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IMPACT OF CLINICAL PHARMACIST INTERVENTION ON MEDICATION ADHERENCE IN HYPERTENSIVE PATIENTS

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Abstract

Hypertensive patients' inability or unwillingness to adhere to prescribed medications can significantly hinder their ability to achieve clinically acceptable levels of blood pressure control, which may lead to increased rates of cardiovascular disease. This research study examines the effectiveness of a clinical pharmacist intervention in improving medication adherence in patients with hypertension. A quasi-experimental design was utilized, and data was collected from patients at outpatient clinics. Patients were randomly assigned to either an intervention group (those who received structured clinical pharmacist services) or a control group (those who received routine care). The clinical pharmacist intervention included counseling, individualized patient education concerning their medications, adherence assessment, advice regarding lifestyle changes, and regular follow-up visits with a clinical pharmacist. Adherence was assessed pre- and post-intervention using a validated adherence measurement tool, and blood pressure was recorded to determine clinical outcomes. Findings from the intervention demonstrated a statistically significant difference in adherence levels between the clinical pharmacist intervention group and the control group; furthermore, the systolic and diastolic blood pressure levels were significantly lower in the intervention group than in the control group. These results support the important contributions of clinical pharmacists to improving patients' understanding of their medications, enabling them to take their medications regularly, and providing ongoing support to help them manage their disease over the long term.

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INTRODUCTION

Chronic cardiovascular disease, hypertension is one of the top causes of death & disability worldwide. Hypertension is referred to as a "silent Killer" because of it's ability to go unnoticed until serious consequences occur e.g. stroke, heart attack, kidney failure or other serious medical events. Globally, many people have high blood pressure and don't receive any treatment due to poor education & follow-up after diagnosis; as well as patients not having long term compliance with their medications. Although there are many good antihypertensives available, only a small number of patients reach their blood pressure goal. The World Health Organisation states that improving adherence to treatment is the equivalent of drug development and both are required in order to achieve satisfactory control over high blood pressure. In addition, poor adherence to therapy not only negatively impacts the patient's disease outcome but also increases the costs associated with managing their disease. To achieve better patient compliance with therapy and improved outcomes for patients, structured programmes need to be introduced. Clinical pharmacists, through education, counselling and monitoring, are key to addressing many of these issues and thus improve blood pressure control and decrease the burden of hypertension on society. (WHO et al, 2021)

Across the world, medication adherence presents a huge problem in the treatment of hypertension. According to studies, close to half of patients with chronic diseases do not take their prescribed medications. There are many possible reasons for nonadherence including forgetting doses, being on a complex medication regimen, experiencing side effects from medications, and lack of awareness of how serious their condition is. Financial issues and poor communication between the patient and healthcare provider are also large contributing factors to nonadherence. Many patients stop taking their medications as soon as they feel better without understanding that hypertension requires lifelong treatment. This results in patients suffering from uncontrolled high blood pressure, which can lead to complications. According to Sabaté et al, adherence is a multidimensional issue that is affected by social, economic, and healthcare system factors. In order to manage patients effectively, it is important to intervene with patient-centered care that includes education, motivation, and ongoing contact with the patient. Pharmacists and other healthcare professionals play a critical role in identifying patients who may not be adhering to their

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medications early on and helping them improve their behavior through structured counseling and support programs. (Sabaté et al, 2003)

Pharmacists are able to provide a variety of pharmaco-therapeutic services for manage patients with hypertension, including patient education, medication management, identification and resolution of medication-related problems and providing reinforcement on the proper use of medications. Pharmacists also provide individuals with education on the disease process, the need for adherence to medications and the possible complications of noncontrolled hypertension. The establishment of individualized care plans breaks down complex medication regimens and improves an individual's comprehension of their medications. The majority of the literature demonstrates pharmacist-delivered interventions to improve adherence to medications at a higher rate than usual care, and thus ultimately provide improved blood pressure control and decrease the risk of developing cardiovascular disease. According to Chisholm-Burns et al, pharmacists' involvement in managing chronic disease provides positive clinical outcomes as well as increased patient satisfaction. Building a rapport between pharmacists and patients through regular encounters is integral to providing a foundation for sustaining long-term adherence. Clinical pharmacists ultimately bridge between physicians and their patients in order to promote safe and effective use of medications. (Chisholm-Burns et al, 2010)

Integrating clinical pharmacists with healthcare teams greatly improves hypertension outcomes. Clinical pharmacists monitor patient therapy to ensure that it is being utilized effectively, look for drug interactions, and make it easier to follow through with therapy by following up at regular intervals. Studies have shown that when pharmacists participate in providing care by intervening on therapy specifically for the treatment of hypertension, there are substantial decreases in systolic and diastolic blood pressure. Authors of a literature review by Bosworth et al stated that pharmacist assistance along with behavioral interventions is important for the long-term control of hypertension. Additionally, working with a pharmacist decreases readmission rates and overall costs related directly to uncontrolled hypertension. Despite the overwhelming evidence supporting pharmacist services, currently, they are not being utilized to the extent that they can be in many health care delivery systems. By providing an expanded role for clinical pharmacists in primary care, chronic disease management could greatly be

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improved. Collaborative, multidisciplinary approaches between pharmacists, physicians, and nursing staff are needed in order to maximize the patient outcomes. Overall, the contribution of the clinical pharmacist is critical for improving the hypertension care delivery system. (Bosworth et al, 2011)

Clinical pharmacist interventions are critical to modern methods of treating hypertension. Counseling, monitoring and ongoing education increase patient adherence to their medications. Numerous studies have demonstrated that pharmacist-led care results in better blood pressure control and fewer complications from cardiovascular disease. The work of Santschi et al demonstrated that patients whose pharmacist provided interventions had significant reductions in blood pressure. This emphasizes the need to integrate pharmacists into routine healthcare practice. For successful implementations to take place, teamwork from all healthcare professionals is essential along with supportive policies. Expanding the role of pharmacists in the management of chronic diseases can greatly reduce the burden on our health systems and improve the outcomes of patients. Clinical pharmacist intervention is a cost effective, and evidence based, means to increase medication adherence among patients with hypertension. (Santschi et al, 2014)

