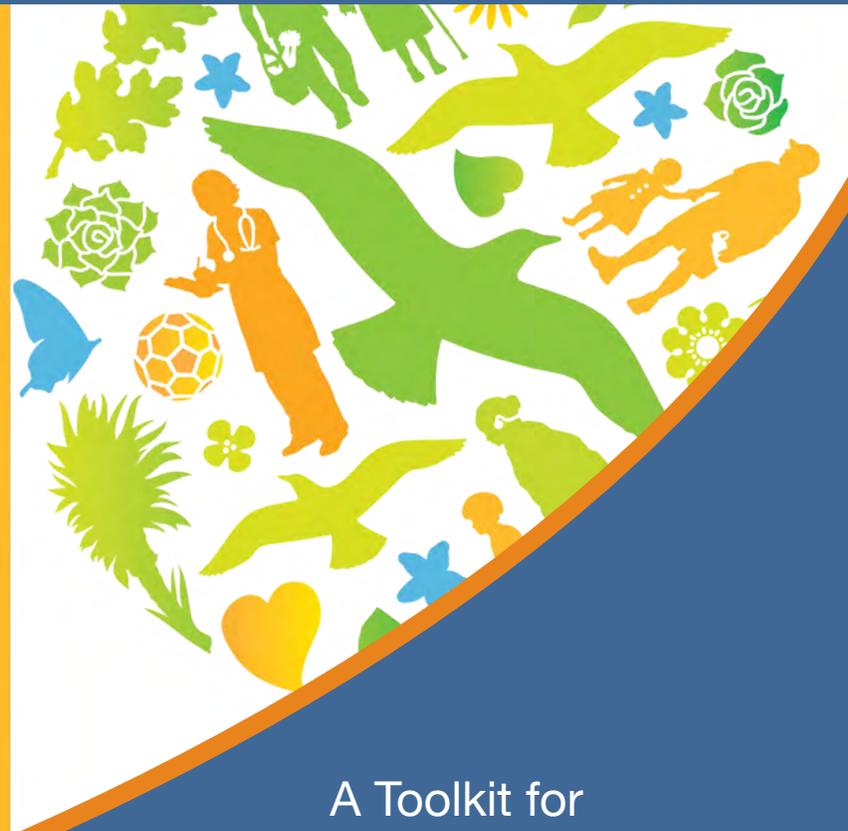


Improving Hypertension Control through Clinical Pharmacy Service Integration:

Comprehensive Medication Management and
Chronic Disease Care Management Models

August 2016



AltaMed

A Toolkit for
Federally Qualified Health Centers (FQHCs)

Authors/Affiliations

Richard Geller

PharmD
AltaMed Health Services

Melissa Jump

PharmD
AltaMed Health Services

Dipa Patolia

PharmD, BCPS, CGP
AltaMed Health Services

Yulia Pchelnikova

PharmD
AltaMed Health Services

Jenny Thai

AltaMed Health Services

Steven Chen

PharmD, FASHP
FCSHP, FNAP
USC School of Pharmacy

Michelle Lee Chu

PharmD, CDE, BCACP
USC School of Pharmacy

Los Angeles County Department of Public Health

Division of Chronic Disease
and Injury Prevention

Noel Barragan

MPH

Jennifer Torres

MSSW, MPH, PhD(c)

Tony Kuo

MD, MSHS

We would also like to thank Michael Hochman, MD, MPH, Keck School of Medicine of USC for his invaluable feedback and insightful suggestions during the writing of this paper.

Table of Contents

Acknowledgements	3
Overview: The Pharmacist’s Role on the Care Team	4
Introduction.....	4
Examples of Pharmacist Impact on Health Outcomes in Federally Qualified Health Centers (FQHCs): A Literature Review	6
Comprehensive Medication Management.....	8
Barriers to Comprehensive Medication Management	
Implementation in Care Delivery Systems	10
Integrating Clinical Pharmacy Services for Hypertension Management	15
AltaMed Health Services Experience with Clinical Pharmacy Services for Hypertension	18
AltaMed-USC Healthcare Innovation Award Grant: Case Study	23
AltaMed Chronic Disease Care Management (CDCM) Model: Case Study.....	35
Lessons Learned and Key Recommendations for CDCM.....	44
Conclusion: Clinical Pharmacist Integration as a Standard Practice for FQHCs	50
Appendix	53
Attachment 1: Patient Care Guideline	53
Attachment 2: AltaMed Algorithm for Provider Use	59
Attachment 3: AltaMed CDCM Script (English)	60
Attachment 4: AltaMed CDCM Script (Spanish).....	62
Attachment 5: AltaMed CDCM Mid-Level Provider Workflow for Hypertension.....	65
Endnotes	68

Acknowledgements

This white paper and toolkit was supported in part by funding through a work order from the Los Angeles County Department of Public Health Division of Chronic Disease and Injury Prevention. Its contents are solely the responsibility of the authors and do not represent the official views of AltaMed Health Services Corporation, the University of Southern California, and/or the Los Angeles County Department of Public Health. Resource materials are included for educational purposes only.

Suggested citation:

Geller R, Jump M, Patolia D, Pchelnikova Y, Thai J, Chu M, Chen S; and the Los Angeles County Department of Health Division of Chronic Disease and Injury Prevention. Improving Hypertension Control Through Clinical Pharmacy Service Integration: Comprehensive Medication Management and Chronic Disease Care Management Models. Los Angeles, California. August 2016.

The Pharmacist's Role on the Care Team

Introduction

More Americans than ever are taking a greater number of prescription drugs. In 2011, the number of prescriptions written in the U.S. reached a record-breaking high of 4.02 billion.¹ Similarly, antihypertensive medication usage has also risen. A population study conducted by The National Health and Nutrition Examination Survey found that the prevalence of antihypertensive medication use among adults has increased significantly from 65% to 77% over the 2001-2010 decade, with almost two-thirds of these patients taking multiple antihypertensive medications.²

Pharmaceuticals occupy a nearly ubiquitous presence in the health care system—they are the most common (and first line of) medical intervention for most chronic medical conditions, and as such, the benefits and dangers pharmaceuticals pose to the patient cannot be underestimated. Drug-related morbidity and mortality costs alone amount to nearly \$374 billion annually in the U.S., nearly equaling the cost of the medications themselves.³

Given how deeply embedded medications are in the patient's health care experience, with some patients filling up to 50 different prescriptions per year, it is not only prudent but necessary for health care delivery systems to offer services focusing on optimizing medication therapy in order to provide optimal health outcomes for the most complex and sickest patients with multiple chronic diseases.⁴ In addition, promoting appropriate medication use minimizes acute care utilization, which drives the majority of health care costs, and reduces mortality. Contemporary pharmacy practice, supported by a constantly evolving pharmacy education curriculum, postgraduate training, and board certification, enables pharmacists to be the health care team members focused on ensuring safe and optimal results from medication therapy.

Examples of Pharmacist Impact on Health Outcomes in Federally Qualified Health Centers (FQHCs): A Literature Review

The benefits of pharmacist involvement in patient care on health outcomes in the United States and in other countries are well-documented in the literature. According to the U.S. Public Health Service, it roughly provides a four-fold return on investment to the health system.⁵ Conversely, according to the New England Healthcare Institute⁶, an estimated \$298 billion in avoidable spending on drug-related morbidity and mortality occurs each year by not having pharmacists participate in medication therapy management outside the traditional dispensing role.⁷ Although the impact of pharmacists on a variety of medical conditions has been published, this white paper focuses on the role and value of pharmacists in hypertension management.

The effectiveness of pharmacists' involvement in hypertension management has been documented in the literature as far back as over four decades ago. A small pilot study in 1973 evaluated the effect of clinical pharmacy services on hypertension control, comparing 25 patients with high blood pressure who received the intervention to 25 "usual care" patients. The results showed that significantly more patients in the pharmacist care group achieved blood pressure control during and throughout the study period. Furthermore, patients' knowledge of hypertension and its treatment improved significantly, and the pharmacists were able to identify a number of adverse drug reactions that were previously not addressed.⁸

In another study conducted by University of Iowa, patients from various racial backgrounds with uncontrolled hypertension were enrolled in a program where the clinical pharmacists worked as part of the medical team at 32 medical offices across 15 states in the U.S. between 2010 and 2013. Results showed that patients who were seen by a team that included a pharmacist had a 6.1 mmHg greater reduction in SBP nine months later, compared to patients who received traditional care during the same time period.⁹ Moreover, the authors of the study found that patients from racial and ethnic minority groups experienced the same degree of blood pressure improvement as the entire population, and were able to sustain the effect for two full years after the intervention ended. This study demonstrated the potential for better hypertension patient outcomes under physician-pharmacist collaborative management.¹⁰

Collaborating with pharmacists does not require physical integration with the health care team. In a community pharmacy-based hypertension program located at Wayne State University in Detroit, MI, patients met with a pharmacist or student pharmacist four times during a six-month period.¹¹ Blood pressure was tracked with a home monitoring device that transmitted readings to the pharmacist. Issues addressed at each visit included education about the importance of blood pressure control and negative consequences associated with hypertension, medication purpose and adherence, lifestyle modification, and a clinical evaluation resulting in identification of medication-related problems. Results showed that the patients with blood pressure above goal at baseline experienced a significant reduction in blood pressure at the end of the study period (-7.3 mmHg change in mean SBP, -4.4 mmHg in DBP).

In a program specific to FQHCs, the Ohio Department of Health collaborated with Ohio colleges of pharmacy and FQHCs in Ohio under a grant from the Center for Disease Control (CDC). In this collaboration, medication therapy management (MTM) was provided by pharmacists to FQHC patients in Ohio to reduce the burden of chronic diseases. The aim of the program was to increase control of disease states such as hypertension and diabetes by having pharmacists provide MTM counseling sessions.¹² The team began tracking data in 2014 in this ongoing project, and the results so far have not been published. However, preliminary data from over 500 patients enrolled reveal that blood pressure control increased from 0% at baseline to 68.6% within a 6-month period,¹³ suggesting promising results from the intervention when the study is complete.

Comprehensive Medication Management (CMM)

The examples shared previously are only a few of the many published studies supporting the value of pharmacists in hypertension management. It is important to recognize that the methods of engaging pharmacists in these programs all differed, ranging from focused disease state management to medication therapy management. While there is not necessarily a single approach to integrating pharmacists into care teams, Comprehensive Medication Management (CMM) has become the method of choice for delivering advanced clinical pharmacy services to patients.

Comprehensive Medication Management is “a direct patient service, provided by qualified clinical pharmacists working as formal members of the patient’s health care team.”¹⁴ As the name indicates, CMM is comprehensive, ensuring that each patient’s medications—prescription, over-the-counter (OTC), alternative/homeopathic or nutritional supplementary—are individually reviewed for appropriateness, effectiveness, safety, and compatibility with the patient’s preference and ability to take them as prescribed, considering all medical problems.¹⁵

Medication management occurs at varying levels in all patient care practices; for example, medication reconciliation (the foundation of medication management) may be performed by any healthcare provider or a clinically trained member of the patient's care team. In contrast, CMM incorporates the clinical pharmacist as the expert on the team in developing an individualized medication care plan to improve health outcomes through optimal medication use. Federally Qualified Health Centers (FQHCs) which primarily serve in federally designated medically underserved areas and populations (MUA/MUP)¹⁶ have higher proportions of patients with chronic conditions and disabilities that require care beyond their insurance coverage, and thus would benefit immensely from using CMM as a care model for their sickest patients.

Many patients can achieve better health outcomes from a more individualized medication care plan and formal education on their medication regimen through CMM. However, CMM provides the greatest return on investment when applied to complex patients with multiple chronic conditions that require a greater number of medications to meet their therapy goals.

Patients are not the only beneficiaries from CMM. Physicians and the entire care team reap valuable benefits when collaborating with clinical pharmacists. The clinical pharmacist's expertise in pharmaceuticals and pharmacotherapy can be relied upon as a resource in a team-based approach to managing complex medication therapies. Pharmacists are not replacing other members of the team, but rather are poised to increase the overall efficiency of the care team, freeing up physicians to dedicate more time to their primary function of providing medical care to more patients.

