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**Management of Hypertension in Mental Health  
Patients in a Primary Care Setting  
An assessment of quality of care**

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University of Cape Town

# **Management of Hypertension in Mental Health Patients in a Primary Care Setting**

## **An assessment of quality of care**

### **Summary**

Numerous studies have revealed that mental health patients tend to receive poor quality of health care for their medical conditions. This tendency has been attributed variously to numerous issues, including stigmatization. In his experience working in the Metro District Health Services Clinics of the Department of Western Cape, the researcher has encountered numerous cases of sub-standard quality of medical care for mental health patients. These encounters, as well as a need to audit the general quality of care of patients with chronic diseases of lifestyle, have been the motivation behind the creation of this research project.

The study is a retrospective cohort study using patient folders as a source of data. It compares the standards, processes and outcomes of the management of hypertension in two populations at Crossroads Community Health Clinic in Cape Town. The first cohort consists of hypertensive patients with psychiatric illnesses, and the second are hypertensive patients without psychiatric illnesses. The study attempts to examine the quality of care of established hypertension in patients with psychiatric illnesses. Folders were examined for the recording of various activities and actions (during consultations) that are essential to the assessment, modification and prevention of complications.

The results reveal a significant difference between the care of psychiatric patients with hypertension and non-psychiatric hypertensive patients at Crossroads CHC, with regard to counselling about diet changes, the measurement of blood pressure at relevant visits, and the weighing of patients annually. Furthermore, basic equipment essential to the optimal management of hypertension is not available in the consulting room where the psychiatric patients are seen. Both groups are sub-optimally managed according to national standards, and a statistically significant but epidemiologically equivocal difference is found between the two groups with regard to the control of blood pressure.

# Introduction

Crossroads Community Health Clinic (CHC) is a primary health clinic located in the peri-urban settlement of Crossroads in Cape Town South Africa. The community is predominantly unemployed and poor, consisting of mostly Xhosa speaking people. The clinic is one of numerous eight hour clinics located throughout the province and falls under the auspices of the Provincial Administration of the Western Cape Department of Health (PAWC DoH), through the Metropolitan District Health Services (MDHS). Crossroads CHC is one of four community health clinics in a sub-district (Mitchell's Plain/Klipfontein) with a population of approximately 115,000 people.<sup>1</sup> It provides primary health care through coordinated services falling under eight national health priority areas/programmes. These areas include HIV/AIDS and STI screening, prevention and treatment, Chronic Diseases of Lifestyle treatment and prevention, Women's Health (Cervical Cancer screening), Tuberculosis treatment and screening, Child care and immunization, Mental Health, and home based care.

The clinic employs six medical doctors and three clinical nurse practitioners involved with the consultation of patients, as well as an extensive professional nursing staff. Three of the medical doctors and two of the clinical nurse practitioners work in the general clinic side, while the other doctors and clinical nurse practitioners work in the anti-retroviral clinic. The clinic employs a club system, whereby patients with the national priority chronic diseases (hypertension, asthma, epilepsy, diabetes) are seen on selected days. These patients are gathered in the club room upon arrival where they are prepared (blood pressure, glucose, peak flows, seizure frequency, etc. are measured and recorded) and health education is provided before they proceed to the consultation rooms.

Mental health patients are seen from Monday to Thursday by a professional mental health nurse practitioner. A psychiatry registrar visits the clinic weekly to see scheduled problematic cases and periodic review cases. Psychiatric patients with hypertension are often sent to the hypertension club after their psychiatric consultation with the psychiatric nurse and reviewed by the medical doctor on call with regard to their hypertension. However, anecdotal evidence at the

clinic seems to suggest that these patients are not being managed as well as they could. Many are not always sent to the club room, but go directly to the doctor on call, and those who are sent to the club room first do not seem to get the same attention as their non-psychiatric counterparts. The most common explanation has been the significant general volumes of patients seen each day. Furthermore, these patients often see the medical doctor after having seen the mental health sister and having gone to the club. They are arguably often tired and in a rush to have their hypertensive medications re-boarded and to go to the pharmacy.

As part of a quality improvement initiative for the management of hypertension at the clinic, the reason for this study is to better ascertain and articulate the quality of care of hypertensive psychiatric patients, and to compare it to the quality of care given to their non-psychiatric counterparts. An added consequence of the study will be to examine the care of non-psychiatric hypertensive patients at the clinic as part of the first step in a quality improvement cycle.

### **Question**

Is there a difference in the quality of management of hypertension in patients with psychiatric illnesses compared to non-psychiatric patients at Crossroads Community Health Clinic?

### **Sub Questions**

Is there a difference in the resulting levels of blood pressure control between the two groups of patients?

What interventions are possible in improving hypertension management in psychiatric patients at Crossroads clinic?

# Literature Review

## Hypertension as a Public Health Priority

Hypertension continues to be a significant worldwide cause of morbidity and mortality, with more than 25% of the world's adult population suffering from it in 2000.<sup>2</sup> This proportion is projected to increase to a total population of 1.56 billion by 2025.<sup>2</sup> The disease's attendant higher risks of other cardiovascular diseases and complications (stroke, heart failure, etc), make it one of the more significant contributors to the burden of disease and mortality in many parts of the world.<sup>3</sup> Indeed, as of 2002, hypertension was responsible for 7.1 million deaths (13% of total).<sup>4</sup> In Sub-Saharan Africa (2000), the rates of hypertension among people between the ages of 40-49 was 38.5% for men and 39.5% for women, with rates increasing with age to as high as 61.0% for women between the ages of 60-69 and 57.4% for their male counterparts.<sup>2</sup> While these rates may be less than rates in economically developed regions, the anticipated increase in global rates of hypertension by 2025 is expected to be due predominantly to a more rapid rise in rates of hypertension in economically developing regions like Sub-Saharan Africa.<sup>2</sup> This rise has been attributed to what has been called elsewhere the epidemiologic transition, where the gradual economic development of a region leads to a shift in the primacy of certain diseases like infectious disorders to diseases like hypertension and diabetes.<sup>5</sup>

South Africa's peculiar history of apartheid leaves it with what has been called a dualistic economy characterised by one part of the population living and participating in a developed economy, while the majority of people remain in a poorer developing economy.<sup>6</sup> As a result, the population suffers from diseases on both proverbial sides of the epidemiologic transition.<sup>5</sup> Communicable diseases like HIV/AIDS and Tuberculosis remain the commonest causes of premature death in the country.<sup>5</sup> However, among the numerous complications of hypertension, stroke is the most common cause of premature death by a non-communicable disease, and hypertensive heart disease is not far behind.<sup>7</sup> In fact, the estimated total cost of cardiovascular disease in South Africa in 1991 was between R4.135 billion and R5.035 billion.<sup>8</sup> The direct costs (excluding opportunity cost due to morbidity and mortality) are estimated to be 42% of

these total costs.<sup>8</sup> In addition, results from the South African Demographic and Health Survey of 1998 revealed that 21% of the South African population is hypertensive.<sup>9</sup> The survey was performed on 13,802 randomly selected individuals whose blood pressures were checked in their homes, and a measurement of 140/90mmHg used as the defining cut-of point for high blood pressure.<sup>9a</sup> These aforementioned global and South African actualities make hypertension a public health priority. Indeed, the WHO (with the South African government following suit) has made it one of the chronic diseases of lifestyle that require special public health policy attention.<sup>10,11</sup>

The Alma Ata declaration of 1978 outlines an approach to health care whose “central function and main focus” is primary health care.<sup>12</sup> Accordingly, this philosophy permeates the South African government’s approach to health care, where the district health system is the coherent structural instrument through which primary health care is delivered.<sup>13</sup> The country’s health care policies articulate a belief that within and through the district health system, primary health care can begin to effectively address the prevalent health concerns of the public, including the effective and efficient treatment of hypertension.<sup>13</sup>

## **Obstacles to the Management of Hypertension**

Perhaps one of the more difficult challenges to any government’s attempts to implement policies, is the monitoring and evaluation of the impact of these policies. It is a challenge that presents itself at all levels of the instruments of government. Within the context of health care and the practice of medicine, this challenge conflates with the persistent attempts to shorten the distance between clinical evidence and clinical practice. The ultimate goal is the improvement of clinical and health outcomes. With hypertension, as with other chronic diseases of lifestyle, numerous obstacles obtain in the implementation of evidence-based practices. This fact is clearly evidenced by the generally poor quality of management of patients with hypertension.