Clinical pharmacist improves medication adherence in hypertensive patients

Controlling high blood pressure (hypertension) is a chronic and long-term problem requiring regular and adequate use of medications to reach optimum blood pressure control; however, the most significant barrier to effectively managing patients that have high blood pressure is not adhering to their medications. Patients often do not take their medications as prescribed for a variety of reasons such as: a lack of understanding about the condition and treatment, forgetfulness about taking their medications, having a complicated or difficult-to-follow treatment regimen, or misunderstanding the necessity for a lifelong commitment to medication use. When patients do not take their medications as prescribed, they are at an increased risk for having higher levels of blood pressure, which can lead to serious medical complications such as a stroke, heart attack or kidney failure. Clinical pharmacists provide a vital role in closing the gap between prescribing a medication and actually taking the medication as prescribed by the physician, thus ensuring that patients fully comprehend their medical condition, what the reason for their prescription medications are, and the consequences of not adhering to their prescribed medication regimen, through

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providing structured counseling, continued support in treatment adherence and assisting the patients with developing positive medication-taking behaviors that ultimately lead to improved hypertension control and improved health status for the patients. (Benheim et al, 2016)

Clinical pharmacists play a vital role in enhancing medication adherence through patient-centric strategies and interventions. This includes providing comprehensive medication counselling, teaching patients regarding their illness/disease progression, clarifying questions patients have about their medication(s), and providing strategies to consolidate complex medication regimens.Patients with high blood pressure commonly experience confusion while trying to manage multiple medications at different times. Clinical pharmacists provide an assessment of the reasons why patients are having difficulty adhering to medication regimens and develop tailored individualised solutions that would be most effective for each patient (e.g., medication schedules, reminder systems, and strategies to incorporate medications into their daily routine). Clinical pharmacists are constantly monitoring patient understanding and reinforcing adherence behaviours with the patient during follow-up visits.Continuous engagement with patients will help them to remain motivated and committed to managing their health through their prescribed medication regimens. Because clinical pharmacists help to facilitate open lines of communication between patients and their healthcare providers, much of the confusion that exists in the patient-provider relationship can be alleviated. As a result, patients are able to feel more secure in their ability to manage their health, leading to increased medication adherence (on their part) and improved long-term blood pressure control.(Peterson et al, 2003)

"One important role of the clinical pharmacist is to identify and manage drug-related problems that can contribute to, or exacerbate, poor medication adherence. Patients may stop taking their medications due to adverse effects (ADEs), fear of ADEs, or lack of a perceived benefit from the medication. Many times these problems go unrecognized, but clinical pharmacists are active monitors of ADEs and develop interventions to mitigate the effects of these issues. In doing so, they educate patients on the possibility of experiencing ADEs and guide them in how to best manage or report ADEs. In addition, clinical pharmacists work collaboratively with physicians to adjust patients' therapy as appropriate in order to maximize therapeutic effectiveness while minimizing adverse effects. By working

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collaboratively with physicians and identifying and resolving these problems early, clinical pharmacists can help ensure patient safety and help improve patient satisfaction with the medications they take. Additionally, clinical pharmacists are able to help identify potential drug-drug interactions that may reduce the effectiveness or increase the toxicity of a patient's medication regimen. By resolving these issues quickly, clinical pharmacists can help ensure that patients continue taking their medications and increase the likelihood of successful medication adherence. The role of the clinical pharmacist in optimizing medications is essential for ensuring that patients receive consistent therapy and achieve their desired blood pressure goals." (Morgado et al, 2011)

Behavioral modification and improvement of lifestyle are two of the most important components in managing hypertension, and clinical pharmacist intervention can play an important part in both. One area in which clinical pharmacists provide education to patients relates to the importance of lifestyle changes such as reducing sodium intake, maintaining a healthy weight, and getting regular exercise, quitting smoking, and limiting or avoiding alcohol consumption. These types of lifestyle changes are meant to work in conjunction with medication therapy to improve overall treatment outcomes. As a part of their treatment plan, clinical pharmacists employ motivational strategies to encourage patients to make healthier lifestyle choices and maintain a long-term commitment to their treatment regimen, while also assisting patients in developing realistic health-related goals and tracking progress toward those goals over time. Clinical pharmacists conduct regular follow-up visits with patients to assess both adherence to medication as well as lifestyle modifications. The comprehensive approach employed by clinical pharmacists provides multiple solutions for patients with uncontrolled hypertension and the root causes of their uncontrolled hypertension. By incorporating lifestyle modification strategies with medication management, clinical pharmacists can provide a comprehensive model of patient care which facilitates both adherence to treatment plans and improved clinical outcomes. This two-pronged approach is particularly beneficial in managing chronic diseases, as achieving long-term behavior change is critical to the successful management of chronic diseases. (Nau et al, 2014)

The clinical pharmacist has a profound effect on hypertensive patients' overall health and well-being through their interventions related to both medication adherence and clinical outcomes. The evidence indicates that

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pharmacist-led interventions improve medication adherence, decrease blood pressure levels, and reduce the risk of cardiovascular complications. Pharmacist integrated care will be more likely to give patients the opportunity to adhere to their prescribed medications than the typical case management approach. This improvement is due to better education about medications, continuity of care as a result of pharmacist follow-up, and targeted individual patient care strategies. Pharmacist care also assists in reducing the total cost of healthcare by keeping patients from being admitted to hospitals or seeking emergency department care resulting from poorly managed hypertension. The pharmacist's role in improving patient satisfaction and increasing the efficiency of the healthcare system will enhance the overall performance of the healthcare staff. The clinical pharmacist is a key member of the multidisciplinary team managing chronic disease. Specifically, through their intervention, clinical pharmacists will keep patients involved in their treatment and will provide better long-term health outcomes than patients treated without the involvement of a clinical pharmacist. Therefore, the incorporation of clinical pharmacy services into hypertensive medication therapy is a viable approach and there is considerable evidence to support this conclusion. (Hom et al, 2015)

