Belize City Clinical Audit Results
2018 – 2019

Introduction[1]:

The National Health Insurance Scheme conducted medical audits at these Primary Care Provider (PCP): **Matron Roberts (MC), Mercy Clinic (MC), Belize Medical Associates (BMA), Belize Healthcare Partners (BHP) and Belize Family Life Association (BFLA)**. These PCPs utilize standardized clinical protocols on the management of chronic-non-communicable diseases. The audit tools were modified to capture the key indicators in a more concise manner, facilitating the assessment of overall compliance. The auditors consisted of a team of medical doctors including internists and National Health Insurance representatives. The auditors evaluated clinicians in relation to compliance with clinical protocols implemented by the Ministry of Health for the management of Hypertension and Diabetes Mellitus. Protocols are a common point of reference for prospective and retrospective audits of clinicians' practices: the tests, treatments, treatment goals provide ready process measures for rating compliance with best care practices. Healthcare systems that provide services and government bodies that pay for them have found clinical protocols to be effective in improving efficiency by standardizing care and optimizing value for money.

Non- communicable diseases have become more prevalent in developing countries where the burden of disease is double than that of infectious diseases. If the present trend is maintained, the health systems in low-and middle-income countries will be unable to support the burden of disease. Prominent causes for heart disease, diabetes, cancer and pulmonary diseases can be prevented but urgent preventive actions are needed, and efficient strategies should deal seriously with risk factors like smoking, alcohol, physical inactivity and western diet.

As the Belizean population ages, chronic disease will have an increasing effect on our health and wellbeing. Our health system must therefore be able to respond in an appropriate and cost-effective way to this challenge. Failure to prevent, detect and treat chronic disease at an optimal stage in its course impacts on affected individuals and their families in terms of pain and suffering, and in productivity losses and high health care costs at the community level.

The Central American Diabetes Initiative (CAMDI): Diabetes and Hypertension Risk Factor Survey conducted in Belize in 2006 showed that the overall prevalence of diabetes mellitus was found to be 13.1%. In Belize, diabetes has been reported as the second leading contributor to mortality for 2003 and 2004 and the leading contributor to mortality in 2005 and 2006 and remains the leading cause of death in 2008.

Reports from the Ministry of Health indicate that in 2008, Hypertension was recorded as being the eighth leading cause of death Hypertension causes organ damage which contributes to ischemic heart disease, the second leading cause of death and cerebro-vascular disease, the sixth leading cause of death in 2008. The study of Diabetes, Hypertension and Non-Communicable Disease Risk Factors published in 2008 indicate that the national prevalence of hypertension among persons twenty years and older was 28.7%.

The results of the 2018-2019 audit also the National Health Insurance with essential data for awarding financial incentives. This incentive is dependent on the achievements of the Key Performance Indicators (KPIs) which are included in the contractual agreement with PCPs. In addition, the analysis of results identifies areas for improvement in the management of Hypertension and Diabetes Mellitus at the Primary Care Level.

Purpose:

- The Medical Audit 2018-2019 was conducted to determine the level to which PCPs provide healthcare services in compliance with compliance with the clinical protocols for the management of diabetes and hypertension.

Objectives:

- Conduct clinical audits at the PCPs that provide healthcare services under National Health Insurance.
- Identify factors that create barriers to protocol adherence.
- Propose recommendations based on the findings of audit aimed and improving the quality of NHI services.

Methodology:1

Sample Selection:

Based on the population size of the registered members within the corresponding PCPs and those identified as diagnosed with either Diabetes or Hypertension, a random sample of 19 records were selected and the Lot Quality Sampling Methodology applied for the analysis.

