinics and 30 pharmacies in the upper Midwest) providing medication therapy management services (MTM) to high-risk patients with diabetes (over 20,000) demonstrated positive impact on various clinical measures (glucose control, LDL-cholesterol, blood pressure, smoking cessation and appropriate use of aspirin) while also generating a 12:1 return on investment (ROI). The pharmacist-specific role was to complete a systematic review of medication therapy to identify (over 100,000 identified) and resolve drug therapy problems through communication either in the clinic (via electronic medical record communication, telephonic or face to face with patient), notations in medical record or by directly modifying therapy through collaborative drug therapy management agreements. Included are what was identified as best practices lessons learned from the experience ranging from structure, to outcomes, and the changes required along the way to optimize the service. Authors noted no single delivery approach will likely be successful. Further, it revealed indirect contact (telephone or video conferencing) could be effective as one site only conducted 40% of interactions face-to-face yet still generated similar resuts.[3]

  > *Brummel A, Lustig A, Westrich K, Evans MA, Plank GS, Penso J, Dubois RW. Best practices: improving patient outcomes and costs in an ACO through comprehensive medication therapy management. J Manag Care Pharm 2014;20:1152-8.*

Chronic Kidney Disease

- A 2-year study involving 104 patients with *severe kidney disease and on dialysis* demonstrated that pharmacist-provided MTM resulted in significantly fewer and shorter hospitalizations and reduced medication use compared with dialysis patients not receiving pharmacists' care.[1]

  > *Pai AB, Boyd A, Depczynski J, Chavez IM, Khan N, Manley H. Reduced drug use and hospitalization rates in patients undergoing hemodialysis who received pharmaceutical care: a 2-year, randomized, controlled study. Pharmacotherapy. 2009;29(12):1433–40.*

- Minorities are disproportionately afflicted with chronic kidney disease requiring dialysis, and because fewer transplants are available, they must remain on dialysis for longer periods than nonminorities. Minority dialysis patients receiving pharmacist-provided MTM reported having a better quality of life, improved diet, more physical activity, and a better time with their families compared with those who did not receive MTM.[1]

  o > *Pai AB, Boyd A, Chavez A, Manley HJ. Health-related quality of life is maintained in hemodialysis patients receiving pharmaceutical care: a 2-year randomized, controlled study. Hemodial Int. 2009;13(1):72–9.*

Section 3: Special Populations

Older Adults

- Pharmacist-provided MTM to older adult patients in long-term care facilities saved more than $1.3 million dollars.[1]

  Trygstad TK, Christensen DB, Wegner SE, Sullivan R, Garmise JM. Analysis of the North Carolina long-term care polypharmacy initiative: a multiple-cohort approach using propensity-score matching for both evaluation and targeting. Clin Ther. 2009;31(9):2018–37.

Mental Health

- Pharmacists impacted patient safety in patients prescribed psychotropic agents with known sub-optimal safety monitoring who were exclusively followed by their primary care providers. This benefit was seen after the pharmacist performed population level medication reviews that were limited to having EHR access only. Over a 1-year project period, pharmacists' reviews and subsequent accepted recommendations resulted in an 18% improvement in patients being up-to-date in psychotropic medication safety monitoring as well as a 20% reduction in risk for drug interaction-based adverse events. Notably, the provider survey regarding the service was overall positive, with some feedback that it would be helpful if pharmacists would take a more active role in ordering and completing laboratory monitoring or personally seeing the patients.[4]

  Gallimore CE, Sokhal D, Zeidler-Schrieter E, Margolis AR. Pharmacist medication reviews to improve safety monitoring in primary care patients. Families, Systems & Health 2016;34;104-13. DOI: 10.1037/fsh0000185

Multiple Sclerosis

- By participating in a pharmacist-managed MTM program, Medicare patients with multiple sclerosis took their medications more regularly and correctly, providing for much more cost-effective management of their disease.[1]

  Stockl KM, Shin JS, Gong S, Harada AS, Solow BK, Lew HC. Improving patient self-management of multiple sclerosis through a disease therapy management program. Am J Manag Care. 2010;16(2):139–44.

Palliative Care

- Palliative care represents an area where patients routinely receive multiple medications from numerous providers and where pharmacists are uniquely poised to intervene. Over a 1-year period, pharmacists were able to improve or stabilize pain in patients after a single visit and

demonstrated statistically significant improvement by visit 2 (82% vs. 19%). Further, addressing the primary adverse events in this population (constipation, nausea and vomiting) trended towards resolution in over 88% of patients by the third visit. This study highlighted the important role of pharmacists in managing medications for palliative care patients, and described a clear path for recognizing and credentialing pharmacists.[4]

Ma JD, Tran V, Chan C, Mitchell WM, Atayee RS. Retrospective analysis of pharmacist interventions in an ambulatory palliative care practice. J Oncol Pharm Pract 2016;22:757-65. DOI: 10.1177/1078155212607089

Section 4: Health Policy

- In Health Affairs, noted experts from Yale, University of California at San Francisco, Brigham Women's Hospital, and the University of Connecticut reviewed the available scientific evidence and called for the inclusion of pharmacists as the provider of medication therapy management.[1]

    Smith M, Bates DW, Bodenheimer T, Cleary PD. Why pharmacists belong in the medical home. Health Aff. 2010;29(5):906–13.