Patient counseling increases awareness and proper medicine use

The practice of providing information about medications and their proper usage constitutes a significant component of the pharmaceutical care process and has been proven to increase patient understanding regarding the proper use of medications; particularly those that treat chronic diseases (i.e. hypertension). The primary reason that patients do not achieve their optimal therapeutic response is because they do not have a complete understanding of their specific medication regimen. By providing patients with information pertaining to their health status, the purpose of specific medications, dosing schedules, and expected outcomes; clinical pharmacy services facilitate bridging the knowledge gap between the patient and the successful use of their prescribed medication. When patients understand both how and why they should take their medication, they are more likely to correctly adhere to their prescribed therapy. Counseling is particularly important when managing patients with high blood pressure since the success of their treatment relies on long-term adherence to therapy. Therefore, counseling represents a fundamental and critical service component used by clinical

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pharmacists to improve patient adherence to medication therapy. Additionally, counseling aids in decreasing patient misconceptions (i.e. patients stop taking their medications once they are no longer experiencing symptoms). Clinical pharmacists use layperson-type language and/or individualized communication strategies; allowing for a greater understanding by the patient regarding their prescribed medication therapy. The greater the patient's understanding, the more likely they will continue to use their medication to achieve desired health benefits. (Armour et al, 2007)

Providing effective counselling for patients increases knowledge while addressing behaviour-related obstacles to the proper use of medication. For many patients, factors such as forgetting to take medications, being unmotivated to use their medications or misunderstanding how to take their medications may lead to poor adherence. Clinical pharmacists determine these factors through counselling and develop tailored solutions including reminders to take the medicine, written instructions and simplified dosing schedules. Patients who receive counselling will also learn to understand the importance of taking their medications regularly, even if symptoms are not present. This understanding is important for long-term control of hypertension which may be asymptomatic. By promoting regular integration of taking medication into their daily routines, pharmacists are able to encourage a greater likelihood of adhering to their treatment regimens. Through education on the potential impact of missing doses (i.e., increased blood pressure and increased chance for developing complications), pharmacists help patients identify knowledge barriers and address any behavioural barriers they may have to optimally take their medication. Thus, providing patient counselling has a positive impact on optimal medication use and positively influences adherence patterns in hypertensive patients. (Blenkinsopp et al, 2000)

Counseling provided to patients is another method to improve the safety of medications and decrease errors that occur from their use. The large number of medications that are taken by hypertensive patients increases the possibility that there will be errors due to misunderstanding about the proper dosage, taking of the same medication twice (duplicate therapy), or due to interactions between them. A clinical pharmacist will be prescribed the medication prescribed to the patient by a healthcare provider and will describe the medication and the most effective way to take it. This helps to reduce errors in the use of medications. In addition to providing information on what the

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medications are for, counseling by the clinical pharmacist will include information about any potential side effects of the medication and how to cope with them. This decreases a patient's level of anxiety regarding potential side effects of a medication and thereby reduce unnecessary discontinuation of a medication. Counseling provides the patient with the opportunity to ask questions regarding their care and to resolve any doubts about what they are doing. By establishing a trusting relationship between the patient and their healthcare provider through discussion, the patient becomes more confident about taking their medication and will be more likely to do so correctly and regularly. Therefore, through counseling, a clinical pharmacist will not only increase a patient's awareness of their care, but also ensure that all medications used by patients with hypertension are used safely and appropriately. (Weber et al, 2006)

An important effect of counseling the patient is to develop long-term adherence due to frequent reinforcement. A single counseling event is usually insufficient when dealing with a chronic problem like hypertension, which requires ongoing treatment for the rest of one's life. For this reason, clinical pharmacists perform regular and ongoing follow-up counseling sessions to reinforce key messages and monitor patients. Follow-up visits provide patients with motivation to continue to take their medications as prescribed, and assist in preventing the patient from discontinuing their treatment. Clinical pharmacists also track non-adherent patterns of behavior and identify early signs of non-compliance so that they can develop strategies for educating the patient, or adjusting the schedule or dose of the medication. Through these continuous supportive systems, the patient will be encouraged to stay involved with their treatment program. Further, the individual provides encouragement to take control of their health through the responsibility and discipline associated with the self-management of their disease, and this in turn leads to improved disease control and potential for better medication-using behavior. (Okumura et al, 2012)

Counseling patients has been shown to improve awareness, understanding, and correct use of medications by hypertensive patients overall. Counseling is one of the most successful ways for pharmacists to help patients have better outcomes from treatment. Counseling helps ensure that patients correctly follow their prescribed therapies through education, behavioral support, and ongoing contact with the pharmacist. Many researchers have found that structured counseling improves

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adherence and blood pressure control in patients who have received structured counseling as opposed to those who have not received any. Counseling also reduces errors in dispensing medication and increases patient satisfaction with their care provider while enhancing the pharmacist-client relationship. Additionally, counseling decreases the number of hospital admissions and associated healthcare costs due to uncontrolled hypertension. Thus, patient counseling is an essential component of hypertension management today and assures that medications are used for safe, effective and rational means. (Morgado et al, 2011)

Regular follow up helps maintain adherence and treatment consistency

Frequent follow-up visits are one of the most important aspects to successfully managing chronic diseases. In particular, patients who are being treated for hypertension will need to be on medications for the rest of their life. When patients begin therapy, they generally experience improvement in their adherence to medication use; however, over time, many patients will become inconsistent with their treatment regimen due to lack of supervision and motivation. Therefore, follow-up visits will help assure that patients are compliant with their prescribed treatment regimens. Clinical pharmacists are an integral part of conducting regular follow-up visits to monitor medication usage, evaluate patient behavior in regards to medication adherence, and reinforce the need for ongoing therapy. Additionally, regular follow-up visits provide patients and pharmacists with the opportunity to address any potential barriers to medication adherence (e.g., side effects, forgetfulness, misunderstanding of instructions). Through regular, ongoing contact, patients can learn about the seriousness of hypertension and the importance of using medications on a continuous basis. Continued interaction with the patient can also increase the patient's take on responsibility and significantly improve their consistency with their treatment plan, resulting in optimal blood pressure control and decreased potential for long-term complications. (Benner et al, 2002)

A major advantage gained by performing routine follow-up is identifying non-adherence at an early stage and providing immediate intervention. Many patients do not disclose missed doses and irregularities related to their prescriptions unless prompted by the provider during these visits. Clinical pharmacists actively review a patient's medication history as well as ask specifically designed questions concerning adherence while assessing adherence levels. If the clinical pharmacist sees anything wrong, he/she will immediately address the problem