Barriers to Comprehensive Medication Management Implementation in Care Delivery Systems

Despite the proven benefits of integrating a CMM model and incorporating the clinical pharmacist as a key member of the care team, the many challenges on an institutional, local, and national level underscore CMM's underuse as a sustaining practice model in many health care systems. For FQHCs and other health delivery systems interested in incorporating CMM into their medical care model, it is essential to understand these challenges—failure to recognize and work through these challenges will greatly hinder the implementation and effectiveness of the CMM model. Here are a few of the most common obstacles to establishing a functioning CMM model:

- **Seeking reimbursement for utilizing clinical pharmacists**

A challenge in incorporating clinical pharmacists as members of the patient's care team lies in the fact that CMM services are not currently reimbursed by most public and private third party payers since pharmacists are not recognized as providers at the federal level¹⁷; as a result, few avenues are available for pharmacists to receive payment for clinical services outside of health systems at full financial risks. However, many local and national efforts promote engagement and payment for pharmacist CMM. Medicare Shared Savings Programs, State Innovation Models (SIMs), Partnership for Patients, the 11th Scope of Work for QIOs, Transforming Clinical Practices Initiative (TCPI), Enhanced MTM Model, and Hospital Readmission Penalties all facilitate payment for CMM through goals that rely heavily on pharmacist expertise in CMM. At least half of performance measures tied to payments, including Accountable Care Organization (ACO) performance measures, Medicare Part D Ratings for health plan performance, and 2016 HEDIS measures, are driven by safe and effective use of medications.

Local health plans, such as Inland Empire Health Plan, are incentivizing community pharmacists to offer CMM through a pay-for-performance program that is essentially no financial risk to the health plan. Legislation is being considered that grants Federal provider status to pharmacists providing care to Medicare patients in medically underserved areas. Assembly Bill 2084 is being considered in California, which would provide payment for CMM services delivered to high-risk MediCal patients. By 2018, alternative payment models will make up roughly 50% of all health care payments, along with 90% of FFS tied to quality measures. This valued-based payment environment supports reimbursement for the outcomes associated with CMM services.

However, it is also worth noting that clinical pharmacist integration must not necessarily adhere to a CMM model and organizations to incorporate a clinical pharmacist may look to a disease state management model, as later discussed in the AltaMed Chronic Disease Care Management (CDCM) model case study.

- **Raising provider and patient awareness regarding clinical pharmacist's scope of practice and skillset**

Although the role of the pharmacist has greatly changed over the past few decades and pharmacy practice has evolved to become more clinical and patient-centered, the outdated perception of pharmacy practice as primarily dispensation of medication remains pervasive. Many patients, especially in the community setting, see pharmacists as ancillary health care professionals solely in charge of selling and dispensing medications. Many people—physicians included—are unaware of the direct patient care responsibilities of pharmacists practicing under collaborative practice agreements. A clinical pharmacist can evaluate patients to identify barriers to treatment success, including performance of point of care testing if

indicated, measurement of vital signs, and application of basic medication-related physical assessment, which are all part of the education and training a pharmacist must complete.¹⁸ In fact, Doctor of Pharmacy education, mandated as the only degree that can be offered by schools of pharmacy since 2000, has evolved dramatically and requires, in addition to clinical instruction, direct patient care experiences throughout all years of the curriculum and interprofessional education. This gives pharmacy students the opportunity to apply medication management services in cooperation with all members of the health care team. In addition, up to two years of postgraduate clinical residency training is available, along with fellowships and board certification.

By definition, CMM requires collaborative practice with physicians, so CMM can only be successful if physicians understand the value CMM brings to patients and non-pharmacist providers, including more time to manage more patients, improved patient access, and improved quality of care and health outcomes for patients through safer and more effective use of medications. Federal programs are spreading knowledge about pharmacists on the health care team through CMS, CDC, AHRQ, HRSA, and other agencies. For example, the HRSA Patient Safety and Clinical Pharmacy Services Collaborative helped spread awareness and integration of CMM into FQHCs across that nation. The CDC is currently funding two wellness grants, 1305 and 1422, for counties in need of better health outcomes for diabetes and hypertension patients that require partnerships with pharmacy. The California Department of Public Health (CDPH) formed a CMM Statewide Implementation Work Group in 2015, with a three-year strategy focused on recognition, integration, and appropriate compensation for CMM within health systems for high-risk patients. A CMM white paper specific to Southern California but applicable nationwide was generated from this workgroup

and published in December 2015, available at the CDPH website (<https://www.cdph.ca.gov/programs/cdcb/Documents/CMMWhitePaperCDPH2015Dec23FINALrev.pdf>). The white paper serves as an educational and resource guide for physicians and senior health system leaders. State and national health care organizations are partnering to develop infographics and other media campaign efforts aimed at informing the public about the importance of CMM. These are just a few examples of many efforts to educate the medical and lay community about the value of CMM.

Ultimately, physicians and other non-pharmacist providers become convinced of the value of CMM when they experience it; as CMM practices spread and as more patients reap the benefits, pharmacists will become better known for their role as medication managers integrated or partnering with healthcare teams.

- **Establishing an accurate quality and outcomes tracking system**

Even with the sheer amount of EHR data available at a provider's fingertips, many FQHCs may find it challenging to navigate and establish systems to collect data for quality improvement purposes. Information technology expertise is essential for reliably and efficiently tracking health care quality measures such as blood pressure and hemoglobin A1C readings. These quality measures are crucial for evaluating the impact of CMM and making programmatic adjustments to ensure optimal results. In the long-term, access to acute care resource utilization data is necessary to evaluate the impact of CMM on net/cost savings.¹⁹

- **Adequate staffing and space**

Advanced pharmacy practice services, such as CMM, require the same support and resources as any clinician in order to provide efficient and effective care. Medical assistants and scheduling staff are needed, as well as private space to evaluate patients. Clinical pharmacy technicians can greatly increase patient enrollment and contact for very low cost, as described in the overview of the USC-AltaMed CMMI program.

All members of the health care team who have the potential to identify patients appropriate for CMM should be engaged and understand referral criteria and procedure. For example, co-location of pharmacists with care coordinators is a model that has proven to effectively increase enrollment of high-risk patients. Likewise, pharmacists should be allowed to refer patients to other health care team members as needed. The most successful teams continually engage clinicians from multiple disciplines, together with their organizations' leaders, in the work of understanding, growing, and tracking the impact of CMM. This integrated interprofessional approach revises traditional health care team roles, maximizing the expertise of the entire team to ensure that the patient receives optimal care.²⁰



Integrating Clinical Pharmacy Services for Hypertension Management

Integration of clinical pharmacy services has tremendous potential to improve health outcomes in the FQHC setting because of poor health care quality measures that are pervasive among the medically underserved, including hypertension (HTN). A wide range of factors contributes to poor HTN control in low-income and minority patients, including cultural competency, health literacy (e.g., the absence of symptoms associated with high blood pressure [“the silent killer] which can promote apathy), cost and transportation barriers.

Clinical pharmacy services targeting HTN patients can be applied to the FQHC setting in a multitude of approaches. Two strategies highlighted in this paper are: 1) Comprehensive Medication Management; and 2) the Chronic Disease Care Management (CDCM) model, which includes clinical pharmacists teaming up with a mid-level practitioner (nurse practitioner or physician assistant) who can bill for visits. The goal of both approaches in the Hypertension Management Program (HMP) is to work collaboratively with uncontrolled hypertension patients and the primary care team to ensure that patients meet their blood pressure (BP) goals. Attainment of target BP requires a combination of an appropriate medication regimen, nutrition, exercise, education, and follow-up interventions. Following educational sessions with team members, patients are able to describe the consequences of poorly-controlled hypertension, identify targeted blood pressure levels, list non-pharmacologic interventions that effectively lower blood pressure, and identify the purpose and general mechanism of action, dose, route of administration, frequency, and storage of all medications. It is also essential to identify and correct medication misuse, particularly nonadherence, through education and assistance device and tools.

Medication therapy adjustments (e.g., addition, substitution, discontinuation, dose adjustment) that are evidence-based, safe, effective, and well-tolerated are essential. The work of the clinical pharmacist does not occur in isolation, but as an active and integral member of the health care team. In addition to direct patient care services, the pharmacist serves as a “curb-side” consultant and continually updates primary care providers (PCPs) and their care teams on new medications, evidence, and treatment guidelines.

Eligibility and recruitment focus on patients who would benefit the most by working with a clinical pharmacist. For hypertension patients, the preferred enrollees are those who have not reached BP goals and/or appear to be poorly adherent with medications. Patients are eligible



if diagnosed with hypertension and have received medical care on a regular basis at the clinic. Patients may be recruited by referral from any member of the health care team (primary care physicians, allied health professionals, or health educators), identification through IT queries via established triggers, and self-referral by patients in response to recruitment posters and flyers (see specific examples in case studies below).

AltaMed Health Services Experience with Clinical Pharmacy Services for Hypertension

In 2012, the California Wellness Plan (CWP) was drafted to promote the improvement of chronic disease management, health and wellness, while empowering the community through the state of California to achieve equity in health and wellness for all Californians. As the largest independent Federally Qualified Health Center (FQHC) in the United States, AltaMed Health Services' mission to eliminate disparities in health care access and outcomes by providing integrated, evidence based, culturally and linguistically competent care for Latino, multi-ethnic and underserved families in Southern California aligns with the California Wellness Plan. Given the diverse, medically underserved patient population AltaMed serves, as a safety net health center, AltaMed is uniquely poised to provide care to some of the state's most complex and high-risk patients.

As previously mentioned, an abundance of evidence supports the efficacy of clinical pharmacy services, such as CMM, in optimizing patient health outcomes while simultaneously lowering health care costs.²¹

The state's white paper describes the integration of clinical pharmacy services into the health care team serving complex high-risk and/or high cost patients, and provides local examples of medication management that have proven to improve the quality of medication therapy, improve medication safety, empower patients, improve health outcome measures, and reduce total cost of care, while substantially increasing patient access to care by physicians and other providers.

Hypertension continues to be the most common condition seen not only at AltaMed but in primary care broadly that leads to major medical complications such as myocardial infarction, stroke, renal failure and death if not detected early and treated appropriately.²² Incorporating a pharmacist in the management of hypertension has proven to significantly reduce both systolic and diastolic blood pressure relative to control groups over a six month study period.²³

In alignment to the state's white paper recommendations to develop innovative, collaborative models that maximize quality of care while remaining cost-effective, AltaMed has engaged in two different collaborative practice models where clinical pharmacists offer medication management services for patients with complex medication-related needs in a team-based setting to ensure optimal results from medication therapy. Pharmacists serve as the health care linchpins to provide services at transitions of care, such as following up on complex patients discharged from hospitals to primary care clinics or community pharmacies. The pharmacy team's work is complementary to the physician, who remains the leader of the health care team and can grant any level of scope of practice to the pharmacist through a collaborative practice agreement.²⁴

Both programs follow protocols based on current literature evidence and national treatment guidelines. The primary reference for the AltaMed hypertension protocol is the Joint National Committee (JNC) hypertension treatment recommendations published in 2013. In addition, AltaMed drew recommendations from the American Heart Association (AHA) hypertension guidelines. The blood pressure goal for most patients is less than 140/90 mmHg. Lifestyle modification is emphasized to all patients with hypertension. Patients are evaluated and initially prescribed one or more of the following drug classes: thiazides, calcium channel blockers (CCB), ACE inhibitors or angiotensin receptor blockers (ARBs). AltaMed adopted the AHA recommendation to increase drug dose and or add another medication if blood pressure target has not been met.

The primary differences between the JNC recommendations and AHA guidelines are the following:

AHA guidelines define hypertension as stage 1 and stage 2: stage 1 systolic 140-159 or diastolic 90-99 recommended lifestyle modifications as trial and consider adding thiazide; stage 2 systolic > 160 or diastolic > 100 recommended lifestyle modifications AND thiazide and ACEi, ARB or CCB or ACEi and CCB. The blood pressure goal for patients 80 years of age and older is less than 150/90.

JNC recommends lifestyle modification initiation for all hypertension patients defined as blood pressure more than 140/90 mmHg and more than 150/90 in patients aged 60 years old and older, AND initiation of medication therapy. The recommendation for hypertension patients with CKD is to initiate ACEi or ARB, while other hypertension subgroups should be begin therapy with thiazide-type diuretics.