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<sup>a</sup> The Joint National Committee on Detection, Evaluation, and Treatment of High Blood pressure guidelines (JNC VI) were followed by the investigators with regard to the measurement of blood pressure by trained standardized fieldworkers (i.e. three measurements taken three minutes apart after five minutes of rest, in a seated position using the left arm at heart level and palm facing up).<sup>7</sup> However, due to the obvious magnitude and logistical difficulties of such a study, blood pressures were not measured again a month later in keeping with recommendations, suggesting a possible overestimation of the prevalence of hypertension.<sup>7</sup> This is not mentioned in the study’s discussions.<sup>7</sup>

Ornstein and Jenkins' audit of process and outcome measures in forty-eight primary care practices in the United States is revealing.<sup>14</sup> In their audit of the quality of care of chronic illnesses (Asthma, Hypertension, Diabetes, Coronary Heart Disease, Stroke, and Atrial Fibrillation) in 1998, the authors found that of the 19,412 patients with more than three recorded measurements of blood pressure above 140/90mmHg (criterion for diagnosis), only 45% were diagnosed with hypertension.<sup>14</sup> Furthermore, only 38.1% of the 14,119 patients with the diagnosis of hypertension had normal blood pressure readings (less than 140/90) at the end of the period being assessed.<sup>14</sup> In South Africa, an assessment of the quality of care of hypertensive patients was recently performed by Rayner et al. at two CHCs in Cape Town.<sup>15</sup> The researchers used a patient completed questionnaire to assess various aspects of the process of care at the two clinics.<sup>15</sup> Their findings revealed that numerous aspects of the process of care of hypertensive patients were lacking, including, proper blood pressure measurement, education about lifestyle changes, risk stratification, and prescription of appropriate medication.<sup>15</sup> Furthermore, they found that only 39.8% of the patients had target level blood pressures (<140/90), compared to 42.1% in an earlier study by Steyn et al.<sup>15,16</sup> It is important to note that Rayner et al.'s findings are almost similar to Ornstein and Jenkins' 1998 findings and to Steyn et al.'s earlier findings.<sup>14,15,16</sup> These results also compare roughly with the third United States National Health and Nutrition Examination Survey (NHANES III) conducted in two phases between 1988 and 1994, which found that only 46.9% of diagnosed and treated American patients with hypertension (1988-1991) had controlled blood pressures below 140/90mmHg.<sup>17</sup> However, the fourth NHANES (1999-2000) finds an improvement in the United States population, where 53.1% of patients diagnosed and under treatment for hypertension were well-controlled (<140/90).<sup>18</sup> This improvement is consistent with a trend of improvement since the first of these surveys was performed in 1960-62, although the first two surveys used an older definition of blood pressure control (160/95) and measured blood pressures using a different standard of measurement.<sup>18</sup> The levels of control in the two South African community health clinics studied by Rayner et al. therefore compare poorly to the already low latest levels of control found amongst American patients.<sup>15,18</sup> The question that naturally arises, is what are the obstacles to better care and how can they be addressed?

Many of these obstacles are created by health care workers themselves and revolve around their knowledge base (the perennial challenge of skills upgrading) and their attitudes to

hypertension. For instance, in their retrospective cohort study of the care of hypertensive patients by clinicians in a health management organisation (HMO) in the United States, Andrade et al. found that primary care physicians were more likely (odds ratio=11.51 with a 95% confidence interval of 6.08-21.50) to intensify antihypertensive therapy in patients whose blood pressure was substantially elevated (>180mmHg systolic), as opposed to patients whose pressures were moderately elevated of 140-149 mmHg (odds ratio of 1.51 with a 95% confidence interval of 0.88 to 2.59).<sup>19</sup> Even at higher systolic pressures of 160-169, the likelihood of intensifying therapy was not as high (2.88 (1.65, 5.02)) as when the systolic blood pressure was greater than 180mmHg.<sup>19</sup>

It is important to note that Andrade et al.'s study has a few shortcomings, notably when their adjusted odds ratios are more closely examined for likelihood of intensification relative to blood pressure levels.<sup>19</sup> In their analysis, they rightly adjust the abovementioned odds ratios to other confounding variables which could influence physicians' decisions to intensify or continue treatment in addition to the blood pressure reading.<sup>19</sup> These additional, potentially influential variables include the patient's age, coexisting cardiovascular disease and diabetes, days or weeks since previous, smoking status, medication intensification at last visit, and number of medication intensifications in the past year.<sup>19</sup> When these variables are included, the likelihood of medication intensification still increases with higher systolic and diastolic pressures, particularly with systolic blood pressures above 180 but, the confidence intervals overlap considerably.<sup>19</sup> For example, the adjusted odds ratio (OR) for medication intensification with systolic blood pressures greater than 180mmHg was 7.33 with a wide 95% confidence interval (2.92, 18.40), which overlaps with that of the lower odds ratio of 1.60 for the intensification of treatment at systolic pressures between 150-159mmHg (0.82, 3.12).<sup>19</sup> This latter odds ratio in turn has overlapping confidence intervals with the adjusted odds ratio for the intensification of medication at blood pressures between 140-149 (1.02 (0.53, 1.98)).<sup>19</sup> This means that in the wider population it may be just as likely for physicians to intensify medication for moderately high blood pressures as for very high recordings, in spite of the large differences found in the study. Nonetheless, Andrade et al.'s findings and acclamations correspond to Hyman and Pavlik's findings that primary care physicians have a higher threshold for treating or intensifying treatment of hypertension than the lower, evidence-based recommendations of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure's (JNC).<sup>20</sup> Of the

379 primary care physicians who responded to their survey, 52% indicated that they would not initiate anti-hypertensive therapy in middle-aged patients with systolic blood pressures (SBP) between 140 and 160mmHg, while only 24% would initiate treatment in patients aged 70 years or older, with SBPs less than 160mmHg.<sup>20</sup>

In yet another study of barriers to physicians' adherence to recommended treatment protocols, Oliveria et al. found that the commonest reason for physicians' high SBP threshold for changing anti-hypertensive drug treatment was that the doctor was content with the blood pressure (46% of responses).<sup>21</sup> Of course, other barriers to the proper management of hypertension exist. These involve patient-related factors--which many health care workers find challenging to address--like diet and lifestyle changes, adherence difficulties and poor access to care. Adherence itself has many contributing factors, including inadequate patient education about hypertension and its treatment.<sup>22</sup> Further barriers include adverse drug effects as well as the difficulties of attending to and monitoring patients' existing drug regimens and their potential interactions.<sup>19,20</sup> While some barriers to better management of hypertension like access to care involve complicated infrastructural and intersectoral interventions, others are more surmountable in the short term. These other barriers are often the targets of quality improvement endeavours within existing care delivery centres like clinics and hospitals, and form part of the larger monitoring and evaluation of policy implementation.

## **Quality Improvement**

The quality improvement cycle, whose basic instrument is the clinical audit, is a valuable and dynamic method of assessing the quality of care in any clinical service setting, and providing a process through which service can be improved.<sup>23</sup> It is a crucial part of what has come to be described wholly as clinical governance, which is an extensive mechanism of implementing and sustaining a high quality of service in national health systems.<sup>24</sup> Furthermore, quality improvement through clinical audits can be particularly helpful with chronic disease management, where numerous evidence-based guidelines and protocols can be used as standards against which management of chronic diseases can be adapted, measured and improved.

Mash and Levitt demonstrate the possibilities in the use of the quality improvement cycle with their work in a community health clinic in Khayelitsha, Cape Town.<sup>25</sup> In their examination of the structure, process and outcomes of the care of diabetes sufferers between 1996 and 1997, all standards for structure except one (availability of cotton wool and disposable pins) were achieved by 1997, even though only one standard for the process of care was attained (90% of patients weighed at last clinic visit), and no standards of outcome were significantly achieved.<sup>25</sup> Nonetheless, the results of the audit allowed for further discussions in the clinic about how to adjust clinical practices in order to attain better results for 1998.<sup>25</sup>

Mash and Whittaker performed a similar audit of the management of Asthma in a Cape Town clinic.<sup>26</sup> These exercises are equally possible with the management of hypertension. Indeed, in their systematic review of quality improvement for hypertension, Walsh et al. concluded that quality improvement strategies (of which clinical audits are a type) are associated with better control of the disease.<sup>27</sup> However, audit and feedback studies were a very small percentage of those reviewed (5 of 44 studies).<sup>27</sup>

A recent pre- and post-intervention study of community health centres involved in quality improvement exercises based on clinical audits in the United States showed an overall significant improvement in the quality of care scores for the management of patients with Asthma, Diabetes and Hypertension compared with centres where no audit-based quality improvement cycles were implemented.<sup>28</sup> These improvements were found notably in process-related measures concerned with the monitoring and treatment of the diseases, indicating that the quality improvement cycle using clinical audits can play a meaningful role in changing clinical practice and improving adherence to evidence-based practice guidelines.<sup>28</sup> However, it is important to note that the study did not find any post-intervention improvement in clinical outcomes.<sup>28</sup> Moreover, the process of care measures for hypertension specifically, were not significantly improved.<sup>28</sup> Nonetheless, the study was examining intermediate outcomes (one year after the interventions), whereas some of the process measures (e.g. smoking cessation advice and the use of aspirin for men at risk of coronary artery disease), have been shown elsewhere to be more relevant to longer term clinical outcomes, which were beyond the scope of this study.<sup>28,29</sup> Additionally, other factors also contribute to clinical outcomes, including patient adherence (and its attendant environmental obstacles), which was not included as a possible, measurable area of intervention in the study.<sup>28</sup>

In separate study by Mashru and Lant, the use of peer review medical audit was tested for its effect on changing clinical practice.<sup>30</sup> The authors audited the records of 740 hypertensive patients from 25 randomly selected general practitioners serving 12% of a district in the north west London.<sup>30</sup> An educational intervention involving the review and dissemination of the latest best practice guidelines was implemented and the medical audit repeated.<sup>29</sup> The intervention resulted in changes and significant improvements in the processes of care, including recording of body mass index (BMI), urea and electrolyte results, as well as total cholesterol levels, but no improvement was seen in blood pressure control.<sup>30</sup> Therefore, quality improvement may still have a valuable place in the monitoring, evaluation and improvement of clinical practice, particularly if it is focused predominantly on the structures and processes of care, while attempting to address how to examine longer term outcomes.