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through methods such as providing counseling, simplifying the regimen used by the patient, or implementing a reminder strategy. This proactive approach prevents the initial minor adherence problems from developing into serious adverse treatment outcomes, as well as providing the opportunity for the clinical pharmacist to evaluate the patient's understanding of his/her therapy and correct any misunderstanding. By providing this level of consistent contact, clinical pharmacists are able to encourage patients to remain involved with their therapy. This systematic process for monitoring patients in a structured manner has shown great improvement in the level of overall adherence to prescribed medications by hypertensive patients. (Viswanathan et al, 2012)

Regular follow-up appointments also allow for evaluation of how well the antihypertensive therapy is working, as well as making appropriate changes. Blood pressure measurements during follow-up appointments allow both the pharmacist and physician to have direct feedback on the success of treatment. If blood pressure continues to be difficult to control, the pharmacist can work with the physician to adjust the dose or change the therapy. This collaboration between the pharmacist and physician ensures optimal therapy is given to each patient. Follow-up appointments allow for evaluation of any adverse drug reactions that could result in poor patient adherence. By addressing these issues early, the pharmacist can prevent unnecessary discontinuation of therapy. In addition, follow-up reinforces patient involvement in their own care, which helps to promote self-management behavior. The ongoing evaluation and feedback loop improves both adherence to treatment and therapeutic consistency among hypertensive patients. (McDonald et al, 2002)

Continual follow-up also includes reinforcement of behaviors. Patients commonly experience difficulty with long-term motivation to adhere to therapy for chronic diseases (ie, hypertension). Follow-up appointments serve to remind patients continuously about the importance of medication adherence and lifestyle modifications. During follow-up appointments, clinical pharmacists attempt to reinforce positive health behaviors, and dissuade patients from non-adherence. They also share practical tools (eg, pill organizers, medication reconciliation charts, reminder systems) to assist with adherence. Over time, these interventions will assist patients in developing a disciplined approach to taking their medication. Continued follow-up also supports the therapeutic relationship

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between the patient and the pharmacist, creating increased trust and willingness to follow recommendations. This psychological benefit provides substantial assistance in maintaining a long-term adherence to therapy. (Hess et al, 2013)

Overall, regularly scheduled follow-up visits greatly improve medication adherence in hypertensive patients and maintain consistent treatment regimens. Regular follow-up enables healthcare providers to continue monitoring their patients' progress, intervene in a timely manner, and reinforce the appropriate use of medication. Several studies indicate that patients who receive regular follow-up services achieve better blood pressure control and have higher rates of medication adherence than do individuals with no follow-up services. Structured follow-up programs conducted by clinical pharmacists contribute to reduced morbidity, decreased hospitalization rates, and decreased health care expenditures due to inappropriate management of hypertension. Participation by clinical pharmacists provides assurance that patients remain committed to long-term therapies and achieve improved clinical outcomes. As outlined above, regular follow-up is an integral component of hypertension management and improves both medication adherence and overall disease control. (Steiner et al, 2015)

Lifestyle modification guidance supports better blood pressure control

To manage hypertension, lifestyle modification must be integrated into any care plan. This is vitally important for effective treatment of hypertension because it enhances therapy by either reducing the total dose of medication or allowing for increased effectiveness at lowered doses. Unsatisfactory lifestyle habits, such as consuming too much salt, being sedentary, being obese, smoking and drinking too much alcohol, still exist among many patients with hypertension and contribute to their overall blood pressure elevation. The clinical pharmacist provides specific guidance through structured methods of addressing lifestyle in educating the patients about their ability to influence their hypertension by changing their daily life habits. As a result of receiving this education and counseling from a clinical pharmacist, patients become aware that their hypertension can be treated with more than just taking medication; their hypertension can be managed as well by changing their lifestyle. Once they have the understanding of this relationship, patients are usually much more amenable to implementing new, healthier lifestyle practices. Providing lifestyle information during routine patient interaction, clinical pharmacists take a much more holistic approach to hypertension

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management, thereby increasing blood pressure control for their patients and decreasing the potential risk of cardiovascular disease for patients. (Appel et al, 2003)

One of the main aspects of managing lifestyle with hypertension is modifying one's diet. Clinical pharmacists help educate patients about limiting their intake of salt, avoiding processed foods, and increasing the amount of fruits, vegetables, and lean protein they eat. Studies have demonstrated that excess sodium consumption can significantly influence high blood pressure. Most people are not aware that many packaged food products contain additional sodium due to the use of preservatives and flavorings. Because of this, pharmacists assist patients in reading food labels correctly, thus making healthier dietary decisions. Furthermore, they promote the use of the DASH (Dietary Approaches to Stop Hypertension) diet as an effective way to lower blood pressures. Lastly, pharmacists will frequently remind patients to stay well-hydrated and limit their consumption of caffeine. These dietary changes will lead to improved hypertension control when practiced consistently, while also decreasing the patient's potential need for higher levels of pharmaceutical treatment. (Whelton et al, 2002)

Another important aspect of lifestyle modification that improves hypertension control is physical activity. Clinical pharmacists encourage patients to engage in moderate-intensity physical activity for at least 30 minutes on most days of the week, such as walking, biking, or swimming. Exercise can help reduce excess body weight, increase cardiovascular fitness levels, and naturally lower blood pressure. Many people have hypertensive conditions and tend to be sedentary physically, which makes controlling their high blood pressure more difficult. The pharmacist will evaluate each patient's physical limitations and will develop an appropriate exercise plan tailored to the patient's health status. The pharmacist will also motivate the patient to continue the program by discussing the long-term benefits of regular physical activity, such as decreasing the risk of cardiac disease and enhancing overall health. Therefore, when combined with medication compliance, exercising on a regular basis has a large positive impact on controlling blood pressure. (Sacks et al, 2001)

Another part of lifestyle change, or modifying one's way of living, for patients with hypertension is weight management and smoking cessation. Clinical pharmacists provide education to their patients regarding the links between obesity and hypertension; even a modest weight loss can have a significant positive effect on blood pressure levels. Clinical pharmacists assist their