- The Journal of the American Medical Association has called for enhanced collaboration between pharmacists and physicians, particularly for older adults, who are at very high risk for poor medical outcomes.[1]

    Steinman MA, Hanlon JT. Managing medications in clinically complex elders: "There's got to be a happy medium." JAMA. 2010;304(14):1592–601.

- In this study, pharmacy researchers have addressed a critical need of governmental and regulatory agencies like Centers for Medicare and Medicaid Services (CMS) to establish relative value units (RVU) for pharmacists working in collaboration with physicians to improve patients' outcomes, Using data from the CAPTION study (demonstrated significant improvement in blood pressure control in a multi-state, collaborative practice model over 5 years), components of pharmacists' work was evaluated, taking into account patient complexity, visit intensity, judgment, training and resources needed to complete the encounter. Pharmacists completed an average 6.2 encounters/patient for a total of 3.44 hours/patient, with nearly 8-times as many encounters taking place via telephone compared to face-to-face. This translated to averages of 33 minutes and 28 minutes per initial and follow-up encounters, respectively. Collectively, including pre- and post- visit time, pharmacists spent 4.99 hours/patient/9-months collaborating with their physician partners to increase blood pressure goal achievement in 43% as compared to no increase in goal achievement in the non-pharmacist group.[4]

    Isetts BJ, Buffington DE, Carter BL, Smith M, Polgreen LA, James PA. Evaluation of pharmacists' work in a physician-pharmacist collaborative model for the management of hypertension. Pharmacother 2016;36:374-84. DOI: 10.1002/phar.1727

Section 5: Miscellaneous Areas

Patient Readmission / Transitions of Care

- Transitions of care after discharge from hospitals were examined for 19,659 elderly patients discharged from two hospitals. The standard for these hospitals was for these patients to receive a telephone call from the hospital call center within 24 hours of discharge. Over a 2-year period, a pharmacist-led a care transition program for 692 patients that consisted of bedside medication delivery by pharmacist prior to discharge and two follow-up phone calls from a pharmacist was implemented. Examining the average 30-day readmission rates between the hospital call center and pharmacist led group, there was a 2-fold reduction in the pharmacist led program. A marked contrast in readmission rates occurred in those over 65 years of age where there was a 6-fold difference favoring the pharmacist-led program. Having the pharmacist make the initial and follow-up contacts, as well as provide the medications prior to hospital discharge, lowered 30-day readmission rates.[2]

    > *Kirkham HS, et al. The effect of a collaborative pharmacist-hospital care transition program on the likelihood of 30-day readmission. Amer J Health-Syst Pharm 2014;71:739-45. DOI: 10.2146/ajhp130457*

- This nationwide, randomized study evaluated if pharmacists providing telephonic medication therapy management (MTM) influenced 30- and 60-day re-hospitalization rates among 895 elderly home health patients. In this study, the MTM service consisted of a minimum of 2 phone calls by the pharmacist over a 30-day period. Despite the study's early termination for budgetary issues, those considered at lower risk for re-admission receiving MTM (n= 232) had a 6-fold reduced risk for re-hospitalization at 30-days and a 3-fold risk reduction at 60-days. There was no statistical difference in either the overall groups or in those at high risk for re-hospitalization, suggesting this MTM model design may be best suited for lower risk patients.[2]

    > *Zillich AJ, et al. A randomized, controlled pragmatic trial of telephonic medication therapy management to reduce hospitalization in home health patients. Health Serv Res 2014; 49:1537-54. DOI: 10.1111/1475-6773.12176*

- Pharmacist-provided telephone-based medication assessment and reconciliation services in persons (n = 243) recently discharged from the hospital significantly decreased readmissions at 7 and 14 days compared to those not receiving services via this MTM model (n = 251). The rate of reduction translated to one readmission prevented for every 25 patients undergoing MTM services. This retrospective analysis balanced patient type, diagnoses, and complexity and included a minimal (single episode) engagement by pharmacists. Researchers projected a savings to the health system of $1.5 million annually. Pharmacists identified medication discrepancies in 80% of patients with many having multiple discrepancies. The benefit was not achieved in those with congestive heart failure (CHF), which raises a question of whether CHF patients benefit from a single intervention.[2]

Kilcup M, et al. Post-discharge pharmacist medication reconciliation: impact on readmission rates and financial savings. J Amer Pharm Assoc 2013;53:78-83. DOI:10.1331/JAPhA.2013.11250