## **Psychiatric Patients and Medical Problems**

Patients with psychiatric conditions in general tend to receive poorer medical care than their non-psychiatric counterparts. In fact, even standard preventive medical care has been found to be of lower quality.<sup>31</sup> The reasons for poorer medical care have been variously ascribed to numerous factors including, poor access to health, discrimination and stigmatization and non-adherence to medication.<sup>32</sup> These actualities particularly pose a challenge to the management of chronic medical conditions among these patients. Moreover, the importance of this challenge lies in the fact that patients with mental illnesses like schizophrenia are already at higher risk of chronic diseases (especially Type 2 Diabetes) than the general population.<sup>33</sup> Elsewhere, Brown et al. measured standardised mortality ratios (SMRs) in their 13-year follow-up of 370 schizophrenia sufferers and concluded that deaths from circulatory, respiratory and endocrine diseases were significantly higher than in the general population.<sup>34</sup> The researchers also cite poor medical treatment as one of the contributing factors to the excess mortality.<sup>34</sup> This assertion is further substantiated by Kreyenbuhl et al.'s study of the management of diabetes in 201 sufferers with a serious mental illness (schizophrenia and major mood disorders) compared to its

management in 99 diabetic patients without a serious mental illness.<sup>35</sup> The study revealed that diabetes was less aggressively managed in the patients with serious mental illnesses (SMI) and this was manifested by a lower likelihood to receive cholesterol lowering statin medication (29% as likely for patients with schizophrenia and 14% as likely for those with mood disorders).<sup>35</sup> They were also less likely to receive angiotensin converting enzyme inhibitors (ACEI) or angiotensin receptor blocking agents (ARB) than their counterparts without mental illnesses.<sup>35</sup>

Obesity is another chronic disease of lifestyle among mental health patients, especially sufferers of schizophrenia.<sup>36</sup> Its prevalence is further exacerbated by the lack of exercise among patients with mental illnesses.<sup>37</sup> Additionally, antipsychotic medications are also associated with weight gain; a recent meta-analysis confirmed that the atypical antipsychotic agents, clozapine and olanzapine had caused the largest amount of weight gain after ten weeks of treatment.<sup>38</sup> Of course obesity is itself associated with cardiovascular complications like coronary heart disease, hypertension and stroke, thus adding to the complexity of medical disorders among mental health patients.

Hypertension specifically is a prevalent chronic disease of lifestyle among this group of patients.<sup>39</sup> Most notable is its higher prevalence among patients with bipolar disorder and those with anxiety.<sup>40</sup> Non-adherence to medication has been proposed as an important influencing factor to the control of hypertension both among psychiatric and non-psychiatric patients.<sup>22,41</sup> In an elegant study of a large population of American veterans with concurrent schizophrenia, hypertension and diabetes, Piette et al. attempted to examine intra-patient variations in adherence to anti-psychotic versus antihypertensive versus hypoglycaemic medication.<sup>41</sup> The authors used medication possession ratios (MPR)—a well-validated proxy measurement of adherence based on patients' patterns of refilling their prescriptions at Veterans Administrations (VA) Hospitals' outpatient pharmacies—to compare how well patients adhered to the different classes of drugs.<sup>41</sup> Their extensive multivariate logistic regression analysis (including such possible confounders as distance from hospital, days of supply or refill intervals, number of mental health and number of medical visits), revealed a higher likelihood of non-adherence to antihypertensive and hypoglycaemic medication than to antipsychotics (Adjusted odds ratio 1.5  $p < 0.001$ ).<sup>41</sup> Possible explanations include less vigilant practitioner attention to these patients' understanding and awareness of their hypertension and diabetes compared to their

schizophrenia.<sup>41</sup> This explanation would fit well with the aforementioned theme of poor medical care for psychiatric patients. Of course, medication adherence is a perennially difficult entity to measure and the MPR is only a proxy and not a direct measurement of it. Furthermore, the authors make no attempt to factor the filling of medical prescriptions from pharmacies outside the Veterans' Administration by the patients as this would be logistically impossible for the population studied (N=1,686).<sup>41</sup>

Siegel et al. also found lower rates of adherence to anti-hypertensive medications among hypertensive patients with major depression who received treatment from the Department of Veterans Affairs in the United States.<sup>42</sup> The groups also used medication possession ratios to approximate adherence among 40,492 patients who were on at least one antihypertensive medication over an eighteen month period.<sup>42</sup> Multiple logistic regression was again used to identify predictors of adherence in this population, and numerous possible confounders like age, gender, and facility were included, although unlike Piette et al.'s study, the researchers did not include distance from hospital.<sup>41,42</sup> Interestingly, while depression was found (followed by race, with African-Americans being least likely to be adherent) to be the associated with the worst adherence to anti-hypertensive medications (odds ratio=0.861 CI:(0.75,0.9) p<0.001), dementia and psychosis were not, presumably because many patients with psychosis or Alzheimer's are more likely to have a carer assisting their medication.<sup>41</sup> These findings do not necessarily contradict Piette et al.'s findings, as they were looking specifically at patients with Schizophrenia, as opposed to other causes of psychosis (in fact Siegel et al. are unclear about how they categorized depression with psychotic features).<sup>41,42</sup> In addition, while suffering from Schizophrenia--as viewed from the concluding lens of Siegel et al.'s study—may not necessarily be a predictor of poorer adherence to antihypertensive medication, this does not negate the finding that this level of adherence is still lower than the level of adherence to anti-psychotic medication as was found in Piette et al.'s study.<sup>41,42</sup> In fact, to reiterate the different approaches, Siegel's group does not differentiate the different subsets or causes of psychosis, and it may well be that schizophrenia by itself, as a subset of this group, is associated with a higher likelihood of poor adherence to anti-hypertensive medication.<sup>41,42</sup>

However, in their comparison of adherence and blood pressure control in middle aged and older patients with psychotic disorders versus patients without psychiatric illnesses, Dolder et al. found similar adherence rates, but poorer control among patients with psychotic

conditions.<sup>43</sup> Naturally, this finding reiterates the fact that control of hypertension involves numerous factors including lifestyle modification and appropriate drug regimens.<sup>44</sup> These are aspects of the care of hypertensive patients that may not be as adequately attended to in patients with psychiatric illnesses.<sup>43</sup> Crossroads CHC provides an ideal opportunity to examine this possibility of differing quality of care and to examine it using an audit template provides an excellent, structured platform from which quality improvement interventions can be made. Moreover, it conflates very well with the South African government's newly restructured health care plan (Healthcare 2010) which aims to approach mental health care in a more integrated and holistic manner, particularly at primary care level.<sup>45</sup>

University of Cape Town

## Objectives

The objectives of the study were to perform an audit of the structure, process and outcome of hypertension management in two groups of patients at Crossroads CHC, namely psychiatric patients with hypertension and non-psychiatric patients with hypertension. Further objectives were to determine if there is a significant difference in the quality of care between the two groups, and to suggest possible interventions to improve quality of care.

## Methods

### Data Collection

Based on the South African National Hypertension guidelines of 2006, a questionnaire (audit instrument) was designed to examine the various measures of the structure, process and outcomes in the management of hypertensive patients.<sup>44</sup> Each of the consultation rooms where hypertensive patients are seen by a doctor (typically after being prepared and receiving education in the club), was assessed using the audit instrument by the researcher. The club room and the injection/procedure room were also examined using the audit instrument.

Folders of patients from the hypertension club aggregate at the pharmacy after patients have completed their transit through the clinic. Of course, these folders also include patients who have come only to collect their month's supply of medication. The clinic only gives two month supplies of medication in December for patients going to the Eastern Cape for the holidays. Therefore, almost all the active hypertensive patients' folders pass through the pharmacy at least once a month. All folders of patients with hypertension at Crossroads CHC are uniquely identified by a red sticker for better filing.

Throughout a four week period in May 2008, folders belonging to non-psychiatric patients with hypertension at Crossroads CHC were collected at the pharmacy. At the time of

data collection, the clinic did not have a current and updated register of the total number of non-psychiatric patients with hypertension. However, it was assumed that most if not all the current hypertensive patients at the clinic should have their folders pass through the pharmacy at least once in any given month, either after a visit to the club and a consultation, or after coming to the clinic only to collect medication. The clinic's pharmacy very rarely gives out more than a month's supply of pills, and only does so for large groups of patients in the months of November and December.