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patients in setting realistic weight loss goals and how to attain those goals through healthy eating and exercising regularly. Smoking is considered to be a primary risk factor for developing cardiovascular disease and negatively impacting hypertension. Pharmacists provide counseling to their smoking patients and can also provide support for smoking cessation by using various behavioral methods and motivational techniques. The use of alcohol is another factor that clinical pharmacists will discuss with their patients and helps to support the patient's efforts to control their blood pressure, since excessive use of alcohol is a factor that contributes to uncontrolled high blood pressure. All of these behavioral changes directed at modifiable risk factors will provide patients with optimal cardiovascular health. (Flack et al, 2010)

The recommendations for making life changes to manage blood pressure issued by a clinical pharmacist are an important means of helping individuals with high blood pressure achieve optimum control over their condition. Through lifestyle changes in conjunction with medication-based therapies, optimal biology can be achieved in patients, leading to improved health outcomes and long-term disease management. In particular, structured lifetime education has been shown to improve systolic and diastolic BP values more than by medication alone. The role of the clinical pharmacist in the patient's success is through ongoing training, guiding and providing each patient with their own personalised lifestyle plan. This holistic approach helps achieve more adherence, increased self-management and decreased complication rates. Thus, in managing hypertension, providing guidance on lifestyle modification is an invaluable and effective tool for improving overall health outcomes and enhancing overall quality of life. (Blumenthal et al, 2012)

Intervention leads to reduction in systolic and diastolic blood pressure

Hypertension is one of the main risks for heart diseases and has the specific features of generally very high systolic or diastolic blood pressure, as a result of chronic high blood pressure.The successful control of hypertension requires pharmacologic and non-pharmacologic (therapeutic) means to encourage patients' adherence to both their lifestyle changes and their blood-pressure medications. Research has shown that clinical pharmacy interventions significantly reduce systolic blood pressure (SBP) and diastolic blood pressure (DBP) through patient education, medication adherence support, and ongoing assessment of drug therapy effectiveness.Through continuous access and follow-up, patients gain improved

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disease understanding (due to patient education) and therefore adhere to their blood pressure medication with greater success, which leads to the patients having better blood-pressure stability. When patients are provided with support from a pharmacist to identify and resolve unnecessarily complicating drug-related problems caused by their medications or comorbidities, their medication adherence improves further and consequently helps to achieve an optimum level of blood pressure (BP) control. The prevalence of pharmacist-led disease management models is increasing and is seen as essential for the attainment of their goal, which is to reach the BP treatment goals outlined for patients with hypertension, as well as improving overall cardiovascular health of patients.(McLean et al, 2008)

Improved medication adherence is one of the main mechanisms by which interventions reduce blood pressure. Hypertension patients often do not reach their target blood pressure because they don't take their medications consistently, or stop altogether. Clinical pharmacist interventions address these issues by providing counseling, reminder systems, and individualized care plans. Pharmacists educate patients on how to consistently take their medications which helps them to understand their treatment goals. A patient that understands their treatment goal is much more likely to take their antihypertensive at regular intervals, leading to sustained stabilization of their blood pressure over time. Research indicates that patients who receive structured pharmaceutical care versus routine pharmaceutical care have significantly less systolic and diastolic blood pressure than those who receive routine pharmaceutical care. In addition to having lower blood pressure, patients who take their medications consistently have less fluctuation in their blood pressure, which is important in preventing cardiovascular complications such as stroke and myocardial infarction. (Ho et al, 2014)

Medication optimization by clinical pharmacy interventions can also lower blood pressure. Pharmacy professionals will review their patients' medication regimen, selecting, dosing, and combining appropriately. Often, patients are either receiving inadequate treatment or do not receive the right combination(s) of medications to provide the treatment needed for desired control of blood pressure. Pharmacy professionals will work with physicians to suggest how to adjust therapy based on specific patient responses and to monitor for adverse drug reactions that may cause a patient to not take the medication as prescribed or to alter the efficacy of the medication. By optimizing

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pharmacotherapy, clinical pharmacists are able to increase the therapeutic effects of antihypertensive therapies. This standardized approach results in decreased systolic and diastolic blood pressure levels, and therefore increases the likelihood of success in treating patients. (Schroeder et al, 2005)

Regular monitoring and follow-up are additional contributing elements for reduction of blood pressure. At follow-up appointments, clinical pharmacists often check patients' blood pressure readings to evaluate the effectiveness of their therapy. Regular examinations provide an opportunity for early identification of uncontrolled hypertension and for timely intervention. Patients are also encouraged to keep track of their blood pressure at home, which increases their awareness of its significance and encourages them to be involved in their treatment. This data will help pharmacists to make educated suggestions regarding medication adherence and lifestyle changes. This continues the cycle of continual feedback to keep patients on track to reach their treatment goals. Sustained reductions in both systolic and diastolic blood pressure are maintained over time. (Altavilla et al, 2017)

The impact of an intervention by a pharmacotherapy specialist on reducing systolic and diastolic blood pressure in patients with hypertension is very beneficial. Pharmacotherapy specialists work with patients through education, adherence support, optimization of medications, and regular measures to enhance the overall effectiveness of their treatment. Patients who receive pharmacotherapy specialist-centered care consistently demonstrate improved control of their blood pressure compared with those who receive standard care. An improvement in blood pressure significantly reduces both the likelihood of experiencing a cardiovascular complication and the long-term health of the patient. Clinical pharmacy specialist interventions are thus an effective, evidence-based method for achieving and sustaining optimal control of blood pressure in patients with hypertension. (Morgado et al, 2011)

Overall hypertension management and patient outcomes are improved

Hypertension is a long-standing, chronic cardiovascular issue that requires continuous and complete management in order for the patient to achieve the best outcome. Management of hypertension includes but is not limited to addressing blood pressure lowering alone, it addresses increasing adherence to medications, decreasing potential complications of hypertension, increasing patient knowledge, and facilitating long-term behavioural/lifestyle changes. Even when patients are prescribed an