Medical Audit Team:

The Medical Audit team comprised of a team of doctors:

Compliance with Diabetes and Hypertension Protocols:

Dr. E. Bradley - Internist and Diabetologist;

Dr. A. Hotchandani – General Practitioner; Consultant

Dr. J. Perez – General Practitioner (QAM NHI)

NHI Personnel:

Dr. N. Castillo – General Manager

Dr. Johanne Perez – Quality Assurance Manager

Ms. Ruth Jaramillo- Health Services Manager

Ms. Cristina Ake- Data Analyst

The team of doctors participated in the review of the audit tools and in a training on the application of these prior to the audit exercise. The NHI team assisted in the coordination of the activity, development of the audit tool and study design and data analysis.

Data Analysis Plan for the Clinical Audit[1]:

Diabetes and Hypertension:

The emphasis of the clinical audit exercise was to ensure that critical data necessary to effectively assess compliance with protocols is not only being collected but also that the cases are being managed in accordance to the established protocols for the management of Diabetes and Hypertension.

To determine compliance with the protocol each medical record was assessed in accordance to the audit tool which identifies the following:

1. The **"must do"** criteria or the core variables that should be done. These variables verify that the client has been diagnosed appropriately and that the overall management takes into account, relevant follow up tests and potential target organ damage monitoring. It offers a more holistic approach to the case management of the patient.
2. The **"should do"** criteria seek further input on the supportive management of the client to include nutritional education; renal failure monitoring, importance of adherence and relevance of summary report for continuous clinical management.

The final percentage score was then calculated per record. The minimum passing acceptable score for each record was **90%** or higher.

A percentage was then calculated based on the number of records that met the minimum standard over the number of records assessed. A clinic met the protocol if the percentage of records that met the minimum standard which was also **90%** or higher.

Diabetes Results SS

Diabetes Audit Score 2018 - 2019					
	BFLA	BMA	IHC	MR	MC
# of records assessed	19	19	19	19	19
# of records that met the target (90%)	19	19	18	19	19
Total score	100%	100%	95%	100%	100%

Belize Family Life Association (BFLA), Belize Medical Associates (BMA), Integral Health Centre (IHC), Matron Roberts Polyclinic (MR) and Mercy Clinic (MC) had scores over 90%. IHC, MR and MC have improved by 5% for this clinical audit period. This is to be commended. Also, for our clinics that have maintained a high standard, BFLA and BMA, we also commend their efforts.

Our clinics continue to perform very well in the clinical audit. All clinics passed on their number of records assessed. This is the consistent pattern that we are seeing. Overall the PCP team have embraced a minimum standard of care that is reflected in their documentation processes.

Demographics	BFLA	BMA	IHC	MR	MC
Gender					
Male	4	2	5	11	6
	21%	11%	26%	58%	32%
Female	15	17	14	8	13
	79%	90%	74%	42%	68%

Females predominantly are seen at all our clinics, with the exception of MR, where the ratio is skewed to males.

Demographics	BFLA	BMA	IHC	MR	MC
Age Range					
31-45	2	2	3	3	0
	11%	11%	16%	16%	0%
46-55	4	3	5	1	0
	21%	16%	26%	5%	0%
>55	13	13	11	15	19
	68%	68%	58%	79%	100%

Most patients that are being treated for diabetes are >55 years old at all our clinics. IHC showed the greatest number of patients from 31-55 years old with 42%. It is worrisome most clinics have 31-45-year-old patients with diabetes: BFLA 24% (from 16% in 2017), BMA 27% (from 11%), IHC 42% (from 16%), and MR remains at 21%. This is a trend that will continue to be monitored.

Demographics	BFLA	BMA	BHP	MR	MC
Ethnicity					
Creole	12	10	12	14	15
	63%	53%	63%	74%	79%
Mestizo	5	6	5	5	3
	26%	32%	26%	26%	16%
Garifuna	1	0	1	0	0
	5%	0%	5%	0%	0%

The predominant ethnic group at all the clinics is Creole (Averaging 66%), followed by Mestizo (AVG. of 25%) and Garinagu.