At the end of each hypertensive club day (Tuesday to Friday), every third folder was selected from the pile of hypertension folders at the pharmacy. These folders were examined using the audit instrument and returned the following day to the clinic's reception. Although patients with hypertension rarely attend the clinic more than twice in one month, folder numbers were also recorded during the data collection process to avoid duplication of entries.

Given the smaller total population of psychiatric patients diagnosed with hypertension at Crossroads CHC, all the folders of psychiatric patients with hypertension were collected from the reception records. All folders belonging to psychiatric patients are stored in a separate filing cabinet in the clinic's reception and are marked with a silver sticker. Folders of psychiatric patients with hypertension were identified using the additional red stickers found on their covers. Furthermore an incomplete list of hypertensive mental health patients was used, which had been irregularly compiled over the previous nine months by the mental health nurse. The use of this list enabled the researcher to find any added folders of current or active patients whose folders may not have had a red sticker in spite of having been diagnosed as hypertensive. This was particularly crucial for the psychiatric patient population given that the total population of hypertensive patients in this group was smaller than was expected. However, not all of these unlabelled folders may have been on the mental health nurse's aforementioned list, as this list was admittedly not exhaustively or consistently filled. Therefore, the folders collected cannot confidently be said to represent the entire population of known psychiatric patients with hypertension, but may be the best possible estimation.

The audit instrument was used to measure the process of care of hypertensive patients based on the folder notes. It was assumed that if an activity or action was not recorded in the notes (e.g. diet education per visit or creatinine measured in the past year), it was not performed. Those activities which were not applicable to certain patients (e.g. smoking cessation education

to a non-smoker) were marked as such (N/A). Folders were also examined for already existing cardiovascular disease (defined as stroke, ischaemic heart disease, clinical cardiac disease or left ventricular hypertrophy), target organ damage, hypercholesterolaemia, and diabetes. Where the existence of these conditions was unknown or unrecorded, it was noted as such. The activity labelled 'Medication Education/year' was used to identify activities in the consultation room involving pill counts and education about how to take the medication. Often, patients are requested to bring their pill packets in order to review whether they are taking their various pills as prescribed on the packets, and to count pills as an approximation of adherence.

The last or most recent blood pressure measured and recorded during the period being assessed (May 2007-May 2008) was recorded for each patient using the audit instrument.

## **Population and Selection**

For both cohorts, only folders belonging to patients who had been seen by a doctor or the mental health professional nurse at least twice in the preceding twelve months (May 2007-May 2008) were used. This is the minimum allowable number of consultation visits in a year, as prescriptions may not exceed six months. Furthermore, folders were excluded from the study if patients were diagnosed with hypertension after only one reading and were immediately placed on treatment, after which subsequent readings were normal. These patients may not be truly hypertensive, as the diagnosis should be made after a minimum of three blood pressure measurements taken on three separate occasions (preferably at the same time of day) within a two months period in keeping with the South African National guidelines.<sup>44</sup> However, those who were diagnosed with hypertension and placed on treatment on their first visit, but whose blood pressure remained elevated on subsequent visits, were assumed to be hypertensive and included in the study. Hypertension was defined (in keeping with current national and international guidelines) as BP  $\geq$ 140/90 mmHg.<sup>44</sup>

As previously mentioned every third non-psychiatric hypertensive folder was collected every Tuesday to Friday from the Pharmacy and perused using the audit instrument, then returned to the reception the following day. In accordance with the research protocol, this process was also attempted for psychiatric patients with hypertension, whereby their folders were also collected at the pharmacy. However, it became rapidly apparent that this population was

much smaller than expected, and a decision was made by the researcher to include all folders belonging to psychiatric hypertensive patients as heretofore described. The most practical, initial sample size calculated for both populations was 212 in order to pick up a difference of at least 11% when comparing proportions from each group.<sup>46</sup> Smaller differences in proportion would have required a higher population of patients (towards 600) which would not have been feasible given the resources available for this study.<sup>46</sup>

## **Analysis Methodology**

In both cohorts, the number of folders where each activity was performed (e.g. blood pressure measured at each visit) was converted to a proportion and the two proportions compared. The mean final (end of period/year) systolic and diastolic pressures were calculated for each cohort. The two-tailed Fisher's exact test was used to compare the proportions of all categorical variables in each group, with the modified Wald method used to calculate confidence intervals for these proportions.<sup>47</sup> Means of continuous variables (age and blood pressure) were compared using the unpaired student's t-test for normally distributed data (with Welch's correction for data with statistically different standard deviations), and the Mann-Whitney test (which compares medians) for non-parametric data.<sup>47</sup>

A review of the literature reveals little consensus and great variation in how different audits of hypertensive management define and assess outcome and control. Some studies use the most recent blood pressure measured during the period being studied, whereas others use an average of all the blood pressure measurements or the last two or three blood pressure measurements in that period.<sup>48,49</sup> For the purposes of the audit, blood pressure control was defined as the last or most recent blood pressure recorded during the period being less than 140/90mmHg in keeping with national guideline definitions of good control.<sup>44</sup> This decision was based mainly on the fact that the number of visits to the clinic per year varies with each patient from as few as two (six months apart) to as many as twelve (monthly). The differing periods of time between blood pressure measurements has been cited as one of the shortcomings of using the last few measurements of the period being studied.<sup>44,50</sup> Furthermore, using the mean of the last two or three blood pressures for patients with as few as three visits throughout the entire year would not give an assessment of the level of control at the end of the period, but simply yield their average blood pressure for that year.<sup>50</sup>

The proportions of patients with the most recent or last blood pressure measurements below the aforementioned limit (140/90) for the period in question were compared across the two groups using the two tailed Fisher's exact test.<sup>47</sup> The proportions of patients in each group with an isolated, controlled last systolic blood pressure less than 140mmHg or an isolated, last diastolic pressure less than 90mmHg were also compared between the two groups. Lastly, the mean last systolic and diastolic pressures were calculated and compared between the groups using the Student's t test, and the medians compared using the Mann-Whitney test, whenever the data were found to be non-parametric.<sup>47</sup> All statistical tests were unpaired and two-tailed.<sup>47</sup>

## **Ethics**

The study was approved by the Facility Manager of Crossroads CHC as well as the University of Cape Town Research Ethics Committee.

# **Results and Analysis**

## **Demographics**

Folders belonging to one hundred and eighty-six non-psychiatric patients with hypertension and forty-eight psychiatric patients with hypertension were collected during the previously mentioned four week period. Amongst the non-psychiatric folders, twenty were excluded because the diagnosis of hypertension was questionable based on the aforementioned selection criteria. Two of the folders had already been collected and assessed the week before. The patients were attending the clinic again that month for new acute problems (unscheduled visits). One folder was missing sheets with notes and information pertaining to the period in question (May 2007-May 2008).

Of the folders belonging to psychiatric patients, seven were excluded because of a questionable diagnosis of hypertension and nine were excluded because they had not been seen at all during the period in question. The earliest last recorded visit in this group was in 2006.

The final total number of patient folders qualifying for the study was one hundred and sixty three non-psychiatric and thirty-two non-psychiatric patient folders. For both cohorts, the majority of patients were females, and the mean age was similar (52.5 vs. 55.4), as seen in Table 1.<sup>b</sup> Other data were not recorded in all of the folders and therefore could not be properly assessed (Table 1.) Furthermore, demographic data like education level were not recorded at all. 44% of the psychiatric patients were schizophrenic, 38% suffered from major depressive disorder (one of whom also had post-traumatic stress disorder), 9 % from schizoaffective disorder, and a further 6% suffered from bipolar affective disorder. One patient (3%) had behaviour disorder not otherwise specified, as well as being mentally disabled (Global assessment of function=60) and deaf from congenital rubella.

**Table 1. Patient Demographics**

Characteristics	Psych Patients (n)	Non-Psych Patients (n)	P values
Total Population (N)	32	163	N/A
Males %	16 (5)	25 (41)	0.37 (Fisher's Exact)
Females %	84 (27)	75 (122)	0.37 (Fisher's Exact)
Mean Age (years+standard deviation)	52.5 ±8.9	55.4±9.9	0.1 (unpaired t-test CI (-0.59 to 6.5))
Recorded Alcohol use %	3 (1)	8 (13)	0.47 (Fisher's Exact)*
Recorded Smoker %	22 (7)	9 (15)	0.02(Fisher's Exact) <sup>†</sup>
Recorded Exerciser %	9.4 (3)	8.6 (14)	0.07(Fisher's Exact) <sup>‡</sup>

\*Alcohol use was unknown/not recorded for 9 psychiatric patients and 43 non-psychiatric patients.

Comparison made for recorded population.

<sup>†</sup>Smoking status was unknown/not recorded for 9 psych patients and 23 non-psych patients. Comparison made for recorded population.

<sup>‡</sup>Baseline exercising status unknown/not recorded for 29 psychiatric and 120 non-psychiatric patients.