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antihypertensive medication that is effective, many do not achieve their target blood pressure numbers due to ineffective adherence and lack of knowledge. Clinical pharmacist interventions are vital to improving overall hypertension management through the provision of structured pharmaceutical care services including patient counselling; medication review; adherence monitoring; and ongoing follow-up. The clinical pharmacist assists patients in realising the importance of taking medications consistently for long-term control of their disease; the clinical pharmacist educates patients about their treatment plans which creates a sense of engagement and responsibility for self-care; and improved communication between the healthcare provider and the patient create a stronger adherence to the treatment plan. Thanks to clinical pharmacist involvement, hypertension can be better managed and has the potential to lead to improved disease management, improved blood pressure control/target numbers, and improved overall patient outcomes. This comprehensive combination of pharmacological and behavioural management of patients with hypertension provides for the potential for a lifetime of health stability. (Libby et al, 2019)

The main advancement in controlling hypertension through the assistance of a clinical pharmacist is by enhancing overall adherence with medication. Uncontrolled hypertension and poor control of hypertension associated with medication adherence is the primary reason for patients being treated for hypertension not having their blood pressure at goal levels. Patients may not take their medications on a scheduled basis due to forgetting to take them, side effects from their medication taking them incorrectly, having complex schedules, or lack of knowledge about hypertension and why they need to take medications. Clinical pharmacists address these problems through identifying the issues of the patient and providing individualized interventions, such as simplifying medication schedules, creating reminders, conducting counseling sessions, and giving educational support. Clinical pharmacists also explain to patients the need for maintenance of therapy life-long, despite not experiencing symptoms, which many patients experience with hypertension. This helps to increase the motivation of patients to take their medications and therefore, result in more consistent use of their medications. Increased adherence to prescribed medications will lead to better stability of blood pressure which, in turn, will decrease the likelihood of adverse

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outcomes associated with hypertension, including stroke, myocardial infarction, and renal disease. In addition, clinical pharmacist-led interventions will also result in an increase in patients' confidence in their ability to manage their own hypertension. In summary, structured pharmaceutical care results in a greater level of patient adherence to their medication regimen than does the usual practice of care. Therefore, it follows that clinical pharmacists play an important role in helping to increase long-term control of hypertension and decreasing the burden placed on the healthcare system by hypertension by ensuring patients' adherence to their treatment regimens. (Fuster et al, 2017)

As well as educating patients about their hypertension and the importance of adhering to medications, clinical pharmacists provide patients with the necessary skills to effectively manage their condition. Many patients do not have an adequate understanding of their hypertension or the complications associated with it, nor do they understand why continuous therapy is important. Through education regarding the condition of hypertension, the purpose of medications, dose schedules and potential side effects, clinical pharmacists assist patients in becoming more aware of their condition and making informed decisions to improve their overall well-being. This assistance will enable patients to perform regular monitoring of their blood pressure at home and to recognize the signs of uncontrolled hypertension in order to contact their doctor for further assistance, thus promoting a sense of empowerment for the patient, as they are actively participating in their own care instead of waiting for their health care provider to intervene. In addition, self-management education teaches patients how to maintain a medication regimen, as well as how to continue to follow their prescribed treatment. Through education and self-management skills, patients will gain more confidence and be able to manage their hypertension better. This increased confidence will lead to improved adherence, greater control of hypertension and fewer emergency visits related to uncontrolled hypertension. Overall, by providing patients with education and the necessary skills to manage their own health, clinical pharmacists are able to create a foundation for long-term hypertension management and the improved health of patients. (Braunwald et al, 2020)

Clinical pharmacists have improved management of hypertension through providing interventions to reduce the need for healthcare services and decreased complications from uncontrolled

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hypertension. Uncontrolled hypertension can lead to many serious complications, including stroke, myocardial infarction, congestive heart failure, and chronic kidney disease; therefore, many patients with untreated hypertensive disease are frequently admitted to the hospital, which increases overall healthcare costs. Clinical pharmacists can help to prevent these complications of hypertension by continuously monitoring patient's medication effectiveness and compliance and/or providing additional education/counseling. In addition, due to the routine follow-up visits that clinical pharmacists conduct with patients, pharmacists will be able to detect early signs of non-compliance, side effects, or ineffective treatment and promptly implement corrective action by altering medication regimens or referring patients to medical doctor if necessary. Pharmacists also educate patients about the importance of reporting symptoms early and consistently taking prescribed medication as directed. By taking a proactive approach to the management of hypertension, clinical pharmacists significantly reduce the number of patient visits to the emergency department and hospitalizations for hypertensive crises or complications. Overall improved blood pressure control due to clinical pharmacist intervention will result in fewer complications from hypertension and ultimately fewer long-term complications from hypertension. Clinical pharmacist interventions will also reduce the burden on the healthcare system due to reduced patient volumes and costs associated with the management of hypertension. Studies have indicated that structured pharmaceutical care provided by clinical pharmacists leads to a reduction in overall healthcare utilisation (i.e., visits to the physician, emergency department, or hospital) by hypertensive patients in the healthcare system; therefore, clinical pharmacists have an important role in improving healthcare efficiency through the provision of safer and more effective management of hypertension. (Oparil et al, 2018)

Clinical pharmacist interventions have been shown to improve hypertension management and patient outcomes through a comprehensive, patient-centered approach. These include medication counseling, support for adherence, regular monitoring, education about lifestyle changes, and continuous follow-up care, all aimed at achieving effective long-term control of hypertension. Patients who receive pharmacist-led care generally have better control of their blood pressure, increased adherence to their medication regimen, and an increased awareness of their own health

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condition when compared to patients receiving standard care. Furthermore, this improved control of blood pressure leads to fewer adverse cardiovascular events and improved quality of life for the patient.Clinical pharmacists also play an important role in helping patients communicate with their healthcare providers regarding treatment plans and assisting in making sure that the patients clearly understand how to adhere to them. By participating as part of a multidisciplinary healthcare team, the clinical pharmacist improves teamwork, and the overall coordination in managing a patient's chronic disease.In addition, pharmacy interventions can decrease the overall cost of healthcare by preventing complications and decreasing unnecessary hospitalizations. There is a substantial amount of evidence supporting the inclusion of clinical pharmacists into hypertension treatment models, as clinical pharmacists make substantial contributions toward improved clinical outcomes and patient-reported outcomes.The essential nature of clinical pharmacists in the effective management of chronic disease in today's modern healthcare system is becoming increasingly well-known. Therefore, clinical pharmacist interventions are an evidence-based and highly effective method of improving overall hypertension management and providing longer-term positive health outcomes to patients with hypertension from a diverse range of populations.(Cushman et al, 2016)