Diabetes	BFLA	BMA	BHP	MR	MC
Cases of Diabetes					
Newly Diagnose	0	1	0	0	0
	0%	5%	0%	0%	0%
Established Case	19	18	19	19	19
	100%	95%	100%	100%	100%

BMA had one newly diagnosed case of diabetes. All clinics have a majority of established diagnosed diabetics.

Diabetes	BFLA	BMA	BHP	MR	MC
Classification					
Diabetes Type 1	0	0	0	0	0
	0%	0%	0%	0%	0%
Diabetes Type 2	19	19	19	19	19
	100%	100%	100%	100%	100%

We noted that the type 2 diabetes is the type of diabetes diagnosed predominantly at all clinics.

"Must Do" Process Criteria	BFLA	BMA	BHP	MR	MC
The Diagnosis of Diabetes is correct	2.0	2.0	2.0	2.0	2.0
HbA1c has been checked at least annually	2.0	2.0	2.0	2.0	2.0
At least annually there has been an assessment of symptoms including hypoglycemic attack.	2.0	2.0	2.0	2.0	2.0

Our patients are being diagnosed appropriately by all our clinics. We commend the clinics in carrying this out successfully. Clinics are also requesting blood markers of diabetes control, for example they order the HbA1c minimally once yearly to all their patients. This practice and the search for medication side-effects such as hypoglycaemia are engendered in the clinical practice of the teams.

"Must Do" Process Criteria	BFLA	BMA	BHP	MR	MC
At least annually the feet have been assessed.	2.0	2.0	2.0	2.0	2.0
At least annually the patient's urine has been checked for albumin to detect early evidence of nephropathy.	2.0	2.0	1.9	2.0	2.0
At least annually the fundi have been examined for retinopathy through either examination with direct fundoscopy with dilated pupil, fundi photo or screened by ophthalmologist.	2.0	2.0	2.0	2.0	2.0

Diabetics feet are being well monitored yearly by all the clinics. This process is recorded in all files of diabetics at all clinics. This is a process that is now engrained in the culture of the clinics.

Microalbuminuria is an important clinical finding because it is not only associated with an increased risk of progres sion to overt proteinuria (macroalbuminuria) and renal failure, but also cardiovascular events. In patients who progress to overt nephropathy, microalbuminuria usually precedes macroalbuminuria by an interval of 5 to 10 years.[2] Our clinics are requesting microalbumin in urine as a party of their holistic patient diagnosis. Of note, we have re-introduced the measurement of the glomerular filtration rate (GFR) as we had mentioned in our last report.[3]

Diabetic retinopathy is a serious sight-threatening complication of diabetes.[4] Our teams are also formidably referring and requesting fundoscopy to screen for diabetic retinopathy. We are cognizant that although ordered, there is a challenge with getting full counter-referral response monitored and document from our service providers. This remains a challenge that NHI must solve. We look forward to reporting that this issue is solved soon.

"Must Do" Process Criteria	BFLA	BMA	BHP	MR	MC
At least annually there has been assessment of the smoking habit.	2.0	2.0	2.0	2.0	2.0
The blood pressure has been checked at every diabetes visit.	2.0	2.0	2.0	2.0	2.0
At least annually the blood lipid has been checked.	2.0	2.0	2.0	1.9	2.0

We reiterate that smoking causes type 2 diabetes. In fact, smokers are 30–40% more likely to develop type 2 diabetes than non-smokers. And people with diabetes who smoke are more likely than non-smokers to have trouble with insulin dosing and with controlling their disease. Smokers with diabetes have higher risks for serious complications.[5]
Our clinics continue to screen our diabetic patients on the hazards of smoking and the benefits of ceasing. NHI is planning to introduce the mental health Gap Action Plan (mhGAP) developed be PAHO in 2019 to the PCPs. This tool has

a stimulant dependence section from which teams may fortify their knowledge in their approach to this stimulant (nicotine) addiction.[67] This is a start.
The coexistence of hypertension in diabetes is particularly pernicious because of the strong linkage of the two conditions with all CVD, stroke, progression of renal disease and diabetic retinopathy.[8] With this in mind our clinics are all measuring our diabetic patient's blood pressure consistently to prevent CVD events and retinopathy. All clinics scored very well here.