Figure 1. JNC8 HTN Algorithm

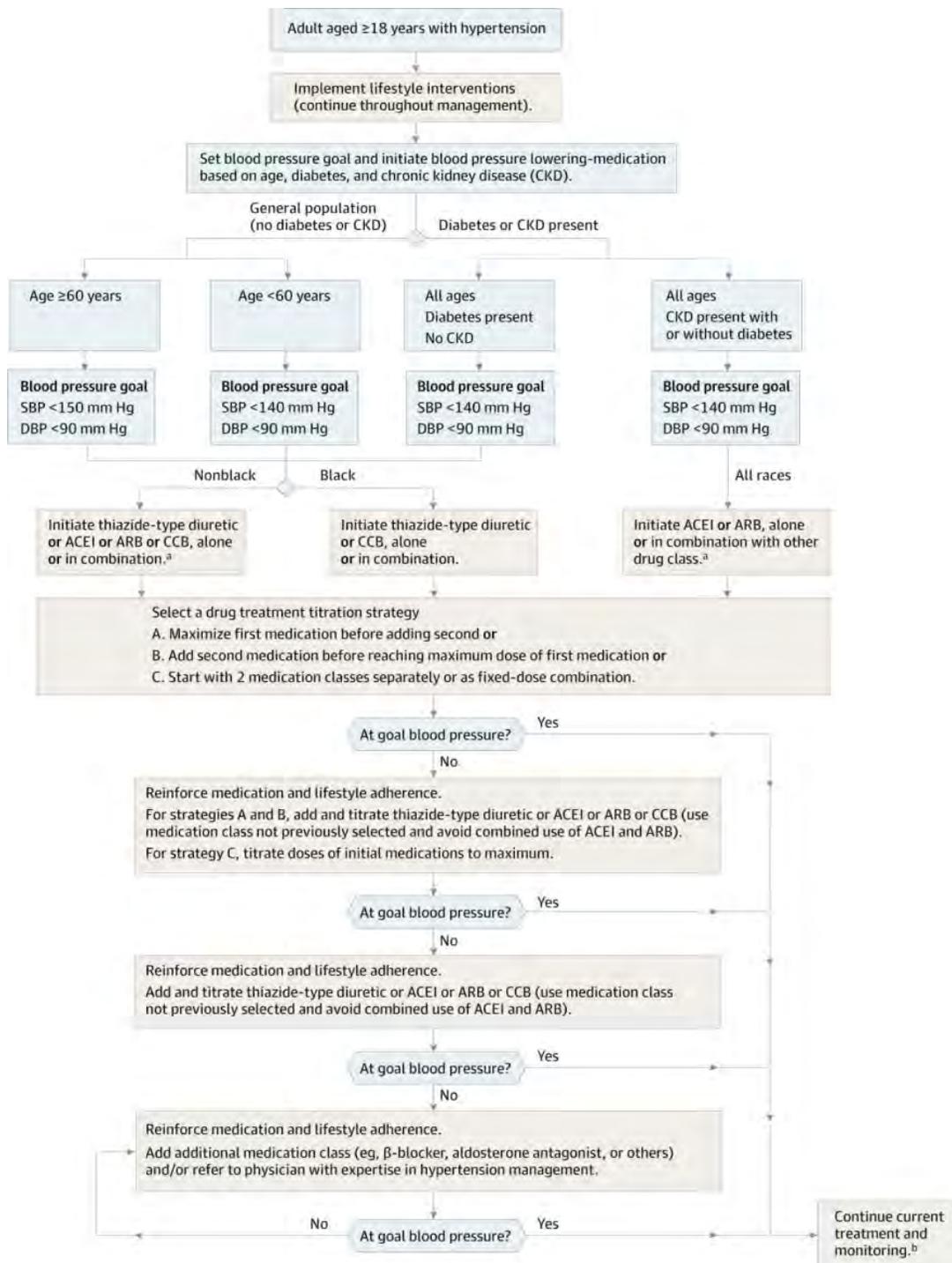
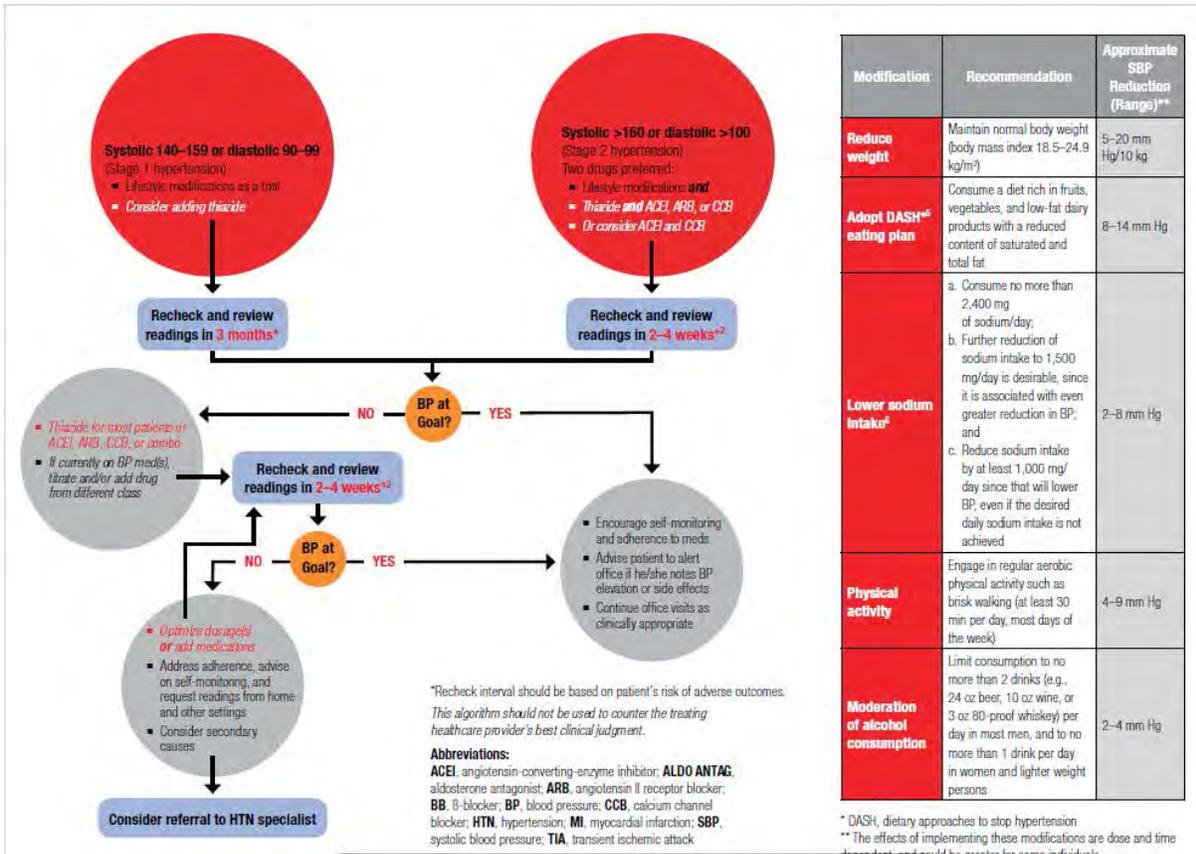


Figure 2. AHA HTN algorithm



Using the recommendations and guidelines put forth by the Joint National Commission and the American Heart Association to develop a comprehensive hypertension protocol that could be easily incorporated into AltaMed's collaborative practice models, AltaMed implemented two models that incorporated clinical pharmacists in the management of hypertension patients: The AltaMed-USC Pharmacy CMM program, funded for three years through a Center for Medicare and Medicaid Innovation (CMMI) grant, and its successor, AltaMed's Chronic Disease Care Management (CDCM) program.

Altamed-USC Comprehensive Medication Management (CMM) Pharmacy Innovation Challenge Grant: Case Study

Program Background

The USC School of Pharmacy was awarded a \$12 million grant in 2012 from CMMI to implement and integrate CMM delivered by clinical pharmacists at AltaMed Health Services. The goal was to achieve the Center for Medicare and Medicaid Services (CMS) Triple Aim of better care, better health, and lower costs. Over a three-year period, USC integrated 10 clinical pharmacy teams into 10 AltaMed clinics, including two PACE clinics in Los Angeles and Orange County. In the last year of the program, USC added a clinical pharmacy team to serve patients from three AltaMed clinics through video telehealth. The impact of this large-scale CMM program on outcomes aligned with National Quality Forum (NQF) health care quality measures, acute care utilization, patient access to health care services, return on investment, and patient and provider satisfaction was evaluated.

Patient selection:

Patients at highest risk for acute care utilization or with poor disease control were targeted for CMM. Patients who were frequently or recently hospitalized were identified through AltaMed administration on at least a weekly basis. Approximately four dozen electronic medical record (EMR)-embedded algorithms or “triggers” were developed that combined medications, medical problems, test results, vital signs, and demographics. These triggers, which were run monthly, identified patients with potential gaps in medication-related safety or quality. The clinical pharmacy team would vet these lists with the EMR and, if a medication-related problem was confirmed, the teams were granted the authority to self-enroll patients and inform primary care physicians of the enrollment.

Primary care providers, including physician assistants and nurse practitioners, were asked to refer high-risk patients. Referral criteria were shared with primary care providers that included a list of chronic diseases and NQF-aligned clinical quality measure thresholds defining poor disease control. Primary care providers would often personally introduce patients to a clinical pharmacy team member (i.e., “warm hand-off”). The team would see patients on the same day whenever possible.

Staffing:

Over 6,000 patients received CMM from the 10 clinical pharmacy teams over the course of three years. Each team consisted of a clinical pharmacist, a pharmacy resident, and a clinical pharmacy technician. All clinical pharmacists had completed at least one year of postgraduate residency training in primary care, almost exclusively through USC, and many had additional certifications (e.g., BPS, CDE). Pharmacy residents provided services similar to clinical pharmacists, but were under close supervision from clinical pharmacists. Pharmacy technicians were trained by clinical pharmacists and residents to provide clerical and clinical support functions through a two-day course at the beginning of their employment. The curriculum that was developed to train the technicians has been integrated into several pharmacy technician schools in Southern California, enabling their graduates to function as clinical pharmacy technicians.

USC pharmacists were granted privileges to initiate, discontinue, or adjust doses of medications that were clinically necessary and were evidence-based according to national treatment guidelines, and to order medication-related laboratory tests through a collaborative practice agreement established between AltaMed Health Services and USC School of Pharmacy. Under this agreement, USC pharmacists managed patients with uncontrolled diabetes, hypertension, dyslipidemia, asthma, COPD, and heart failure, as well as patients on anticoagulation therapy. However, the collaborative practice agreement permitted medication management for any other chronic condition upon consultation with the primary care provider (please refer to Figure 3 for clinic flow chart).

Patients scheduled for a CMM visit received appointment reminder calls from clinical pharmacy technicians. This call was extremely important as it gave clinical pharmacy technicians the opportunity to review the purpose of the visit and address any concerns or confusion that the patient may have about CMM and pharmacists. All of the clinical pharmacy technicians were Latino, which helped facilitate trust and improve communication.

On CMM appointment days, patients were checked in by front office staff as they would for any primary care provider visit. A medical assistant roomed the patient and measured vital signs. Next, the clinical pharmacy technician performed the initial steps of medication reconciliation, and any discrepancies or concerns were reported to the clinical pharmacist. The clinical pharmacist completed the medication reconciliation and evaluated the patient's health literacy, attitude toward medications, adherence, signs and symptoms of unstable chronic conditions, and progress towards treatment goals. In addition, the clinical pharmacist performed medication-related physical assessment, ordered laboratory tests that were appropriate and necessary, and adjusted medication therapies. The clinical pharmacist also provided education at an appropriate literacy level about pathophysiology of chronic conditions, the purpose of each medication, and patient self-management strategies including lifestyle modification. Shared decision-making and motivational interviewing were an integral part of the CMM program.

After the visit was completed, the clinical pharmacy technician or medical assistant scheduled a follow-up appointment, usually ranging from one to four weeks out depending on the severity or complexity of the patient's condition. The clinical pharmacy technicians assisted clinical pharmacists with refill requests, Patient Assistant Program management, reinforcement of self-management strategies, and the use of complex medications or monitoring devices (e.g., insulin, blood glucose monitor, etc.) Since some patients were referred for one-time education and not necessarily management of uncontrolled chronic conditions, only patients who had at least two visits with clinical pharmacists were considered to be CMM program enrollees.

Upon reaching treatment goals (e.g., A1C or blood pressure targets), patients were discharged from the CMM program back to “usual” care. However, discharged patients received check-in calls every two to three months from clinical pharmacy technicians to screen for medication/self-management/monitoring adherence, adverse drug events, or other medication-related issues. This was performed using preformatted questionnaires with binary responses divided in columns, where one column included positive or reassuring responses and the other included negative or concerning responses. Concerning responses were directed to clinical pharmacists for further evaluation and consideration for patient re-enrollment. The summary of CMM program team members is described in Figure 4.