<sup>b</sup> The ages of psychiatry patients were found to be parametric based on one out of three tests for normality (KS, D'Agostino & Pearson omnibus, and the Shapiro-Wilk normality tests were used) while all two of the three tests found the non-psychiatric patients' ages to fit a normal distribution.<sup>45</sup> The standard deviations were not found to be statistically significant. The t-test therefore was used because of its higher power, but using the Mann-Whitney test also found the median ages to be similar (p=0.1).<sup>47</sup>

There was no significant difference between the two cohorts in the prevalence of pre-existing diabetes, target organ damage, cardiovascular disease, or the regular use of non-steroidal anti-inflammatory medication (Table 2). However, a considerable number of patients had never been screened for these conditions. 29% of the non-psychiatric patients had never been screened for diabetes, and the majority of patients in both cohorts had never been screened for cholesterol, cardiovascular disease, or target organ damage. More specifically, the presence of pre-existing cardiovascular disease was unknown (or unrecorded if known) in 84% of the psychiatric patients and in 46% of the non-psychiatric patients.

**Table 2. Pre-existing Conditions**

	<b>Coexisting Diabetes</b>	<b>Coexisting Target Organ damage</b>	<b>Coexisting Cardiovascular Disease</b>	<b>Coexisting Hypercholesterolaemia</b>	<b>Regular Use of NSAIDS (monthly)</b>
<b>% Psych Patients (n)</b>	18.8 (6)	12.5 (4)	9.4 (3)	3.1 (1)	0
<b>Percentage of Non-Psych Patients (n)</b>	30.7 (50)	16.6 (27)	18.4 (30)	11.7 (19)	1.8 (3)
<b>Comparison p values (Fisher's exact)</b>	<b>0.2</b>	<b>0.79</b>	<b>0.21</b>	<b>0.21</b>	<b>1</b>
<b>95% Confidence Int. of diff. between percentages</b>	<b>(-5.2, 29)</b>	<b>N/A<sup>c</sup></b>	<b>N/A<sup>c</sup></b>	<b>N/A<sup>c</sup></b>	<b>N/A<sup>c</sup></b>

<sup>c</sup> 95% Confidence interval for difference between proportions cannot be calculated if one of the absolute values (n) is less than 5.

In both groups, the majority of patients (41% of the psychiatric patients and 35% of the non-psychiatric patients) were on two anti-hypertensive agents (Table 3). There was no statistically significant difference between the proportions of patients on one, two, three, or more than three agents between the two groups (Table 3). For the psychiatry cohort, patients on two or less agents were a majority (73%), while patients on two or three agents (61%) constituted the majority of patients in the non-psychiatric group (Table 3). This difference was also not statistically significant ( $p=0.54$ , CI for difference between percentages: (-11, 25)).

According to the 2006 National Guidelines, the recommended first three pharmacological lines of treatment in the management of hypertension should be a thiazide (Hydrochlorothiazide at Crossroads CHC) or thiazide-like diuretic, an angiotensin-converting enzyme inhibitor (ACE-I: Enalapril at Crossroads CHC) or a long-acting dihydropyridine (Amlodipine at Crossroads CHC) or non-dihydropyridine calcium channel blocker (CCB) (Verapamil at Crossroads CHC).<sup>44</sup> Unless there are other compelling reasons, other agents are recommended only for the fourth or fifth line of treatment after contributing factors like adherence, white coat hypertension, secondary causes, and lifestyle, among others.<sup>44</sup> More specifically, the guidelines do not consider Atenolol as appropriate routine first to third line treatment for hypertension because of its poor effect on reducing cardiovascular or myocardial mortality.<sup>44</sup> Although just under 7 percent (11 patients) of the non-psychiatric patients were on Atenolol and none of the psychiatric patients were taking it, this did not constitute a statistically significant difference (Table 3). Only two of these patients were taking Atenolol as one of two antihypertensive agents (no compelling reasons noted), and three patients were taking Atenolol as one of the three anti-hypertensive agents prescribed for them. One of the patients taking Atenolol as a third agent suffered from ischaemic heart disease, with the other two agents being a thiazide and an ACE-I. The rest of the patients on Atenolol (6 patients) were taking four or more antihypertensive agents and one of them suffered from ischaemic heart disease.

All other patients in both groups had one or all of the recommended first three lines of anti-hypertensive agents (Thiazide, ACE-I, CCB), in addition to other agents like Hydralazine and other types of diuretics, for those on more than three agents. In other words, all patients in both groups on a single agent were taking hydrochlorothiazide (HCTZ), all other patients on two agents in both groups were either taking a thiazide with an ACE-I or a CCB, and all others in

both groups on three agents were taking all three recommended first to third line agents (Thiazide, CCB and ACE-I).

**Table 3. Number of Antihypertensive Agents**

	1 Agent	2 Agents	3 Agents	> 3 Agents	Patients on Atenolol
<b>Psych Percentage of total (n)</b>	32 (10)	41 (13)	19 (6)	9.4 (3)	0
<b>Non-Psych Percentage of Total (n)</b>	22 (36)	35 (57)	31 (49)	13 (21)	6.7 (11)
<b>P values of compared percentages (Fisher's exact)</b>	0.26	0.55	0.28	0.77	0.22
<b>Confidence Interval of Difference Between Percentages</b>	(-7.0, 25)	(-13, 24)	(-5.7, 28)	N/A <sup>d</sup>	N/A <sup>d</sup>

<sup>d</sup> 95% Confidence interval for difference between proportions cannot be calculated if one of the absolute values (n) is less than 5.

## Structure Measures

The club and preparation rooms at Crossroads CHC were found to have all the necessary equipment and materials for appropriate care of hypertension patients, except for a copy of the latest hypertension guidelines (Table 4). Furthermore, there was no record of when the weight scale was last calibrated. Assessment of the consulting rooms where these patients are seen revealed that the three consulting rooms for non-psychiatric patients had all the necessary material and equipment for the optimal care of hypertensive patients, except for two rooms which did not have tape measures and one which did not have a body mass index chart or wheel (Table 5).

In comparison, the singular consulting room where psychiatric patients are seen everyday, none of the required items was present (Table 5).

**Table 4. Club and Preparation Room Contents**

<b>A. Do the club and preparation rooms have the following items?</b>		
<b>Item</b>	<b>Yes</b>	<b>No</b>
1. Functioning Scale (weight)	x	
2. Patient Education Leaflets	x	
3. Urine dipsticks	x	
4. Facilities for collecting urine	x	
5. Height Scale	x	
6. Latest Hypertension Guidelines		x
7. Mercury sphygmomanometer or oscillometric device with standard Sized cuff.	x	
8. Large size cuff	x	

<b>B. Does the procedure/injection room have the following items?</b>		
<b>Item</b>	<b>Yes</b>	<b>No</b>
1. Functioning ECG Machine	x	
2. All necessary items and stationery for Phlebotomy and blood specimen Collection.	x	

<b>C. Of the following items in current use, how many have been calibrated/repared</b>
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in the past two years?			
Item	Total Number	Number Calibrated/Repaired	Percentage
Sphygmanometer	4	4	100
Weight Scale	1	0	

**Table 5. Consulting Room Contents**

Number of Consulting Rooms With:	Psychiatric Patients	Percentage	Non-Psychiatric Patients	Percentage
Mercury Sphygmanometer or Oscillometric Device with standard size cuff	0	0	3	100
Large size cuff	0	0	3	100
Latest Hypertension Guidelines	0	0	3	100
Tape Measure	0	0	1	33.3
BMI Chart/Wheel	0	0	2	66.7
Patient Education Leaflets	0	0	3	100

## Process Measures

One of the more notable differences between the two cohorts was the significant difference ( $p < 0.0001$ ) in the median number of visits.<sup>e</sup> The psychiatric patients at Crossroads CHC tend to be seen on a monthly basis, and indeed the median number of visits for the psychiatric cohort was 8.50 (Standard deviation (SD)=2.69) compared to 3.00 (SD=1.48) visits for the non-psychiatric cohort.<sup>f</sup> That the psychiatric patients are seen more often provides an opportunity for hypertension care related activities to be performed. However, most of these activities are recorded as having been performed less frequently for this group than they are performed for the non-psychiatric patients. Diet education was given at least once during the period in question for only 25% of the psychiatric patients as opposed to 64% of the non-psychiatric patients ( $p = 0.0001$ ), while education/advice about exercise was also provided to a significantly lower proportion (22%) of psychiatric patients than non-psychiatric patients (48%,  $p = 0.006$ ), as indicated in Table 6.1. Nonetheless, this latter difference in percentage of patients given exercise advice at least once in the year, seems practically unimportant when the 95% confidence interval of the difference between the proportions (7.8 to 45) is considered. The real difference between percentage of psychiatric versus non-psychiatric patients given exercise advice may be as high as 45%, but may be as low as 7.8% (e.g. 20% versus 27.8%), which is arguably a negligible difference in patient numbers (Table 6.1). Similarly, while there is a significant difference between the groups ( $p = 0.02$ ) in the percentage of patients receiving education about their medication, the 95% confidence interval of this difference (4.6 to 41) has a negligible lower limit, suggesting that in the total populations the difference could be as small as 4.6% (Table 6.1). This is not a meaningful difference when comparing these proportions.