- Addressing the critical healthcare needs in transitions of care, a prospective study looking at community pharmacists providing MTM to recently discharged patients with serious cardiopulmonary conditions was conducted. In partnership with 2 regional hospitals, 7 community pharmacists provided 72-hour, 2 week and 30-day follow-up transitions of care sessions performing medication therapy management services tailored for post-discharge patients. Pharmacists reconciled medications, identified drug therapy problems, recommended changes to therapy, and provided self-management education. The population (90 patients) were overwhelmingly elderly (>60 years old) and averaged 6 medical conditions, 10 medications, and had been hospitalized over 4 days. For over 50% of patients, this was at least their second admission in 1-year. A significant decrease in hospital re-admission rates was realized by the pharmacist intervention group (7%) as compared to those who did not have the pharmacist-provided MTM interventions (20%), a clinically as well as statistically significant difference. Physicians accepted pharmacist therapy modification recommendations in 46% of instances and patients implemented the pharmacist recommendations 72% of the time – both likely key factors in program success.[3]

Luder HR, Frede Sm, Kirby JA, Epplen K, Cavanaugh T, Martin-Boone JE, Conrad WF, Kuhlmann D, Heaton PC. TransitionRx: impact of community pharmacy post-discharge medication therapy management on hospital readmission rate. J Amer Pharm Assoc 2015;55:246-54. DOI: 10.1331/JAPhA.2015.14060

- The IPITCH study was an examination of the impact a face-to-face meeting and follow up phone calls by pharmacists would have on hospital readmissions, emergency department visits, medication errors, and adverse drug events for patients recently discharged from the hospital. Over a 6-month period, the researchers found fewer of those patients being provided pharmacists' care had to be readmitted or go to the ER. This was seen across all disease states with the biggest impact on those patients with a cardiovascular condition. This prospective evaluation demonstrates the value of having pharmacists engage with patients at the point of discharge as well as via telephone once the patient is back home.[4]

Phatak A, Prusi R, Ward B, Hansen LO, Williams MV, Vetter E, Chapman N, Postelnick M. Impact of pharmacist intervention in the transitional care of high-risk patients through medication reconciliation, medication education and post-discharge call backs (IPITCH study). J Hospital Medicine 2016;11:39-44. DOI: 10.1002/jhm.2493.

- Recognizing an opportunity to improve care transitions for all persons, pharmacists in the Pharm2Pharm program provided medication management services to geriatric patients transitioning from hospital to home who were identified as high-risk for medication problems. The project design was for the hospital pharmacists to provide patient-selected community pharmacists the medical and medication information. The community pharmacists would then follow up via telephone (primarily) with the patient (a pharmacist 'hand-off') over a one year

period. Over the 2-year study period, with over 2,000 enrolled patients, the program demonstrated a 36.5% reduction in medication-related hospital re-admissions in the hospitals participating in the program compared to hospitals not participating. The authors provided an estimate of over $6.6 million saved annually by this program with an estimated return on investment of 2.6:1.[4]

> *Pellegrin KL, Krenk L, Oakes SJ, Ciarleglio A, Lynn J, McInnis T, Bairos AW, Gomez L, McCrary MB, Hanlon AL, Miyamura J. Reductions in medication-related hospitalizations in older adults with medication management by hospital and community pharmacists: a quasi-experimental study. J Amer Geriatr Soc 2017;65:212-9. DOI: 10.1111/jgs.14518*

Patient Safety/Medication Errors

- In 2006, Congress directed CMS to work with the Institute of Medicine to reduce medication errors, with a special emphasis on Medicare Part D enrollees. Pharmacist-provided MTM reduced medication costs an average of $840 per patient in year 1 and $1,061 per patient in year 2. In terms of preventing unnecessary hospital admission, patients receiving MTM were *admitted to the hospital 60% less often* with a diagnosis of bleeding ulcers (a $5,000 charge per admission) than those patients not receiving MTM. Every year nearly 500,000 patients are admitted to hospitals in the United States for upper GI bleeds due to peptic ulcers. If pharmacist-directed MTM targeting those with peptic ulcers were delivered across the United States, the health care system could save *$995 million annually*.[1]

> *Pindolia VK, Stebelsky L, Romain TM, Luoma L, Nowak SN, Gillanders F. Mitigation of medication mishaps via medication therapy management. Ann Pharmacother. 2009;43(4):611–20.*

Smoking Cessation

- Allowing pharmacist MTM in a VA (change medications and formally educate patients) produced significant improvements in control of cholesterol, blood pressure, and diabetes and more patients successfully stopping smoking.[1]

> *Taveira TH, Friedmann PD, Cohen LB, et al. Pharmacist-led group medical appointment model in type 2 diabetes. Diabetes Educ. 2010;36(1):109–17.*

- A study of military veterans found that a smoking cessation program provided by pharmacists was 2.5 times more successful than customary VA care.[1]

> *Dent LA, Harris KJ, Noonan CW. Randomized trial assessing the effectiveness of a pharmacist-delivered program for smoking cessation. Ann Pharmacother. 2009;43(2):194–201.*

Appendix A

2013 APhA Evidence for Pharmacist Services Expert Panel

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Appendix B

2014 APhA Evidence for Pharmacists Services Expert Panel

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Appendix C

2015 APhA Evidence for Pharmacists Services Expert Panel

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Appendix D

2016 APhA Evidence for Pharmacists Services Expert Panel

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