Figure 3: USC / AltaMed CMM Program Process

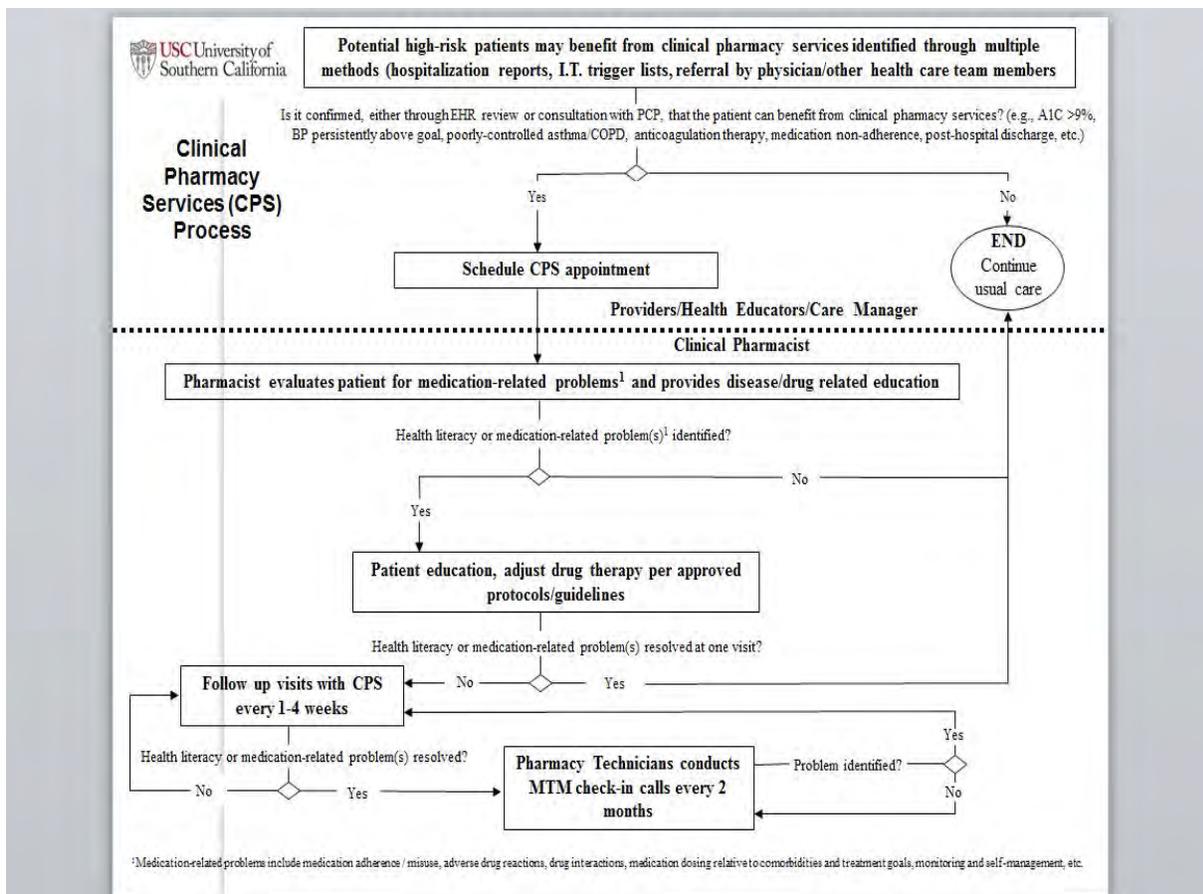


Figure 4. Summary of USC CMM Team Members

<p>Clinical pharmacist</p>	<ul style="list-style-type: none"> • Provides CMM via in-person clinic visit (60 minutes for initial visit; 15-30 minutes for follow-up visit) • Initiates, discontinues, and/or modifies national treatment guideline driven/evidence based drug therapy upon evaluation of patient to obtain clinical goals (i.e. target BP levels, A1c goal) • Orders appropriate laboratory tests • Documents progress note in the EMR in S.O.A.P format • Provides patient education (self-management, disease state, medications, diet, adherence)
<p>Clinical pharmacy technician</p>	<ul style="list-style-type: none"> • Reviews trigger list periodically for eligibility for the program • Recruits patients via phone and coordinate referral from providers • Schedules or reschedules follow up appointment with clinical pharmacist (shared with medical assistant) • Obtains medication history from patients and reconciles with patient’s medical record, which is verified by clinical pharmacist • Provides periodic MTM check-in calls after patient’s clinical goal is obtained and “discharged” from clinical pharmacist to ensure all lab values, clinical goals, and adherence are being maintained • Provides reinforcement of patient education on medical devices (insulin, glucometer, home blood pressure monitor) that were already provided by clinical pharmacist
<p>Medical Assistant*</p>	<ul style="list-style-type: none"> • Measures vitals & reviews allergies at appointment with clinical pharmacist • Schedules follow-up visits with clinical pharmacist

**Functions of medical assistant are shared with clinical pharmacy technician*

Medication-Related Problems:

Over 67,000 medication-related problems (MRPs) were identified and resolved by the pharmacy teams over the course of three years, averaging over 11.5 per patient. These MRPs were documented in the EMR using a tool developed by the USC School of Pharmacy and distributed nationally through the Health Resources and Services Administration Patient Safety and Clinical Pharmacy Services Collaborative (see http://cymcdn.com/sites/www.cshp.org/resource/resmgr/Files/Practice-Policy/For_Pharmacists/cshp_mtm_resource_guide.pdf).

Medication-related problems were divided into four categories:

- **Appropriateness and Effectiveness**
 - Examples: inadequate dosing, untreated medical problem
- **Medication Safety**
 - Examples: excessive medication dosing for the conditions being treated, contraindication, duplicate drug therapy, lack of medication-related monitoring according to national standards
- **Nonadherence and Patient-Specific Issues**
 - Examples: underuse of medication as prescribed, inadequate patient self-management
- **Miscellaneous**
 - Examples: cost/formulary problem, no follow-up appointment with PCP

Most MRPs (approximately one-third) were associated with appropriateness and effectiveness of medication therapy. One-fifth were medication safety problems and another one-fifth were nonadherence. Just over 10% were problems with patient self-management that attenuated the therapeutic benefits of medications. Consequently, the clinical pharmacists added, substituted, or adjusted medications much more often than discontinuing medications. This pattern is consistent in most CMM programs, particularly adult non-senior populations, regardless of payer mix; treatment inertia (i.e., failure to advance drug therapy when patients present with health care quality measures that are clearly not meeting NQF-aligned treatment goals) is common for many chronic diseases. Hypertension is one of the most common chronic diseases associated with treatment inertia in the literature, and was one of the most frequently managed conditions by the pharmacy team.

Hypertension management under the USC CMM program

Target patient population:

Patients targeted for hypertension management by clinical pharmacy teams had a sustained systolic blood pressure above 140 mmHg (150 mmHg if 60 years and older) or diastolic blood pressure above 90 mmHg. Patients with proteinuric chronic kidney disease had a lower systolic blood pressure threshold of 130 mmHg. Targeted patients were identified through the trigger list or referred by their primary care providers.

Management process:

As indicated in the flow diagram, patients with blood pressure above goal were seen by a clinical pharmacist every one to four weeks depending on the severity of their blood pressure levels and/or concerns about the safety, efficacy, or use of medication therapy. At each visit, the clinical pharmacist conducted a comprehensive medication review, evaluated medication adherence, screened for signs and symptoms indicating potential or actual adverse drug events or poor blood pressure control, evaluated self-monitored blood pressure levels (if available), discussed treatment goals and expectations, and reinforced the importance of lifestyle modifications.

Total appointment duration (including time with medical assistant, clinical pharmacy technician, and clinical pharmacist) was typically between 30 to 60 minutes, depending on each patient's level of health literacy, language barriers, and the number of medication-related problems identified. Clinical pharmacy technicians provided the most non-pharmacist interaction with patients during appointments (10 to 20 minutes), which gave clinical pharmacists more focused time to spend evaluating and resolving medication-related matters. Having clinical pharmacy technicians on CMM teams enabled the team to provide CMM to 50% more patients per day than when no technician was available.

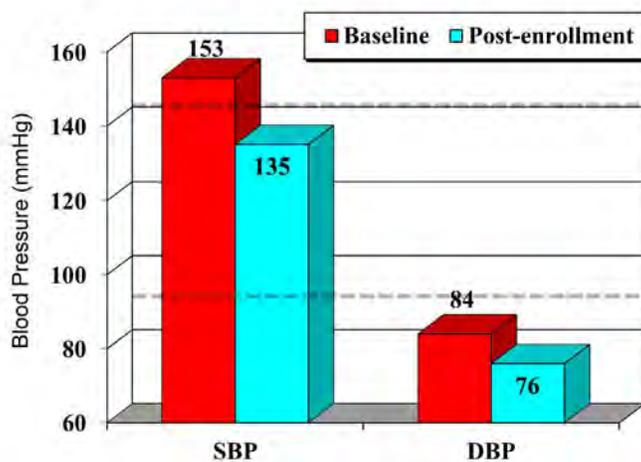
After patients reached blood pressure goal, they were "discharged" from the CMM program. However, a clinical pharmacy technician provided check-in phone calls every two to three months to collect information on medication adherence, lifestyle modification, and maintenance of blood pressure control. Any responses of concern during the technician check-in calls prompted the pharmacist to evaluate the patient and consider reenrollment. Otherwise, the patient continued their appointments with primary care providers.

Outcomes:

Early results from the program for patients with blood pressure above goal at baseline (N=356) indicated that 87% of patients who received care through the USC-Altamed CMMI program achieved a systolic blood pressure of <140 mmHg and diastolic blood pressure <90 mmHg.

Blood Pressure Changes at 45 Days (n=356), Patients with BP > 140/90 mmHg Upon Enrollment

87% achieved BP < 140/90 mmHg within 45 days



Longer-term impact on hypertension management was measured by the magnitude of change in blood pressure at three and six months of enrollment with clinical pharmacy teams. In addition, control of blood pressure (NQF 0018) was compared between patients who received CMM and a propensity score-matched cohort of patients from non-intervention AltaMed clinics that was not exposed to CMM. Improvement of blood pressure at three and six months of enrollment:

Total of 1,032 patients with blood pressure above goal had at least one visit with AltaMed primary care providers from 10 study sites and had an ICD-CM9 for hypertension and hypertension-related codes during the six-month period prior to their enrollment.

At baseline, the average systolic blood pressure (SBP) of these patients was 151.7 mmHg and diastolic blood pressure (DBP) was 82.5 mmHg. The propensity score-matched cohort was very similar (average SBP/DBP = 152.7/81.9 mmHg).

After three months of CMM, the average SBP improved to 135.2 mmHg along with average DBP to 76.0 mmHg (reduction of -16.5 and -6.5 mmHg, respectively). In comparison, the control cohort SBP and DBP values at three months were 140.8 and 76.8 mmHg, respectively. After six months of enrollment, the average SBP and DBP values were at 135.6 mmHg and 76.0 mmHg, respectively. Control cohort SBP was 137.6 mmHg and DBP was 74.1 mmHg. When comparing percentage of patients with blood pressure control, 60.6% of patients reached goal by the three-month mark vs. 50.9% of control cohort patients. At six months the gap was narrowed but remained significant (60.9% vs. 54.4%). The results suggest that CMM improves blood pressure levels and control more rapidly than usual care.

Maintenance of blood pressure one-year post “discharge”:

When blood pressure goal was achieved for two consecutive visits with clinical pharmacy teams, patients were discharged from the CMM program but received follow-up phone calls from pharmacy technicians every two to three months. This was performed to ensure that patients remained at treatment goal.

Almost 90% of discharged patients maintained blood pressure control 12 months post-discharge from the CMM program.



AltaMed Chronic Disease Care Management (CDCM) Program: Case Study

Program Background

Originally developed as an alternative model to the USC grant-funded Clinical Pharmacy Program, the Chronic Disease Care Management (CDCM) program at AltaMed was a disease state management (DSM) program that would adapt clinical pharmacist integration practices from the USC program to provide high quality, dedicated care with a more efficient, streamlined delivery model to reduce health care disparities by improving the health care and quality outcomes of patients with chronic diseases and reducing emergency room and hospitalization utilization rates.