Probably the most crucial activity in the management of patients with hypertension is the actual measurement of the blood pressure at each visit. Assessments of risk and decisions about further management are impossible without knowledge of a patient's blood pressure. A

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<sup>e</sup> This was calculated using the Mann-Whitney test because the non-psychiatric values were non-parametric. However, the t-test with Welch's correction yielded the same p value (standard deviations were statistically significant).<sup>47</sup>

<sup>f</sup> Using the t-test with Welch's correction to compare means, the 95% confidence interval for the difference between the mean number of visits for the groups (4.45) was from 3.45 to 5.44 (i.e. the real difference between these means could be as low as 3.45, and as high as 5.44).

comparison of the two groups reveals that for the non-psychiatric patients, almost all patients' blood pressures were measured at each visit (99%), whereas only 9% of the psychiatric patients' blood pressures were measured at every visit. However, it is important to note that the psychiatric patients were seen every month for the psychiatric problems, and that most of these visits appropriately involve an assessment of mental health status and global assessment of function. Arguably, it may not be beneficial to measure a patient's blood pressure every month unless his/her blood pressure is uncontrolled and various changes are being made to the patient's drug regimen. Given that the non-psychiatric patients made an average of just under four visits in the year (3.87), it was helpful to examine how many psychiatric patients had at least 3 or more visits throughout the year where their blood pressure were measured. The result was 71.9% (23 patients), which was still significantly less than the proportion of non-psychiatric patients whose blood pressure was measured at every visit ( $p=0.001$ ).

Other activities which were performed for a significantly lower proportion of psychiatric patients with hypertension than for non-psychiatric patients were the annual measurement of weight and the dipsticks testing of urine (Table 6.1 and 6.2). There were also significantly lower proportions of psychiatric patients whose renal function and cardiac condition were objectively tested (serum creatinine levels and electrocardiograph (ECG)) at least once during the year in question (Table 6.2). Once again, however, while there may be a statistically significant difference between a proportion of 0% psychiatric patients compared to 5% of non-psychiatric patients having an annual ECG ( $p=0.006$ ), the difference is not meaningful to this particular comparison (Table 6.2). Both proportions are low and it is clear that ECGs are not done very much for either group of patients at the clinic. Lastly, the confidence interval of the difference between each group's percentage of patients having annual serum creatinine levels measured also as a small lower limit (7.2 to 45), which suggests the possibility of a meaningless difference between the actual populations at the clinic with regard to the performance of this test (Table 6.2).

It is interesting to note that the number of patients whose blood pressure was measured at each visit was equal to expected national standards (as defined by the South African Hypertension Guideline 2006) in the non-psychiatric group (Table 6.1).<sup>44</sup> For both groups, none of the other variables were performed in a large enough proportion of patients to significantly equal national standards (Tables 6.1 and 6.2).<sup>44</sup>

**Table 6.1 Process of Care Activities**

	Diet Education/year	Diet Education/visit	Exercise Education/year	Exercise Education/visit	Smoking Education/year	Alcohol Education/year	Medication education/year	BP measured/visit	H M
Percentage of Total Psych Patients	25	0	22	0	9	0	19	9	
Percentage of Total Non-psych Patients	64	4	48	1	9	5	42	99	
Comparison p values	0.0001	0.59	0.006	1	1	0.36	0.02	0.0001	
95% Confidence Interval of difference between percentages	(20, 58)	N/A <sup>g</sup>	(7.8, 45)	N/A <sup>g</sup>	N/A <sup>g</sup>	N/A <sup>g</sup>	(4.6, 41)	N/A <sup>g</sup>	
Percentage of patients expected by NATIONAL STANDARD <sup>44</sup>	100	ND <sup>h</sup>	100	ND <sup>h</sup>	100	100	100	100	
Comparison p-values for Psych Patients to National Standard	<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<
Comparison p-values for non-Psych Patients to National Standard	<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	0.5	<

<sup>g</sup> 95% Confidence interval for difference between proportions cannot be calculated if one of the absolute values (n) is less than 5.

<sup>h</sup> Not determined. Guidelines only state what the lifestyle requirements for blood pressure control are, but do not state how frequently counseling should be given. However, it is reasonable to assume that this should be done at least once annually with every hypertensive patient even if it involves positive reinforcement of good lifestyle practices in well-controlled patients.

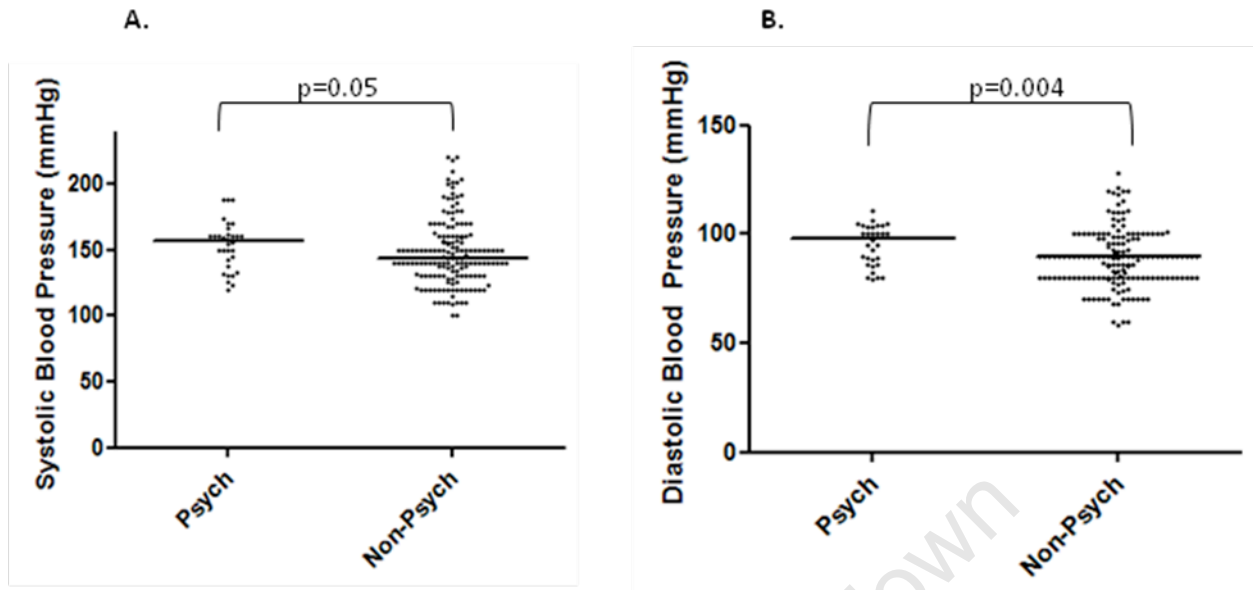
**Table 6.2 Process of Care Activities**

	BMI/visit	BMI/year	Waist Circ measure d/visit	Waist Circ measure d/Yr	Urine Dipstick /year	Glucose/year	Chol/year	Creatinine/year	Potassium/y
<b>Percentage of Total Psych Patients</b>	0%	3%	0%	9%	34%	41%	25%	22%	
<b>Percentage of Total Non-psych Patients</b>	0%	16%	0%	12%	95%	52%	47%	48%	
<b>Comparison p values</b>	1	0.09	1	1	0.0001	0.25	0.03	0.007	
<b>95% Confidence Interval of difference between percentages</b>	N/A <sup>i</sup>	N/A <sup>i</sup>	N/A <sup>i</sup>	N/A <sup>i</sup>	(47, 74)	(-7.4,30)	(3.4, 41)	(7.2, 45)	
<b>Percentage of patients expected by NATIONAL STANDARDS<sup>44</sup></b>	100	100	100	100	100	100	100	100	
<b>Comparison p-values for Psych Patients to National Standard</b>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
<b>Comparison p-values for non-Psych Patients to National Standard</b>	<0.0001	<0.0001	<0.0001	<0.0001	0.01	<0.0001	<0.0001	<0.0001	<0.0001

<sup>i</sup> 95% Confidence interval for difference between proportions cannot be calculated if one of the absolute values (n) is less than 5.

## Outcome Measures

The proportion of psychiatric patients whose blood pressures at the end of the study period were less than 140/90 (controlled) was only just significantly greater ( $p=0.05$ ) than the proportion of patients in the non-psychiatric cohort (Table 6). In fact, when examined with the confidence interval of this difference, the lower confidence limit of 1.4%, suggests that the difference in the proportions for the actual populations in the clinic may be negligible (Table 6). However, there was also a significant difference in the median systolic pressures between the two groups at the end of the study period (Figure 1A, Table 6). The median diastolic pressure was significantly much higher for the mental health patients (98mmHg vs. 90mmHg  $p=0.004$ ), suggesting better blood pressure control for the non-psychiatric patients at the end of the period (Figure 1B, Table 6). Lastly, the non-psychiatric patients had significantly higher proportions of patients whose last isolated systolic pressures or isolated diastolic pressures were controlled (49.1 % and 66.3% respectively. See Table 6). Once again, this difference for the last systolic pressures is negligible when examine alongside a confidence interval with a lower limit suggesting a possible difference as small as 5.2%.