Strengthens patient–healthcare provider communication

Successful management of high blood pressure relies upon good interaction between healthcare professionals and patients. Clinical pharmacists, as intermediaries between physicians and patients with hypertension, work to facilitate this interaction. Many individuals do not fully comprehend their treatment recommendations, explanation of drugs or how serious their high blood pressure is, which causes them to not comply with their treatment plan and have uncontrolled high blood pressure. Through providing simple and concise information regarding medication usage, how often that medication should be taken, as well as what the outcome from taking that medication will be, clinical pharmacists assist patients' understanding of hypertension care. In addition, clinical pharmacists also provide opportunities for those patients to voice concerns, and experience side effects due to their therapy. The two-way communication established between patients and healthcare professionals provide the healthcare professional with better information about the patient's

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behaviour and any issues with the overall treatment plan, so that they can make more effective changes to the current treatment plan, based upon the patient's needs. Additionally, through good communication and understanding between the healthcare provider and the patient, misunderstandings between patients and providers regarding the proper instructions to follow will be reduced. Ultimately, with hypertension management with a long-term commitment is essential to achieving success, the enhanced communication provided through the clinical pharmacy profession will significantly increase the patient commitment to their treatment plans and improve the patient's success at controlling their high blood pressure. In summary, clinical pharmacists provide essential value in increasing the level of communication which directly correlates with enhanced medication compliance and improved hypertension management outcomes. (Peterson et al, 2003)

Pharmacists support clearer communication with benefits to both the patient's adherence to the prescribed medication and understanding of how to meet their treatment goals. Many people who have hypertension struggle with their prescriptions being very complicated with multiple medications and often times the instructions are not clear, which results in confusion and non-adherence with the treatment plan. In order to combat these issues, pharmacists attempt to streamline medication instructions through the use of non-medical language and examples during patient counselling. Furthermore, by utilizing interactive communication pharmacist can determine whether the patient understands what has been communicated between them by asking the patient to paraphrase or explain to the pharmacist using their own words what they were just told. Utilising this technique helps ensure that the patient has a clear understanding of the information provided and lowers their risk of making medication errors. In addition, pharmacists encourage patients to openly discuss any side effects or other concerns that they may have without the fear of being judged. By doing this, pharmacist build trust and strengthen the connection they have with their patient's when patients believe that they are being heard and supported they typically have a greater success rate with following the treatment plans as prescribed. Continued communication between the patient and the pharmacist allows the healthcare provider to better identify barriers preventing the patient from following their treatment plan or therapy. This will allow for a more tailored approach to the therapy provided enabling the patient to achieve the highest level of

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success when following their treatment plan / \. The continuous communication loop will enhance coordination between the patient and the physician and/or healthcare team with regards to hypertension management (Murray et al, 2007)

The clinical pharmacist plays an important role in medication reconciliation and follow-up communication, which are essential for improving the strength of communication among healthcare providers. A patient with hypertension often sees more than one provider, which could result in conflicting or duplicate prescriptions. Clinical pharmacists can review all medications and communicate any necessary changes to patients and physicians. This process minimizes confusion and keeps the patient's treatment plan safe and effective. When a pharmacist meets with the patient, they discuss medication adherence, blood pressure measurements, and anything that may have been difficult for the patient. These structured conversations allow for the identification of issues as they arise and enable timely intervention. Additionally, clinical pharmacists provide physicians with information about the progress of their patients and how the patients respond to their treatments. The collaborative nature of this communication supports all members of the healthcare team in reaching a consensus concerning clinical treatment. Improved coordination of care creates fewer medication errors and improves patient safety. Furthermore, the collaborative work of pharmacists helps optimize therapy through the use of patient-specific data. Collectively, the involvement of pharmacists within the communication process improves the quality of patient care for individuals with hypertension. (Farmer et al, 2011)

Through communication, clinical pharmacists can enhance patient engagement and empowerment in managing their blood pressure. Trust is often lacking in a patient's relationship with their health care team. Many patients simply take the instructions given to them without taking an active role in their treatment decisions. By encouraging shared decision-making, pharmacists can include patients in conversations about their treatment options which instills a sense of confidence and motivation towards compliance with their treatment. Furthermore, clinical pharmacists will educate patients on ways to monitor their hypertension (i.e., home blood pressure measurement), which creates additional patient involvement and improves communication between appointments. When patients communicate actively with their providers regarding their health, the individualization and effectiveness of treatment are substantially improved.

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Clinical pharmacists also provide continued motivation to patients, helping them to remain committed to long-term therapy. Continuous contact develops a greater therapeutic relationship with the patient and improves the overall quality of communication. Therefore, patients will feel more accountable for their health and will be more likely to adhere to their prescribed treatment. (Katon et al, 2010)

When patients have effective communication with their health care providers, they experience better management and outcomes of their hypertension. Clinical pharmacists maintain an important connection between patients and their health care team by providing patients with counseling, follow-up care, reviewing medications, and patient education. This role ensures that patients fully comprehend their treatment plan while also providing them with a way to communicate any concerns they may have about these plans. Better communication between patients and health care providers results in medications being more adhered to, fewer errors, and greater effectiveness in controlling the disease. Additionally, improved communication provides for improved coordination among all members of the health care team resulting in better informed and patient-centered treatment decisions. Since successful long-term hypertension management requires ongoing commitment, a strong communication structure is crucial for maintaining continuity of therapy and preventing the development of complications. Clinical pharmacists assist in establishing a communication structure that promotes better trust, engagement, and collaboration between all members of the health care team; thus leading ultimately to the delivery of effective and safe patient care. Therefore, strengthening communication is an important factor in achieving effective hypertension management and improving patient care outcomes in clinical practice. (Roter et al, 2006)

Helps prevent hypertension-related complications

Uncontrolled Hypertension is a chronic disease that results in major adverse events such as Stroke, Myocardial Infarction, Heart Failure and Chronic Kidney Disease. A combination of controlling blood pressure over time, with Education for Patients regarding Hypertension and the Importance of Adherence to Antihypertensive Therapy plays an important role in reducing the risk of these adverse events. Clinical pharmacists provide guidance to patients about Hypertension: how to manage Hypertension through lifestyle changes; how to understand their medications (including side effects and drug interactions); and the impact of non-