The CDCM team personnel will include clinical pharmacists, mid-level providers, care management coordinators and may include pharmacy residents, clinical pharmacy technicians, and student pharmacists on an as needed basis. Primary care providers will be updated and consulted as outlined below. The expertise of all allied health will be utilized, including but not limited to nurses, nutritionists/dieticians, and case managers. The clinical pharmacist is responsible for ensuring that the elements of care described in this protocol are accurately provided by all pharmacy-related personnel.

In accordance with California State Pharmacy Law, Section 4052.1, clinical pharmacist functions include performing routine drug therapy-related patient assessment procedures, medication monitoring (initiating, discontinuing and adjusting medication dosages), ordering laboratory tests to monitor efficacy of medications, and consulting with primary care providers and health care team to manage patient health.

CDCM Program Overview

The CDCM program at AltaMed was designed to act as a care extension program to provide clinical support to a subset of AltaMed's patient population—specifically patients with one or more of the following disease states that are uncontrolled:

- Diabetes
- Hypertension
- Anticoagulation Treatment (any patients on blood thinners)
- Asthma/COPD
- Congestive Heart Failure (CHF)
- Dyslipidemia (patients with high cholesterol)

Qualifying patients are identified and enrolled into the program, where a care team consisting of a nurse practitioner/physician's assistant, a clinical pharmacist, a medical assistant and a care management coordinator work in concert to help patients gain control their chronic disease states.

Patient Recruitment

Patient recruitment has consisted of referrals from health professionals, mostly primary care physicians and established trigger lists, which were adapted from the USC CMM program. The trigger lists are being generated electronically on a monthly basis, and compile a list of patients who meet one of the following three criteria during the calendar year: 1) ages 18-59 years with a diagnosis of hypertension, and blood pressure $\geq 140/90$ mmHg on most recent test; 2) ages 60-85 years with diagnosis of hypertension, and blood pressure $\geq 150/90$ mmHg on most recent test; 3) ages 60-85 years with diagnoses of hypertension and diabetes, and blood pressure $\geq 140/90$ mmHg on most recent test. The patients must also have had two medical visits at AltaMed between January 1 of year prior to measurement year and December 31 of current measurement year.

Figure 5. CDCM Clinical Criteria for Eligible Patients

Triggers for Chronic Disease Care Management ¹

Diabetes	Hypertension	Lipids	Asthma/ COPD	CHF	Anticoagulation
<ul style="list-style-type: none"> • Trigger 1: A1c > 8% • Trigger 2: No A1c result on record 	<ul style="list-style-type: none"> • Trigger 1: BP>140/90 	<ul style="list-style-type: none"> • Trigger 1: Diabetics with LDL 70-189 • Trigger 2: History of ASCVD (MI, stroke, TIA, angina, PAD) • Trigger 3: Most recent LDL>190 	<ul style="list-style-type: none"> • Trigger 1: Asthma/COPD ER visit or hospitalization in previous 6 months • Trigger 2: Oral prednisone, theophylline, LABA but no ICS 	<ul style="list-style-type: none"> • Trigger 1: CHF ER visit or hospitalization in previous 6 months • Trigger 2: Systolic CHF but no ACEi/ARB or BB 	<ul style="list-style-type: none"> • Trigger 1: On an oral anticoagulant <ul style="list-style-type: none"> • Warfarin • Xarelto • Pradaxa • Eliquis

Referrals to the CDCM program are made either via internal referral; a message sent directly to the clinical pharmacist or care management coordinator; or as a “warm handoff,” where the referring party will refer the patient to the mid-level provider at the time of the appointment in the clinic. In the cases where the PCP sends the referral electronically, the clinical pharmacist may review the patient’s profile prior to the appointment being scheduled to ensure the patient meets the program’s criteria.

The care management coordinators reached out to patients who have been referred to the program or whose name is on the trigger list, as described above, to schedule an appointment with the mid-level provider. During the call, a script is utilized, ensuring patients are informed of the intent and goals of the program (see appendix for script).

¹It should be noted that these triggers are used as a general, broad guideline for patient eligibility selection. In practice, a patient that may meet one of these clinical triggers may not necessarily be an uncontrolled chronic disease patient. It is recommended to use these triggers, along with patient history and past/current medication use to evaluate patient chronic disease state. It is for this reason that the best patients for CDCM are ones referred by PCPs who are familiar with patient’s medical history.

Patient care and collaboration

Patients are seen by the mid-level providers at six AltaMed clinics in Los Angeles and Orange counties. The providers' scheduling template allow for 27 visit slots per day, Monday through Friday. The high number of slots is to account for a high expected no-show rate in this patient population.

The mid-level providers were presented with a workflow diagram to outline the steps involved in hypertension patient care (see appendix for provider workflow).

To ensure continuity of care and collaboration between all parties involved in the program, meetings are held on a regular basis. The clinical pharmacists, care management coordinators, pharmacy director, and pharmacy director's assistant meet on a biweekly basis at AltaMed's corporate location to discuss the progress of the program and address any issues. Furthermore, a CDCM staff meeting is held monthly, where questions and concerns can be discussed with AltaMed leadership.

At the clinic site level, the mid-level providers regularly collaborate with PCPs to identify patients who could benefit from enrolling in the program and update the PCPs on patient progress. This often involves daily "huddles" between the mid-level provider and the PCP, where both providers work together to evaluate any potential candidates on the PCP's panel who may qualify for the program.

The clinical pharmacists are on site at the clinics generally one day a week to assist the mid-level providers, which can entail seeing patients together, providing drug information, or answering any other questions.

Program Completion Criteria

Patients who meet blood pressure goals will have completed the Chronic Disease Care Management program. To be considered for completion from the program, the patient needs to show two controlled blood pressure readings on two separate visits (<140/90 ages 18-60, <150/90 ages 60 and up if no diabetes or CKD). The mid-level provider identifies these patients, and the clinical pharmacist reviews patient profiles to ensure that criteria are met. If the patients who have completed the program have a high blood pressure reading again in the future, their name will come up on the hypertension trigger report, at which time the patients will be enrolled back into the program for further management.

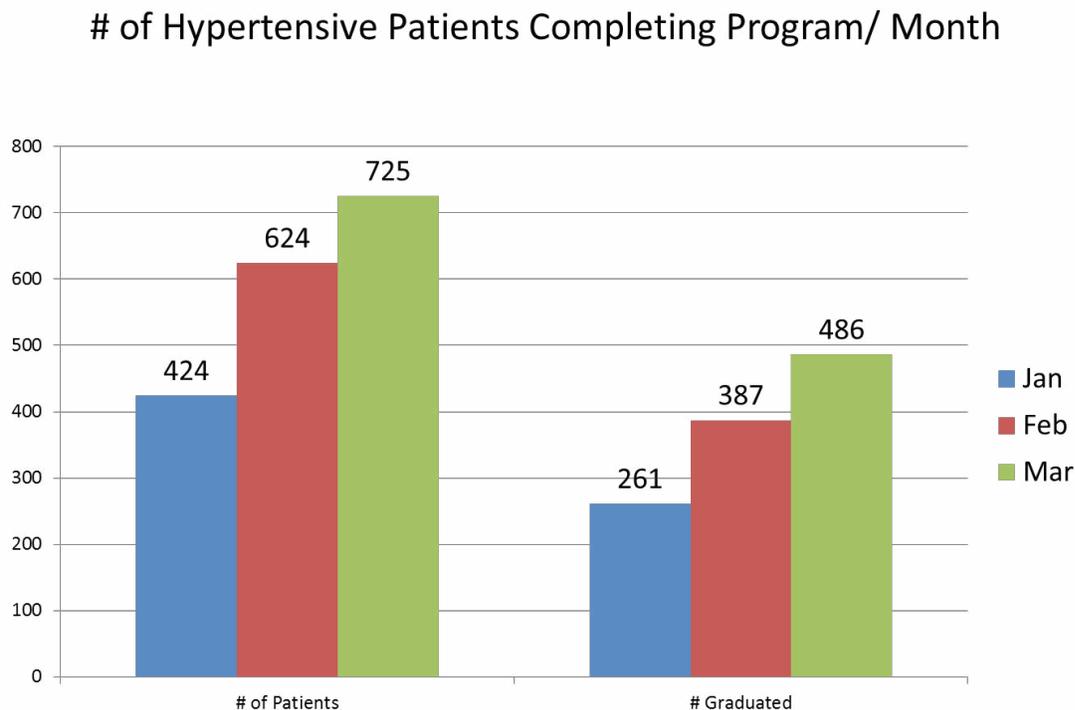
Figure 6. Summary of CDCM Team Members

<p>Clinical Pharmacist</p>	<ul style="list-style-type: none"> • Reviews profiles of patients who were referred to CDCM program to confirm eligibility • Answers any medication-related questions from mid-level provider and/or sees patients together with the mid-level provider • Follows up with patients via telephone, if needed, for medication reconciliation, compliance or other medication-related issues
<p>Mid-level Provider (Nurse Practitioner or Physician Assistant)</p>	<ul style="list-style-type: none"> • Sees patients during 15 minute appointment slot for hypertension management • Educates patients on lifestyle medication, such as diet, exercise, and salt intake • Adjusts dose and/or prescribes/discontinues medication as needed to attain goal blood pressure as per JNC 8 guidelines • Informs clinical pharmacist when patient met graduation criteria
<p>Care Management Coordinator</p>	<ul style="list-style-type: none"> • Reaches out to patients to schedule initial appointment, as well as follows up to reschedule missed appointments • Point of contact for patients' scheduling needs for CDCM program • Keeps track of patients who graduated the program
<p>Medical Assistant</p>	<ul style="list-style-type: none"> • Measure vitals, performs medication reconciliation, reviews allergies at appointment with a mid-level provider • Schedules follow-up visits with mid-level provider

Clinical Outcomes—Preliminary Findings

Given that the CDCM program at AltaMed is a new and ongoing program, long-term clinical outcomes have yet to be determined. However, some preliminary results drawn from three months' worth of data tracking blood pressure readings show that even within the short span of three months, patients with uncontrolled hypertension are already seeing improved clinical outcomes. Based on the results drawn from a cohort of 775 patients enrolled in the Chronic Disease Care Management (CDCM) program for uncontrolled hypertension during the three-month time period from January to March 2016, a cumulative total of 486 patients were able to complete the program (see Figure A). Completing the program indicates that within three months, the patient had at least two blood pressure readings below 140/90 (or blood pressure readings <140/90 for patients with both diabetes and hypertension). Patients who meet these criteria are transferred back to their primary care provider.

Figure 7. CDCM program completion numbers for hypertensive patients, Jan-March 2016



As health care providers who are intimately familiar with chronic disease management can attest, seeing improvement in hypertension patients, particularly for uncontrolled patients, is a metric best measured out over a longer span of time than three months. However, in three months alone, the positive impacts of AltaMed using CMM in controlling blood pressure can already be seen in comparing patients enrolled in the CDCM program with a control cohort of patients not enrolled in the CDCM program. When comparing percentage of patients with controlled blood pressure, 70.37% of the CDCM cohort had achieved controlled blood pressure compared with the 54.93% for the non-CDCM cohort. Despite the considerable difference in cohort size, the 15.44% percentage difference in controlled hypertension patients is statistically significant ($t=10.80$, $p < .00001$) and suggests that CDCM intervention improves blood pressure levels and control more quickly than conventional care.

Figure 8. Comparison of Controlled Hypertension Proportion in CDCM and Non-CDCM Groups at AltaMed, January – March 2016

	#Uncontrolled HTN	# Controlled	Cohort Size	% Controlled HTN
CDCM Total*	317	753	1070	70.37%
Non-CDCM Total	12173	14839	27012	54.93%
Grand Total	12926	15156	28082	53.97%
<i>*includes HTN only & HTN/DM patients</i>				

It is also important to account for a key confounding factor when comparing the CDCM cohort to AltaMed's entire non-CDCM patient population: no two AltaMed clinics are exactly alike and every AltaMed clinic may differ widely in patient demographics. The following comparison of controlled hypertensive patients with a cohort more similar in patient demographics—specifically comparing CDCM patients with non-CDCM patients at CDCM-hosting clinics—shows that CDCM patients showed significantly more improvement than their non-CDCM counterparts (t=2.23, p <.01288).

Figure 9. Comparison of Controlled Hypertensive Proportion in CDCM and Non-CDCM Groups at AltaMed CDCM Hosting Sites, January – March 2016.

	#Uncontrolled	#Controlled	% Controlled HTN
CDCM TOTAL	856	1,093	56.08%
NON-CDCM TOTAL	1,254	1,401	52.77%

Long term effects of CDCM program intervention on hypertension patients are still forthcoming.