**Figure 1.**

Comparison of the median last recorded systolic and diastolic blood pressures between psychiatric and non-psychiatric hypertensive patients for the period May 2007-May 2008. Statistically significant difference is seen in Graph A between the median systolic blood pressures ( $p=0.05$ ) where the median systolic pressure is higher for psychiatric patients. Graph B also demonstrates a significantly higher last recorded median blood pressure for psychiatric patients ( $p=0.004$ ). Results are based on the Mann-Whitney test as values were not parametric.<sup>45</sup>

**Table 6. Intermediate Outcome of Care Measures**

	<b>% Last BP&lt;140/90</b>	<b>% Last Systolic &lt;140</b>	<b>% Last Diastolic &lt;90</b>	<b>Median Systolic Pressure (mmHg)</b>	<b>Median Diastolic Pressure (mmHg)</b>	<b>Mean Systolic Pressure (mmHg)</b>	<b>Mean Diastolic Pressure (mmHg)</b>
<b>Psych Patients</b>	21.9	25	37.5	157	98	153	95
<b>Non-Psych Patients</b>	41.7	49.1	66.3	147	90	148	89
<b>Comparison p Values</b>	0.05	0.02	0.003	0.05	0.004	0.28 <sup>j</sup>	0.02
<b>CI of difference between proportions (Fisher) or means (T-test)</b>	(1.4, 38)	(5.2, 43)	(10, 47)	N/A	N/A	(-4, 21)	(0.4, 13)

<sup>j</sup> These t-test calculations are included for interest. Note that given the non-parametric nature of the data, the t-test is an inappropriate test and the Mann-Whitney comparison of medians is more relevant. T-test maintains significance for the difference in diastolic but not systolic pressures.

## Discussion

The results of this study demonstrate a significant difference between the care of psychiatric patients with hypertension and non-psychiatric hypertensive patients at Crossroads CHC, with regard to counselling about diet changes, the measurement of blood pressure at relevant visits, and the weighing of patients annually. This difference is underpinned by the lack of all relevant equipment required for the care of hypertensive patient in the psychiatric consulting room. The lack of a sphygmomanometer in the room means that even basic measurement of blood pressure for these patients has to be done in the neighbouring emergency room. While urinalysis is done centrally for all patients in the preparation room, the use of a scale in the psychiatry consulting room would enable the facile weighing of patients as part of the consultation.

The overall median systolic and diastolic pressures of all the last visits of the twelve month period were also found to be significantly lower for the non-psychiatric patients than the psychiatric patients. However, this difference (157/98 for psychiatric patients versus 147/90 for the non-psychiatric patients) is clinically and epidemiologically difficult to interpret as these two blood pressure measurements fall in the same hypertensive stage (I) and therefore carry the same prognosis when one does not consider added risk factors or target organ damage.<sup>44</sup> As will be discussed further below, the poor recording of the presence of these added risk factors (significant family history, target organ damage, clinical cardiac disease, hypercholesterolaemia etc) renders it difficult to provide a more nuanced interpretation of the blood pressure measurements, and is one of the shortcomings of this study. Thus, it may well be possible that the presence of these risk factors in one group more than the other, places it in a higher overall blood pressure stage in spite of the clinically similar blood pressure measurements.<sup>44</sup> Conversely, it is also equally important to note that in various other randomised controlled trials involving treatment of hypertension, small differences in treated blood pressure between groups (e.g. mean reductions in blood pressure of less than 10mmHg of systolic or diastolic) have resulted in often resulted in statistically significant reductions in relative risk for events like death due to cardiovascular disease.<sup>51</sup>

Interestingly, the proportion of non-psychiatric patients whose blood pressures were at target levels (41.7%) is similar to that found by Rayner et al. at two other Cape Town CHCs in 2006 (39.8%) and to Steyn et al.'s findings at another Cape Town CHC in 1999 (42.1%).<sup>15, 16</sup> They compare poorly to the United States' NHANES findings for 1999-2000 (53.1%), suggesting much need for improvement for all the Cape Town CHCs.<sup>18</sup> Of course, these levels should be much lower for those patients with high risk (diabetes, heart failure, renal disease, etc).<sup>44</sup>

The study therefore reveals important differences in the quality of care between the two groups of patients, while a clinical and epidemiological difference in the immediate outcomes (blood pressure control) between the two groups is less clear. How and to what extent different aspects of the process of care of hypertensive patients (lifestyle counselling, regimen changes, routine testing for target organ damage, adherence monitoring, etc) impact on immediate outcomes (one or two years) like blood pressure control, is an interesting multivariate question beyond the scope of the current study. As stated before, the national guidelines give specific recommendations with regard to the frequency with which certain process activities like the measuring of weight should be performed, but are obviously unable to give a recommendation on the frequency of interventions like diet and lifestyle counselling.<sup>44</sup> These important aspects of care are expected by this study to have been performed at least once a year. However, counselling should also be tapered to the patient's needs and readiness, resulting in different levels of intensity, frequency and emphasis for each patient.<sup>52</sup> At the risk of further digression, to examine how these interventions independently have an effect on immediate outcomes would be methodologically unwieldy to consider, but may be possible in a larger inter-site study that stratified and grouped patients using all possible confounding variables.

Lastly, the study established that both groups at the clinic were managed in a substandard manner with regard to the processes of care, when compared to the current national guidelines, with the exception being the actual measurement of blood pressure at each visit for the non-psychiatric group.<sup>44</sup>

## Medical Records

Perhaps one of the more obvious challenges and shortcomings of this study was its sole dependence on medical records as representations of the processes of care. The author's own personal experience at Crossroads clinic specifically, is that often the health education talks in the club room (given by the professional nurse to the patients), are not recorded in the folders as having been performed. Thus, the assumption that activities which are not recorded were not performed is not entirely accurate. Interestingly, the relationship between good clinical note-taking and good quality clinical care is not simple. Segovia refers to a multi-centre study (15 medical centres in Segovia, Spain) performed by his group that attempts to examine the relationship between the quality of medical notes and the quality of care of diabetic patients.<sup>53</sup> Their findings ostensibly demonstrate (unfortunately the original article only in Spanish in *Aten Primaria*, an unavailable journal) better quality of medical records amongst the subset of patients on insulin who had had diabetes the longest, but who had the lowest levels of control as measured by their Haemoglobin A1C (HbA1C) levels.<sup>53</sup> Overall, the entire population of patient charts in the study did not show a significant relationship between good quality of records and better HbA1C levels.<sup>53</sup> Segovia introduces time as a possible confounder and proposes that it is possible for physicians to record certain data "at the appropriate moment within the evolution of the illness."<sup>53</sup> Thus, patients with good control may have certain data not recorded or its collection postponed, whereas physicians may be more vigilant with patients with poorer control, resulting in an apparent relationship between bad recording and good quality of care.<sup>53</sup> Of course, another consideration is that the recording of certain data like a creatinine level for example, does not necessarily translate into better control in the form of a lower HbA1C.<sup>53</sup> As stated before, the recording of such data can only act as a proxy that implies a certain vigilance and attention to quality, which is hoped will ultimately influence outcome.

In a cross-sectional survey of fifty-two Dutch general practices which care for 1641 patients with diabetes type 2, Goudswaard et al. found no correlation ( $p=0.20$  at practice level and  $p=0.51$  at patient level) between completeness of medical records and a lower HbA1C.<sup>54</sup> The survey assessed the practices' charts for the recording of eleven items which were deemed crucial to the good quality care of diabetic patients based on current guidelines.<sup>54</sup> These items included annual recording of patients' weight, cholesterol and creatinine, but did not include the

recording of important activities like lifestyle counselling as well as retinal and foot screening.<sup>54</sup> The authors also propose that not recording an activity does not necessarily mean it has not been done.<sup>54</sup>

Nonetheless, there remains an important medico-legal presumption that an unrecorded activity was not done.<sup>55</sup> In a survey of 253 Colorado primary care physicians regarding a total of 1614 primary care consultations over a six month period, not only was clinical information missing in 13% of the visits, but the surveyed clinicians felt that in 44% of these cases, this missing information was at least somewhat likely to result in an adverse clinical outcome.<sup>56</sup> Lastly, it is arguable that activities during the patient visit which involve the obtaining of objective data like weight, blood results, ECGs, urine dipsticks, etc. are more likely to be recorded only if performed, than activities like lifestyle counselling, which was included as a measure in this study but not in any of the abovementioned studies from the literature.