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adherence on disease progression (by addressing patient's perception of symptoms or lack of symptoms). Through Counseling and Continuous Monitoring by Clinical Pharmacists, they assist patients in maintaining consistency with their antihypertensive medications. By assisting patients with medication Adherence and Rational Drug Use, Clinical Pharmacists play a significant role in preventing adverse events associated with Uncontrolled Hypertension. These actions will produce significantly improved Long-term Cardiovascular and Renal Health Outcomes, while decreasing the Disease Burden of Uncontrolled Hypertension on Healthcare Systems. (Whelton et al, 2018)

One of the primary responsibilities of Clinical Pharmacists in preventing complications due to hypertension is assisting with medication adherence. One of the most common reasons for patients to have an elevated Blood Pressure is due to non-adherence. Non-Adherence is a primary risk factor for the development of complications due to uncontrolled Blood Pressure. Pharmacists will often assist patients by identifying barriers to adherence (e.g., forgetfulness, side effects, lack of knowledge) and developing individual plans to address each barrier. Solutions can include patient counseling, reminder systems, and simplification of medication regimens (e.g., combined medications). By helping patients maintain their regular and proper medication use, pharmacists assist in maintaining a stable Blood Pressure. Stable Blood Pressure is necessary to minimize damage to critical organs (e.g., heart /brain/kidneys) as a result of hypertension. Clinical Pharmacists provide education to patients in regards to the long-terms risks associated with uncontrolled hypertension to provide added motivation to remain adherent to their medication regimen. This continuous support has been shown to significantly decrease the occurrence of acute cardiovascular events and chronic complications. Ultimately, pharmacist-directed interventions provide a significant layer of protection to patients at risk for experiencing severe hypertension-related health outcomes. (Lewington et al, 2002)

Clinical Pharmacists also assist in avoiding complications of hypertension as well as optimizing antihypertensive treatment. Most patients are either undertreated or taking inappropriate drug combinations to treat their high blood pressure, resulting in poor blood pressure control. Clinical Pharmacists thoroughly review patients' medications and work collaboratively with Physicians to provide effective products for the Patient. Clinical Pharmacists will also monitor for

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drug-to-drug interactions as well as side effects to the Patient's treatments. By working to identify and resolve issues early, Clinical Pharmacists can prevent a patient's treatment from failing or developing additional medical problems related to poorly controlled hypertension. In addition, Clinical Pharmacists frequently adjust antihypertensive medications based on blood pressure readings as well as how a patient responds to the medication. By utilizing this individualized approach, each Patient will receive optimal treatment for his or her specific condition. Proper management of medications on an individual basis will improve patients' blood pressure control and significantly decrease the risk for developing cardiovascular and renal illnesses. The overall impact that Clinical Pharmacists make on hypertension management through this organized approach is to improve patient safety and efficacy of their hypertension treatment. (Ettehad et al, 2016)

Clinical Pharmacists help monitor patients regularly to reduce the risk of developing a complication associated with hypertension through preventative measures. Pharmacists will assess blood pressure levels as well as measures that indicate whether patients are taking medications as directed. Pharmacists' continuous monitoring will help find uncontrolled high blood pressure (hypertension) early, prior to developing any complications. Patients are also encouraged to measure their blood pressure at home, allowing for results that can be reported back to their prescribing pharmacists should any changes occur. Pharmacists can use this information to develop timely interventions and adjust a patient's treatment plan. Through this proactive approach, pharmacy interventions play an important role in preventing the progression of disease, decreasing the risk of emergencies such as stroke and hypertensive crisis, and assisting patients in identifying complications via their education. Pharmacists consistently perform follow-up evaluations to ensure patients remain stable and controlled. These pharmacist interventions significantly decrease the risk of organ damage over a long period and improve the overall health outcome of patients. (Law et al, 2009)

Pharmacists play an important role in preventing future complications related to having high blood pressure (hypertension) via a patient-centered and comprehensive approach. Helping patients to achieve optimal blood pressure control is done with pharmacist interventions that include enhancing adherence to prescribed regimens, optimizing therapy, and ongoing monitoring. All of these contributors reduce the risk of life-threatening complications from

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hypertension, including heart attack and stroke, kidney failure, and heart failure. Moreover, patient education and counseling enhances patient awareness which ensures that patients are educated on the importance of long- term treatment for hypertension. Additionally, clinical pharmacists can assist with the early recognition and management of possible health concerns, which can help avoid disease progression. Working with other health care providers on a multi-disciplinary health care team adds value to patient care and improves treatment outcomes. As a result, patients under pharmacist-directed care experience fewer complications and have an enhanced quality of life. Thus, clinical pharmacist interventions are a positive intervention to reduce hypertension-related risks and improve long-term healthcare outcomes for patients with high blood pressure. (Forouzanfar et al, 2017)

Conclusion

Clinical Pharmacist Interventions Play Significant Role in Improving Medication Adherence for Hypertensive Patients, Hypertension is a Chronic Condition Requiring Lifelong Treatment; however, The Greatest Barrier to Achieving Proper Blood Pressure Control Is Poor Adherence to Medication. Clinical pharmacists Participate in Assisting with This Problem by Providing Structured Patient Counseling on a One-on-One Basis, Educating Patients About Their Medications, Following Up with Patients Upon Discharge from Clinical Practice, and Having Patients Continuously Monitor Their Blood Pressure Levels. These Clinical Interventions Allow the Patient to Gain an Understanding of Their Disease, Increase Motivation for Treatment, and Promote Consistent Use of Antihypertensive Medications Prescribed by Their Doctor, Which Will Result in Improved Patient Compliance with Their Treatment Plan. Improved Medication Adherence Will Acute Result in Improved Clinical Outcomes, Which Include Effective Decreases in Both Systolic and Diastolic Blood Pressure; as a Result, The Patient Will Have a Decreased Risk of Serious Complications (i.e. stroke, Myocardial Infarction, Heart Failure, And Chronic Kidney Disease). Clinical Pharmacist Interventions Provide Better Communication Between Health Care Providers and Patients to Ensure Safe, Rational, And Effective Use of Medications.

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