Lessons Learned & Key Recommendations for CDCM

As previously discussed, the inherent challenges of integrating comprehensive medication management (CMM) model must be acknowledged and understood in order for the care extender program to be successful. For FQHCs and other health delivery systems interested in integrating the care management team as an extension of their primary care team, we offer the following lessons learned and key recommendations from the Chronic Disease Care Management (CDCM) care model:

#1: True collaboration and consistent communication between the primary care and care management teams is crucial to program success.

It can hardly be emphasized enough that collaboration across providers is key to success. Collaboration among pharmacists, mid-level providers, and primary care physicians (PCPs) can improve efficiency and effectiveness in providing health care to underserved populations. Collaboration can also give providers the opportunity to learn from and support each other through the successes and failure of the health implementation process by sharing best practices and innovations among the group. Additionally, by engaging multiple providers, this collaborative process can promote community acceptance of change and foster a sense of purpose towards achieving a common goal. Mid-level providers had clinical pharmacists to consult as an additional resource for case discussion, pharmacotherapy recommendations, and refractory treatment options. Clear, consistent communication has been demonstrated as effective between the CDCM and PCPs, especially when there are medication changes.

#2: Obtaining physician buy-in is critical to sustained patient recruitment.

A truly successful collaborative effort requires program buy-in from the primary care physician (PCP). It is impossible for CDCM to act as the PCP's "care extender" if the PCP does not feel that their patients will not benefit from the program, or that the CDCM team will replace them altogether. Although collaboration with PCPs on hypertension patients has increased, provider hesitancy to refer patients due to a perceived fear of losing their patients has been the biggest barrier. Strategies to reduce this fear include: leadership support to present the program to the clinics and PCPs, incentivize the PCPs to refer patients, stress the idea that mid-levels are an extension of the PCPs and that implementing a CDCM program will allow PCPs to free up their templates to allow acute issues to be addressed.

#3: Establishing reliable clinical result measurements is essential for accurate capture and monitoring of patient progress.

It is extremely difficult to track a patient's progress towards controlled hypertension if the clinical measurements themselves are not accurate.

The advantage of using EMR to collect a wealth of data to track hypertensive patients is crucial for time saving and increasing the specificity of capturing the patients. Trigger lists run by the informatics team are very effective in capturing the appropriate patient for the program. However, it is important for the data collection process itself to be standardized to avoid skewed blood pressure measurements.

For instance,

- *Patients often do not take their hypertension medications prior to coming in for their appointment, which can lead to a falsely elevated blood pressure level. It is essential to educate patients to take their morning medications 2-4 hours prior to coming in for HTN follow-up in order to get a more accurate reading of what a "managed" blood pressure is. To alleviate this, patients should be informed to make their appointment times for after taking their medications in order to see the effects of the medications*
- *It should be a standard that every patient above BP goal during the 1st BP check should automatically have BP re-checked. Often, patients have a slightly above-goal BP and are captured as not controlled, but upon recheck, yield a controlled BP level. White Coat Hypertension, or the phenomenon when the patient's anxiety triggered by being in a medical environment results in an abnormally elevated blood pressure reading, is something to be kept in mind when assessing BP reading*

- *Patients often bring in their own BP machines and cuff calibration must be performed.* Often, BP readings are off by 10-20 mmHg. It is important to perform manual checks against their (patient) cuffs/our (clinic) cuffs and determine whether the readings are comparable
- *The time of day the medication is taken could possibly affect the blood pressure reading in a select population.* Several providers have noted that when certain patients take their HTN medications in the evening, the BP is not controlled during the day. Providers have transitioned their patients to take their medications in the morning—especially for short acting agents, in order to provide hypertension management during the day

#4: Developing a comprehensive patient education plan with the unique medical needs of the treated patient population in mind is needed to improving patient adherence to medications and overall health outcomes.

There are many patients in CDCM who fit the criteria of resistant hypertension, characterized by either of the following: 1) blood pressure that remains above goal despite concurrent use of three antihypertensive agents of different classes, including diuretics, or 2) patient whose blood pressure is controlled by four or more medications. Developing an algorithm as part of the protocol to manage resistant hypertension could be helpful. Medication nonadherence plays a part at least 25% of the time. Strategies to reduce noncompliance include simplifying the regimen (such as switching from metoprolol tartrate to metoprolol succinate once daily dosing, educating the patient on diet, exercise, and caffeine restrictions. Counseling patients on their regimen is very crucial because frequently patients do not realize they are taking the medication incorrectly.

Given the complexity of the medication regimen that hypertension patients, it is critical that clinical pharmacists and mid-level providers work together in educating the patient on their medications. Essential topics to address with the patient may include:

- Advising against nonsteroidal anti-inflammatory drug (NSAID) use is crucial, especially with renal dysfunction since many patients do not know that NSAIDs are not preferred in renal dysfunction
- Interviewing patients determine possible contributing factors for the HTN. Family medical history, sleep apnea history, cold medications use, stress level, signs/symptoms of sleep apnea, NSAID use, and salt intake are all contributory factors that should not be overlooked
- Educating HTN patients on the Dietary Approaches to Stop Hypertension (DASH) because patients commonly do not know about foods high in sodium content
- Modifying customary practices in favor of best practices for complex hypertension patients, including the frail and elderly, and patients with chronic kidney disease (CKD) or end-stage renal disease (ESRD)

#5: Anticipating the operational and financial challenges of working with the chronically ill, a historically noncompliant patient population.

Given that the CDCM program works with uncontrolled chronic disease patients—a historically noncompliant population—it is essential to anticipate and navigate through the operational challenges of working with this population. Anticipating a high no-show rate, our team opted for an aggressive (27) 15-minute templates for our mid-level providers. However, time constraint was also an issue faced by the 15-minute templates. For complex patients with multiple uncontrolled disease states, (e.g., severe hypertension and diabetes), mid-level providers had to focus more on the DM in one visit and address the HTN at the second visit. Transitioning to a 20-minute template may also help alleviate this issue.

In addressing the no-show issue, the most common reason for no-shows was that patients forgot they had a scheduled appointment. To remedy this, multiple touches and touch types in combination—reminder phone calls and texts—were found to be effective in reducing no-show rates by 20% over a two-week period.

Conclusion: Clinical Pharmacist Integration as a Standard Practice for FQHCs

While the long-term clinical results of the CDCM program at AltaMed have yet to be determined, the available data from the program cohort thus far supports the growing base of evidence that comprehensive medication management (CMM) or the incorporation of a clinical pharmacist as a key member of the primary care team is a cost-effective and effectual approach to improve the treatment outcomes of hypertensive patients. Preliminary findings show that while the long-term clinical outcomes of hypertensive patients have yet to be seen, the short-term results provide evidence that a care management model incorporating a clinical pharmacist's pharmacotherapy expertise can improve blood pressure readings and overall knowledge of disease state for uncontrolled patients more quickly than a conventional primary care model.

The landscape of health care is constantly changing, with a shift in patient demographics. By 2030, one in five Americans will be a senior citizen.²⁵ As the elderly population expands, so do the challenges of supporting an older, more vulnerable population prone to experiencing multiple chronic conditions. The complexities of managing chronic disease patients, who are typically the most expensive of patients to treat, demand creative changes in how health care systems structure themselves to provide the best quality of care while keeping costs down.

Similarly, the field of pharmacy and its scope has evolved. Direct patient care training is now embedded into the pharmacy curriculum and clinical pharmacists, as specialists in the biochemical mechanisms and interactions of medications, are uniquely poised to use their knowledge to educate and counsel chronic disease patients on taking their medications correctly and safely to manage their disease states and improve their quality of life. Hypertension, in particular, like many common chronic conditions, has no singular identifiable cause, but instead may develop from a multitude of factors and conditions and may be difficult to treat. An integrated inter-professional team of dedicated health professionals, all specialists in different aspects of the patient's health care plan, is an optimal approach to allow for better communication, coordination and collaboration in ensuring that hypertension patients receive the best quality of care.

A key advantage the CMM and the CDCM models share is their utilization of electronic medical record (EMR) data to streamline the process for identifying not only uncontrolled hypertensive patients, but also hypertensive patients yet to be diagnosed ("hiding in plain sight"). The trigger lists used by both the USC CMM and CDCM programs establish clinical criteria (BP >140/90) for evaluating elevated blood pressure readings. Using EMR data for patients who have had at least three encounters for other diseases, but had at least two readings of a systolic measure >140 or 2 diastolic measures >90 would help screen for undiagnosed hypertensive patients. EMR data can be also be used to identify undiagnosed hypertensive patients in other ways; for example, using EMR data to search for patients who may be on antihypertensive medications but may not have the hypertension diagnosis code in their charts. EMR data is also useful in analyses comparing hypertension prevalence in one's medical practice to the national estimate to evaluate whether or not the population is at a higher risk. Once high risk and/or undiagnosed hypertensive patients have been successfully identified, both models follow up with team-based care to manage those patients.

In this report, we have offered two team-based care management models for hypertensive patients—the USC comprehensive medication management (CMM) model and the AltaMed Chronic Disease Care Management (CDCM) model. While both models are similar in their utilizing pharmacists to work alongside the primary care team and monitor hypertension patients, they are also different programs that operate on different financial models. The USC CMM program was solely funded by the Center for Medicare and Medicaid Services grant, which paid for 10 USC clinical pharmacists, 10 clinical pharmacy technicians, USC pharmacy residents and 10 AltaMed medical assistants over a three year period. In contrast, the AltaMed CDCM program relied solely on medical provider (in this case, a nurse practitioner or physician assistant) billable visits to generate revenue to cover program operating costs. Federally qualified health centers (FQHCs) and other health care systems looking to adopt a comprehensive medication management team care model will need to consider factors such as available financial and staffing structures when developing a care management model that will best suit their organization’s current infrastructure and the specific patient population they are working with.

²Billable visits defined as FQHC encounters, which are defined as face-to-face encounters in an outpatient setting between patient and FQHC core practitioner. Encounters with more than one health professional and multiple encounters with the same health professional that take place on the same day and location are billed as a single unit.

Appendix

Attachment 1: Hypertension Patient Care Guidelines

Hypertension Patient Care Guidelines

Purpose

The goal of the Hypertension Management Program (HMP) is to work collaboratively with the primary care team to ensure that hypertensive patients meet their blood pressure (BP) goals.

Measuring BP

Blood pressure should be measured according to AHA standards, which includes:

- Environment - quiet, 5 minutes of rest
- No caffeine or tobacco x 30 min. prior
- Measure both arms, record / treat higher arm
- BP measurement = average of 2 readings taken ~ 1-2 min. apart that are within 5 mmHg
- If >65, diabetic, or c/o dizziness: Check standing BP at 0 and 2 minutes

Patient assessment

- Review past medical history
- Determine presence of additional cardiovascular risk factors (family history, tobacco, obesity, and dyslipidemia)
- Examine lifestyle, cultural, psychosocial, educational, and economic factors that might influence the medical management of hypertension.
- Evaluate current hypertension drug treatment regimen and patient's adherence to regimen
 - *The patient should be asked to identify each medication, its purpose, its dose and its frequency of administration*
 - *Patient is to bring all medications (prescription and over-the-counter) to every visit*
 - *Provider should attempt to identify causes (e.g., inconvenience of dosing frequency, medication access issues, etc.) and solutions for any discrepancies between the patient's use of the medication and the prescribed regimen*
- Identify potential medication-related problems
- Perform drug therapy-related physical assessment (e.g., check for ankle edema resulting from calcium channel blockers)
- Review laboratory test results
- Provide patient education on the following topics: interpretation of blood pressure readings; common adverse effects of prescribed medications; importance of adherence to medications; lifestyle modifications (see chart below); self-monitoring of blood pressure

Table 5. Lifestyle modifications to manage hypertension**

MODIFICATION	RECOMMENDATION	APPROXIMATE SBP REDUCTION (RANGE)
Weight reduction	Maintain normal body weight (body mass index 18.5–24.9 kg/m ²).	5–20 mmHg/10 kg weight loss ^{23,24}
Adopt DASH eating plan	Consume a diet rich in fruits, vegetables, and lowfat dairy products with a reduced content of saturated and total fat.	8–14 mmHg ^{25,26}
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).	2–8 mmHg ^{25–27}
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 min per day, most days of the week).	4–9 mmHg ^{28,29}
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (1 oz or 30 mL ethanol; e.g., 24 oz beer, 10 oz wine, or 3 oz 80-proof whiskey) per day in most men and to no more than 1 drink per day in women and lighter weight persons.	2–4 mmHg ³⁰