Despite its crudeness, therefore, the presumption that unrecorded data means that it was not performed or obtained remains the only consistent presumption for any study involving medical records, where no other method of data collection (i.e. observation) is used to triangulate or confirm. For example, whether or not the measurement of patients' blood pressures was done according to accepted standards can only be confirmed by observation or re-measuring. In their previously mentioned survey of hypertension management at two community health clinics (CHC) in Cape Town, Rayner et al. checked the patients' blood pressures in a standardized manner which adhered to national guidelines in order to compare with blood pressure readings in the folders.<sup>15</sup> This exercise was enabled by Rayner et al.'s access to resources which allowed them to use a re-trained nurse practitioner to check the blood pressures of all patients whose folders were involved in the study.<sup>15</sup> Nonetheless, this endeavour does not address the problem of unrecorded activities like diet and lifestyle counselling, as well as blood results. An approach to this problem may be a direct observation study using anonymous observers or actor patients to sit through club sessions and perhaps even consultations and note which activities were performed. Their findings could then be compared to the notes in the folders. Alternatively, exit interviews of patients in the form of questionnaires could enquire which aspects of the process of care were performed and again compare with what is recorded in the folders. These methods are limited by their intrusive nature and their need for resources which were not available for the current study. Where they are used, they provide a valuable method of validating and

triangulating the data collected from medical records. Stange et al. exemplify this last assertion in their comparison of chart review to patient questionnaires and to direct observation with regard to the assessment of health service quality and delivery in outpatient medical services.<sup>57</sup> The researchers used direct observation as a gold standard against which to compare patients' exit interview questionnaires and medical chart reviews for levels of recording or reporting of activities performed during consultations.<sup>57</sup> 4454 visits by patients to 138 family physicians were directly observed by trained nurse observers, after which charts were reviewed using a validated instrument and patients also given a standardised validated exit interview.<sup>57</sup> Interestingly, the patient exit interviews were found to confirm the occurrence of lifestyle counselling during the consultation much better than the chart reviews, whereas there was higher concordance of chart reviews with direct observation with regard to recording physical examinations and some outpatient procedures like pap smears.<sup>57</sup> The study methodology was relatively thorough, including close analysis of interater reliability (mostly high), validity of instruments, follow-up of lost cases (i.e. patients who opted to mail their exit interviews instead of completing them after the consultation, and patients who refused to participate), and factoring for the Hawthorne effect (by including folders of patients for whose visits a direct observer had not been present).<sup>57</sup> Thus, in the absence of the potentially intrusive direct observation, using patient exit interviews might have been a valuable method of ascertaining whether any lifestyle counselling occurred during a particular visit for the current study.

## **Audit Practice**

Another possible limitation of this study was its restriction to a twelve month period. The twelve month period was used because according to the guidelines, most of the activities pertaining to the process of care of hypertensive patients (i.e. urinalysis and serum creatinine and cholesterol analysis) should be performed at least once in a twelve month period.<sup>44</sup> It also provides a good baseline assessment from which an annual quality assurance cycle can be implemented, making it convenient for planning. However, for some patients, some of the process of care activities being examined may have been performed the month just before the period being studied, or just after it. An erroneous impression of poor quality of care may thus

be given. Therefore, it may have been more accurate to look at a period of two years or eighteen months. Little consensus exists as to the best length of time for audits to examine, with periods ranging from one year to five.<sup>48</sup> Nonetheless, in their critical review of British general practitioners' hypertension audits, Cranney et al. caution against not exceeding five years as standards and guidelines change over time.<sup>48</sup>

This study used the last measured blood pressure of the period in question as a measurement of intermediate outcome. As mentioned previously, using only one blood pressure reading has its limitations.<sup>44</sup> Often, patients attend the clinic so early in the morning that they have not taken their pills, resulting in elevated blood pressure readings which probably more accurately depict their medications' trough levels of blood pressure control, but not an overall picture of control. Furthermore, a patient whose blood pressure was well controlled throughout the year, might have missed his/her appointment at the end of the year and therefore attended the clinic after a few weeks without medication, thus having an elevated blood pressure at the last visit of the period being studied. These possible scenarios would give an impression of poor control if this last blood pressure reading were the only one used. Nonetheless, these random actualities are arguably equally likely for blood pressures taken at earlier visits during the year.

An average of the last two or three readings of the period in question may have helped to decrease the effect of these random variations, but as stated before this would be difficult to interpret as an approximation of outcome, particularly with patients who had only visited the clinic twice. In addition, the times between measurements vary between patients, during which interventions like exercise may have different effects.<sup>44</sup> Lastly, recording the difference between the first blood pressure reading of the period and the last, is another possible method for measuring outcomes, which was not mentioned in any of the audit literature found. This method provides for looking at gradients of the difference, so that although target blood pressures are not reached, a downward trend can be used to demonstrate the effects of interventions.

Yet another shortcoming of the study, (particularly as the beginning of an exercise in quality improvement for the clinic) was to neglect to examine more thoroughly the patterns of practice. While the prescription of the appropriate recommended classes of anti-hypertensive agents at the clinic was very good, the response by clinicians to uncontrolled levels of blood pressure throughout the year was not examined in the review of the records. This is an important aspect of the quality of care, the assessment of which would have provided valuable information

regarding the process of care and subsequently, further areas for intervention and improvement. The national guidelines give specific timelines and intervals for different levels of blood pressure, including how often to titrate doses or add more agents when blood pressure is uncontrolled, how often blood pressure should be measured once control is achieved, when to refer to higher levels of care, and how soon control should be achieved for all stages of blood pressure.<sup>44</sup> Adherence to these recommendations should also be a part of any exercise in quality improvement, as the actions are all recordable and therefore easy to review in patient records.

## Confounders

Apart from the proposed differences in process of care activities, numerous confounding factors may have contributed to the albeit minor differences in median blood pressures seen between the two groups of patients at the end of the twelve month period. Differing levels of adherence may have contributed to these differences. Previously mentioned studies have found lower levels of blood pressure control among patients with major depression and that patients with psychosis have lower adherence to their antihypertensive medication than psychotic patients.<sup>41,42,43</sup> These may well contribute to the higher levels of blood pressure in the psychiatric group.<sup>41,42,43</sup> While education about medication—for which there was a statistically significant ( $p=0.02$ ), but substantively uninteresting difference (CI for difference between percentages: (4.6, 41)) between the two groups—can be seen as a proxy for adherence counselling, an better assessment of adherence might have helped with comparing the two groups. Of course, adherence is notoriously difficult to measure, particularly in a system without electronic records, unlike the United States' Veterans Administration records mentioned in previous studies which measured adherence.<sup>41, 42, 43</sup>

## Recommendations

As part of a continuing exercise in quality improvement, the following recommendations are made for the clinic's medical staff to implement as a team:

1. The purchasing of all required equipment (sphygmomanometer with standard-sized and large-sized cuff, tape measure) for the psychiatric consulting room and easily accessible records calibration dates for all sphygmomanometers.
2. Psychiatric patients with hypertension to begin their visits at the club room in order to participate in the group educational sessions that occur there and to be reviewed by the primary care doctor on call after their psychiatric clinic consultation at least four times a year (or more if uncontrolled and regimen changes are made, in keeping with the national guidelines). The formalised inclusion of mental health patients in the club room will also fit very well with the integrative aspirations of the state and province's comprehensive service plan for Healthcare 2010, regarding mental health care, as well as begin to create better awareness and less stigmatization of mental health patients.<sup>44</sup> Some of the more stable psychiatric patients may indeed benefit from separate dates for their hypertension club visits. Four (or more, depending on their level of control and interventions) of their monthly visits to the clinic each year could be substituted for club visits, where the primary reason for the visit is their hypertension. Their mental status and other aspects of their mental health could be assessed with reasonable competence by the primary care doctor at these times.
3. Training of all relevant staff (doctors, nursing staff in the club and preparation rooms, the psychiatric professional nurse) in the process of care requirements for hypertensive patients using the national guidelines, so that all involved can better monitor and coordinate the provision of care activities for these patients. This entails updated protocols (i.e. aligned with the 2006 national guidelines) for the frequency of certain preparation room and club room tasks (e.g. proper blood pressure measuring technique, weighing of patients, BMI calculations, etc). It also includes a review with the clinicians of the recommended frequency of patient review according

to levels of control, when and how to titrate, to add treatment or to refer, and how to risk stratify patients (this naturally implies better history taking and record keeping with regard to patient lifestyles and family history).

## Conclusion

The results of this study suggest a lower quality of some aspects of care of psychiatric patients with regards to their hypertension, and add to the previously mentioned body of literature suggesting the poor management of medical conditions amongst patients with psychiatric patients. Of course, it is impossible to isolate a specific reason (i.e. prejudice and stigmatization) for these differences, particularly at Crossroads CHC where the aforementioned structural obstacles and deficits exist. Beyond the basic structural obstacles, other possible explanations do include the ongoing marginalization of patients with psychiatric illnesses. Numerous factors are possible, some of which (as mentioned in the recommendations), are easily surmountable. Beyond this, the study reveals that the quality of the process of care of both groups of patients at this clinic is significantly lower than the expected national standards. This arguably translates into the low percentage of patients (22% Psychiatric patients and 42% non-psychiatric patients) with controlled hypertension (BP<140/90).

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