Drug treatment approach

- In accordance with JNC 8, all patients should be initially prescribed one or more of the following drug classes: thiazides, calcium channel blockers (CCB), ACE inhibitors or angiotensin receptor blockers (ARBs)
- Figure 1 illustrates the appropriate blood pressure goals and therapy based on patient’s age and presence of diabetes and CKD
- There are three therapy titration strategies (Figure 2). Each strategy is an acceptable pharmacologic treatment strategy that can be tailored based on individual circumstances, clinician and patient preferences, and drug tolerability
- With each strategy, clinicians should regularly assess BP, encourage evidence-based lifestyle and adherence interventions, and adjust treatment until goal BP is attained and maintained

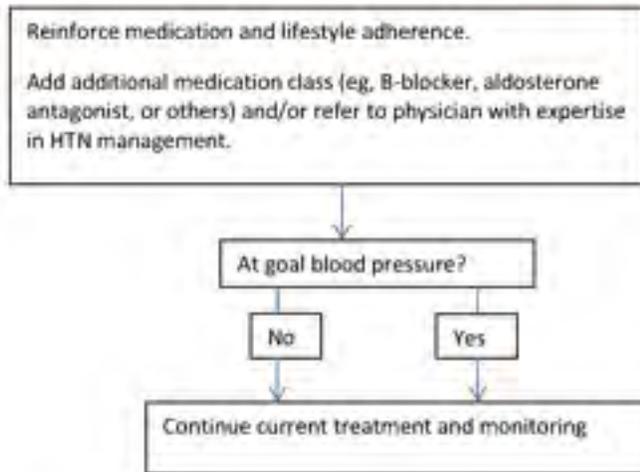
Figure 2

Strategies to Dose Antihypertensive Drugs ^a		
Strategy	Description	Details
A	Start one drug, titrate to maximum dose, and then add a second drug	If goal BP is not achieved with the initial drug, titrate the dose of the initial drug up to the maximum recommended dose to achieve goal BP. If goal BP is not achieved with the use of one drug despite titration to the maximum recommended dose, add a second drug from the list (thiazide-type diuretic, CCB, ACEI, or ARB) and titrate up to the maximum recommended dose of the second drug to achieve goal BP. If goal BP is not achieved with 2 drugs, select a third drug from the list (thiazide-type diuretic, CCB, ACEI, or ARB), avoiding the combined use of ACEI and ARB. Titrate the third drug up to the maximum recommended dose to achieve goal BP.
B	Start one drug and then add a second drug before achieving maximum dose of the initial drug	Start with one drug then add a second drug before achieving the maximum recommended dose of the initial drug, then titrate both drugs up to the maximum recommended doses of both to achieve goal BP. If goal BP is not achieved with 2 drugs, select a third drug from the list (thiazide-type diuretic, CCB, ACEI, or ARB), avoiding the combined use of ACEI and ARB. Titrate the third drug up to the maximum recommended dose to achieve goal BP.
C	Begin with 2 drugs at the same time, either as 2 separate pills or as a single pill combination	Initiate therapy with 2 drugs simultaneously, either as 2 separate drugs or as a single pill combination. Some committee members recommend starting therapy with ≥ 2 drugs when SBP is > 160 mm Hg and/or DBP is > 100 mm Hg, or if SBP is > 20 mm Hg above goal and/or DBP is > 10 mm Hg above goal. If goal BP is not achieved with 2 drugs, select a third drug from the list (thiazide-type diuretic, CCB, ACEI, or ARB), avoiding the combined use of ACEI and ARB. Titrate the third drug up to the maximum recommended dose.

Abbreviations: ACEI, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; BP, blood pressure; CCB, calcium channel blocker; DBP, diastolic blood pressure; SBP, systolic blood pressure.

^aThis table is not meant to exclude other agents within the classes of antihypertensive medications that have been recommended but reflects those agents and dosing used in randomized controlled trials that demonstrated improved outcomes.

Hypertension Management Program (HMP) for Chronic Disease Care Management (CDCM) Hypertension Identification and Intervention Algorithm



Recommended Follow Up For Hypertensive Patients

Provide Life Style Modifications (see following):

- Reduce weight maintaining normal BMI 18.5-24.9 kg/m²
- Adopt DASH eating plan rich in fruits, vegetables & low fat dairy products
- Lower sodium intake
- Engage in regular aerobic physical activity (i.e. walking at least 30 min. per day most days)
- Moderation of alcohol consumption (Men: no more than 2 drinks/day; Women: no more than 1 drink/day)

Provide American Heart Association (AHA) Hypertension Risk education materials (available at www.heart.org)

Provide Blood Pressure (BP) Log for home readings

Education on new medications for hypertension

Schedule follow up to recheck BP in 2-4 weeks

Common ICD-10 Codes for Hypertension Screening

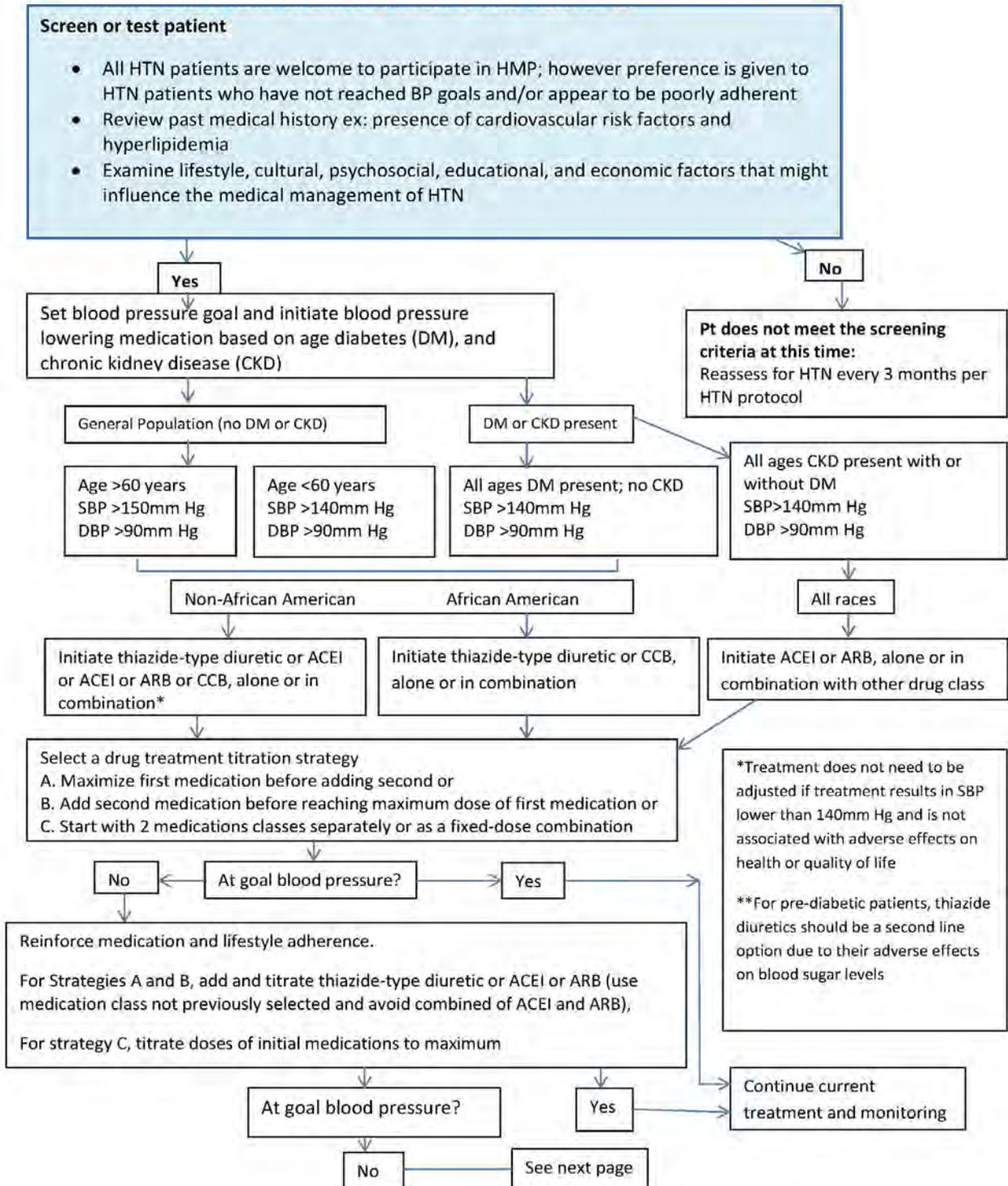
Z13.6 Hypertension Screening (V.81.1 ICD-9)
 I10 Essential (primary) Hypertension
 E66.9 Obesity
 E66.3 Overweight
 I15.0 Renovascular hypertension
 I15.9 Secondary hypertension, unspecified

CPT Codes for Hypertension Screening

CPT G8950 Pre-hypertensive
 CPT 93005 EKG (HTN unspecified)

Attachment 2: AltaMed Hypertension Identification and Intervention Algorithm

Hypertension Management Program (HMP) for Chronic Disease Care Management (CDCM) Hypertension Identification and Intervention Algorithm



Attachment 3: Patient Script (English)

Subject:	Outbound Call for Disease Management
Message delivered by:	Care Coordinator for Intro Call and Pharmacist for First Call
Message delivered to:	Patients participating in Disease Management Program
Date of dissemination:	TBD
Issuing Authority:	The Office of Corporate Communications and Public Affairs
Date:	8/28/15

Outbound Call Scripts

Audience: Patients participating in Disease Management Program

Type of Call: Outbound Intro call

Placed by: Care Coordinator

Hello, my name is _____. I'd like to speak to <patient name>.

When patient does not answer:

OK, when is a good time to call back?

When the patient does answer:

AltaMed Staff must obtain the following information below from the patient. If any of these items cannot be verified, AltaMed staff should use caution when sharing any PHI over the telephone.

I am from Dr. _____ office here at AltaMed. Before I continue, I need to ask you a couple of questions <caller to confirm the following>:

1. What is your full name?
2. What is your birthdate including the year?
3. Please give me your home address
4. What is your phone number?
5. *If minor:* What is your Father/Mother/Guardian's name?

Thank you for that information.

I am calling to let you know about a new service available to you. Dr. _____ recommended you to our chronic disease program and we coordinate care for people with long term health conditions. It includes services from medical providers, pharmacists and care management coordinators like me. Dr _____ is still in charge of your care and you will still see them. We work with your doctor as a part of his/her team. We can help your doctor by being able to focus on maintaining your _____ goals, and on helping you be as healthy as you can be. We'd like you to take advantage of these services. When can I schedule your appointment?

Audience: Patients participating in Disease Management Program

Type of Call: Outbound first call to patient

Placed by: Pharmacist

Hello, my name is Dr. _____ from AltaMed. I'd like to speak to <patient name>.

When patient does not answer:

OK, when is a good time to call back?

When the patient does answer:

AltaMed Staff must obtain the following information below from the patient. If any of these items cannot be verified, AltaMed staff should use caution when sharing any PHI over the telephone.

I am calling to let you know about a new service available to you from AltaMed. Before I continue, I need to ask you a couple of questions <caller to confirm the following>:

1. What is your full name?
2. What is your birthdate including the year?
3. Please give me your home address
4. What is your phone number?
5. ***If minor:*** What is your Father/Mother/Guardian's name?

Thank you for that information.

I'm following up on your conversation with_____, my chronic disease management coordinator. Dr._____ recommended you to our chronic disease program. I am your pharmacist and I will be helping you with your medication management. I work with Dr._____ as a part of his/her team. What I will be doing is helping your doctor by talking with you one on one to help you reach your goal. If you have time, I'd like to go over your medication therapy with you. Is now a good time?

Attachment #4: Patient Script (Spanish)

Tema:	Llamada saliente para el control de enfermedades
Mensaje transmitido por:	El coordinador de atención para la llamada introductoria y el farmacéutico para la primera llamada
Mensaje transmitido a:	Pacientes que participan en el Programa de Control de Enfermedades
Fecha de difusión:	Por determinarse
Autoridad emisora:	Oficina de Comunicaciones Corporativas y Asuntos Públicos
Fecha:	17 de septiembre de 2015

Guiones para Llamada Saliente

Público: pacientes que participan en el Programa de Control de Enfermedades

Tipo de llamada: llamada introductoria saliente

Realizada por: el coordinador de atención

Translation to begin here. Copy in teal font is for instructional purposes, only translate copy in black font below.

Hola, mi nombre es_____. Me gustaría hablar con <patient name>.

When patient does not answer:

Bien, ¿a qué hora puedo volver a llamar?

When the patient does answer:

AltaMed Staff must obtain the following information below from the patient. If any of these items cannot be verified, AltaMed staff should use caution when sharing any PHI over the telephone.

Llamo del consultorio del Dr./la Dra. _____ de AltaMed. Antes de continuar, necesito hacerle algunas preguntas <caller to confirm the following>:

1. ¿Cuál es su nombre completo?
2. ¿Cuál es su fecha de nacimiento, incluido el año?
3. ¿Cuál es su dirección?
4. ¿Cuál es su número de teléfono?
5. *If minor:* ¿Cuál es el nombre de su padre/madre/tutor?

Gracias por la información.

Me comunico para informarle acerca de un nuevo servicio disponible para usted. El Dr./La Dra. _____ le recomendó para el programa de enfermedades crónicas y nosotros coordinamos la atención médica para personas con afecciones de salud crónicas. Incluye servicios por parte de proveedores médicos, farmacéuticos y coordinadores de administración de la atención médica, como yo. El Dr./La Dra. _____ aún está a cargo de su atención médica y seguirá atendiéndole. Nosotros trabajamos con su médico como parte de su equipo. Podemos ayudar a su doctor a enfocarse en mantener sus _____ objetivos y ayudarle a usted a estar lo más saludable posible. Queremos que aproveche estos servicios. ¿Para cuándo puedo hacer su cita?

Público: pacientes que participan en el Programa de Control de Enfermedades

Tipo de llamada: primera llamada saliente para el paciente

Realizada por: el farmacéutico

Hola, soy el Dr./la Dra. _____ de AltaMed. Me gustaría hablar con <patient name>.

When patient does not answer:

Bien, ¿a qué hora puedo volver a llamar?

When the patient does answer:

AltaMed Staff must obtain the following information below from the patient. If any of these items cannot be verified, AltaMed staff should use caution when sharing any PHI over the telephone.

Me comunico para informarle acerca de un nuevo servicio disponible de AltaMed para usted. Antes de continuar, necesito hacerle algunas preguntas

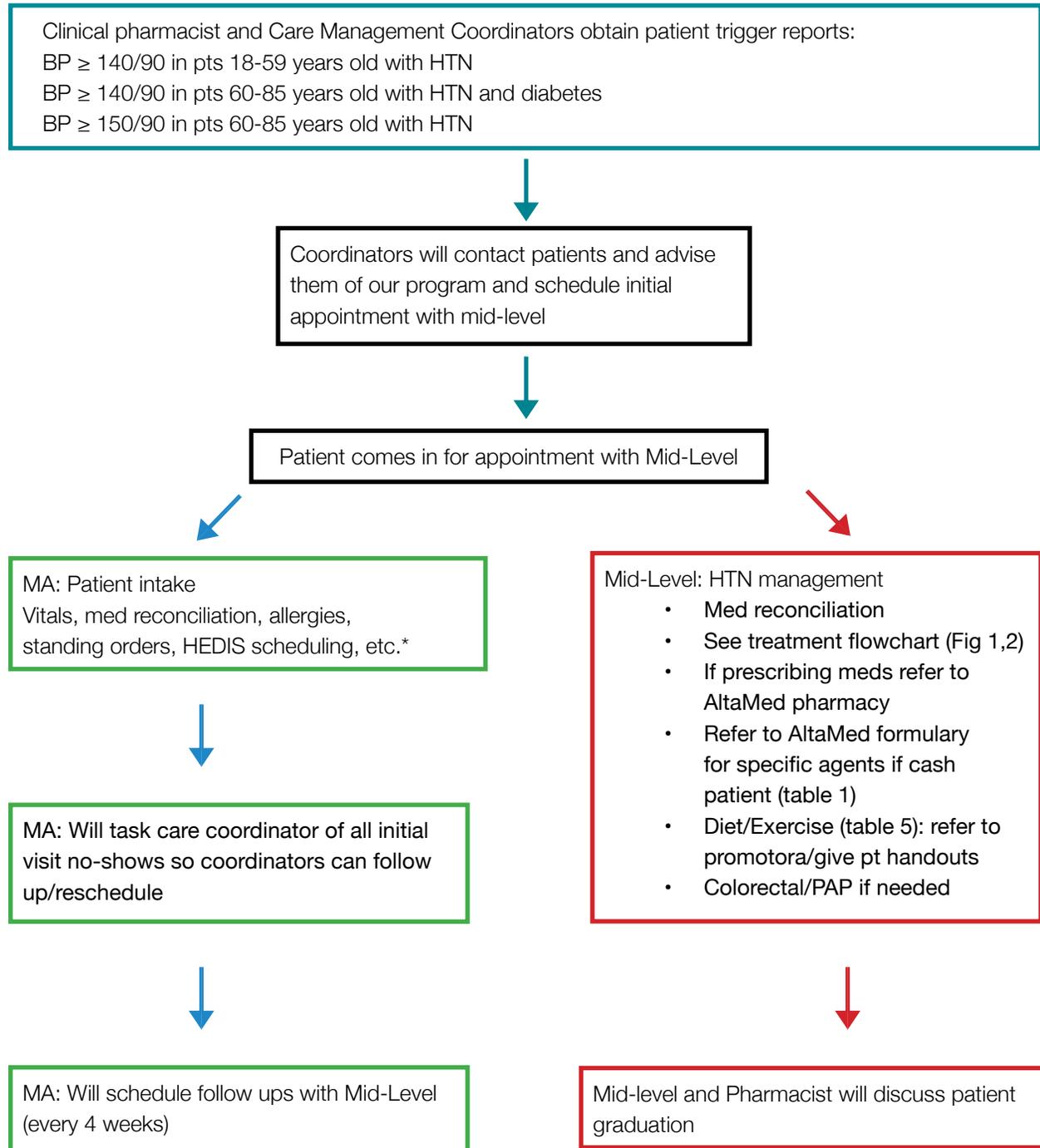
<caller to confirm the following>:

1. ¿Cuál es su nombre completo?
2. ¿Cuál es su fecha de nacimiento, incluido el año?
3. ¿Cuál es su dirección?
4. ¿Cuál es su número de teléfono?
5. *If minor:* ¿Cuál es el nombre de su padre/madre/tutor?

Gracias por la información.

Estoy dando seguimiento a la conversación que tuvo con _____, mi coordinador de control de enfermedades crónicas. El Dr./La Dra. _____ le recomendó para nuestro programa de enfermedades crónicas. Yo soy su farmacéutico y le ayudaré con la administración de sus medicamentos. Trabajo con el Dr./la Dra. _____ como parte de su equipo. Lo que haré es ayudar a su médico al hablar con usted de forma individual para lograr sus objetivos. Si tiene tiempo, me gustaría revisar con usted su tratamiento con medicamentos. ¿Es posible hacerlo ahora?

Attachment 5: AltaMed CDCM Mid-Level Provider Workflow for Hypertension



*MAs will also review standing orders for any HEDIS deficiencies upon check in

Drug treatment approach

- Management of hypertension must be patient-centered and evidence-based. While no single evidence-based treatment algorithm can be developed for all hypertension patients, in general the clinical approach to management of hypertensive patients will be consistent with the Eighth Joint National Committee (JNC 8) recommendations
- All patients should be initially prescribed one or more of the following drug classes: thiazides, calcium channel blockers (CCB), ACE inhibitors or angiotensin receptor blockers (ARBs). Figure 1 illustrates the appropriate blood pressure goals and therapy based on patient's age and presence of diabetes and CKD
- There are three therapy titration strategies (Figure 2). Each strategy is an acceptable pharmacologic treatment strategy that can be tailored based on individual circumstances, clinician and patient preferences, and drug tolerability. With each strategy, clinicians should regularly assess BP, encourage evidence-based lifestyle and adherence interventions, and adjust treatment until goal BP is attained and maintained
- It is important to emphasize that the algorithm in Figure 1 is only a general guide and will not replace clinical judgment when modifying a patient's medication regimen, as patient-specific variables may necessitate deviation from the algorithm. Importantly, clinicians will ensure that medications recommended for compelling indications are used for blood pressure management whenever possible

Table 1 - Agents on formulary by class

Agent	Strengths (mg)
ACE Inhibitors	
Lisinopril	2.5, 5, 10, 20, 30, 40
Benazepril	5, 10, 20, 40
ARB	
Losartan	25, 50, 100
Thiazides	
Hydrochlorothiazide (preferred)	12.5, 25, 50
Chlorthalidone	25, 50
CCB	
Amlodipine	2.5, 5, 10
Nifedipine SR	30, 60, 90
Diltiazem SR	120, 180, 240
Verapamil SR	120, 180, 240

Endnotes

- ¹ Lindsley C. The Top Prescription Drugs of 2011 in the United States: Antipsychotics and Antidepressants Once Again Lead CNS Therapeutics. *ACS Chemical Neuroscience*, 2012; 3 (8): 630 DOI: 10.1021/cn3000923
- ² Gu Q, Burt V, Dillon C, Yoon S. Trends in Antihypertensive Medication Use and Blood Pressure Control Among United States Adults with Hypertension: The National Health and Nutrition Examination Survey, 2001 to 2010. *Circulation*, 2012; 126: 2105-2114. DOI: 10.1161/CIRCULATIONAHA.112.096156
- ³ Medicines Use and Spending in the U.S. – A Review of 2015 and Outlook to 2020. IMS Institute for Healthcare Informatics. April 2016.
- ⁴ The Patient-Centered Medical Home: Integrating Comprehensive Medication Management to Optimize Patient Outcomes Resource Guide. Patient-Centered Primary Care Collaborative. 2nd Edition, June 2012: 4
- ⁵ Ibid.
- ⁶ Ibid.
- ⁷ Ibid.
- ⁸ Ibid.
- ⁹ University of Iowa. “Pharmacists help patients with hypertension: Studies show medical teams with pharmacists helped patients control blood pressure.” *ScienceDaily*. ScienceDaily, 30 July 2015. <www.sciencedaily.com/releases/2015/07/150730111041.htm>.
- ¹² Tyler H. Gums, Liz Uribe, Mark W. Vander Weg, Paul James, Christopher Coffey, Barry L. Carter. Pharmacist intervention for blood pressure control: medication intensification and adherence. *Journal of the American Society of Hypertension*, 2015; 9 (7): 569 DOI: 10.1016/j.jash.2015.05.005
- ¹¹ Nemerovski CW, Young M, Mariani N, et al. Project ImPACT: Hypertension Outcomes of a Pharmacist-Provided Hypertension Service. *Inov Pharm*. 2013;4(3): Article 126. <http://pubs.lib.umn.edu/innovations/vol4/iss3/9>.
- ¹² Loren Bonner. Moving the needle in Ohio: CDC-funded MTM pilot expanding at FQHCs. *Pharmacy Today*. 2016;22(1): 40. <https://www.pharmacist.com/moving-needle-ohio-cdc-funded-mtm-pilot-expanding-fqhcs>. Accessed April 19, 2016.
- ¹³ Ibid.
- ¹⁴ “Coverage for Comprehensive Medication Management Services for Medicare Patients: ‘Getting the medications right’ in a reformed and modernized program” letter to Congress. The American College of Clinical Pharmacy (ACCP).
- ¹⁵ The Patient-Centered Medical Home: Integrating Comprehensive Medication Management to Optimize Patient Outcomes Resource Guide. Patient-Centered Primary Care Collaborative. 2nd Edition, June 2012: 5
- ¹⁶ “Medically Underserved Areas/Populations: Guidelines for MUA and MUP Designation” Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services, see <http://www.hrsa.gov/shortage/mua/>

¹⁷ To date, pharmacists are not recognized under Section 1861 of the Social Security Act as health care providers eligible for Medicare Part B reimbursement.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Ibid.

²² James PA, Suzanne O, Carter BL, et al. 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults. Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC8). JAMA.2013.284427.

²³ Okamoto, MP and Nakahiro, RK. (2001). Pharmoeconomic Evaluation of a Pharmacist-Managed Hypertension Clinic. Pharmacotherapy, 21 (11), 1337-44.

²⁴ Ibid.

²⁵ Centers for Disease Control and Prevention. The State of Aging and Health in America 2013. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 2013.