Our clinics are doing very well in ordering the respective lipid screens in our diabetic patients. Diabetes mellitus is considered a high- or very high–risk condition for atherosclerotic cardiovascular disease (ASCVD).[9] Heart disease mortality is two to four times higher in patients with diabetes compared with those without diabetes. Managing the high risk for cardiovascular morbidity and mortality in diabetic patients is a challenge for practicing clinicians. Reducing the burden of cardiovascular disease in diabetes begins with assessment and treatment of elevated LDL cholesterol.[10] At our clinics lipids are also being checked according to the rationalization tool for medical services.[11]
A value added use of the lipid scores lies in its use in the atherosclerotic cardiovascular disease risk estimator plus (ASCVD risk estimator plus.) This was introduced and accepted by our clinical teams. It utilizes lipid scores, blood pressure, and medical history to "estimate our patient's 10-year ASCVD risk at an initial visit to establish a reference point."[12] Our clinics acceptance and initial use of this estimator was excellent. We continue to use tools that will promote education and advocacy for lifestyle modification on our patient's behalf.

"Must Do" Process Criteria	BFLA	BMA	BHP	MR	MC
If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	2.0	1.98	2.0	2.0	2.0

Our clinics are doing very well identifying target organ damage and modifying treatments to these conditions. It is essential to investigate target organ damage in the diabetic. Up to 75% of adults with diabetes also have hypertension. Thus, hypertension and diabetes are common, intertwined conditions that share a significant overlap in complications. Complications include microvascular and macrovascular disorders. Macrovascular complications, which are well recognized in patients with longstanding diabetes include coronary artery disease, myocardial infarction, stroke, congestive heart failure, and peripheral vascular disease. Although microvascular complications (retinopathy, nephropathy, and neuropathy) are conventionally linked to hyperglycemia, studies have shown that hypertension constitutes an important risk factor, especially for nephropathy.[13] Thus our viewing our patients holistically has aided in identification of these damages to target organ damage.

"Should do" indicators:

These place a high emphasis on the proper follow up, education and adherence counselling offered to patients. These interventions if applied, further prevent potential target organ damage and assesses the overall outcome of the current management of the patients.[1]

Should Do Process Criteria:

All our clinics are giving continues education to our patients about the importance of managing their diabetes. Although we may not have many newly diagnosed patients. The practice of reminding patients of the lifestyle recommendations is a part of the culture of treatment at our clinics.

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia.[14] Caloric and national intake is a key component of diabetes management and a nutritionist can be a key stakeholder in our patients dietary education.

Our referral to the nutritionist available for consultation at the clinics is also doing well. There has been an increase in the referral to this service. NHI is planning to improve the monitoring of this service to our patients, to keep track of the trend. This will show us the number of referrals to this service compared to the numbers that are able to access the service. Thus, able to detect gaps in service here.

A high BMI can be an indicator of high body fatness.[15] Obesity and its concomitant complications (diabetes, hypertension, cardiovascular disease, and cancer, etc.) are a key component of increased risk of diabetes.[16] Our NHI health teams are measuring BMI's. All the clinics are measuring BMI's more than once yearly and tracking this health indicator.

Creatinine is produced in muscle metabolism and excreted principally by way of the kidneys, predominantly by glomerular filtration. Blood assays for creatinine constitute the most commonly used measure of the presence and progression of CKD. Thus, the level of the serum creatinine in a subject is a general reflection of the level of kidney function. With kidney disease and loss of nephrons, the level of serum creatinine would therefore show an upward trend.[17] Our clinical teams are requesting renal function (creatinine, blood urea nitrogen) regularly and homogenously to our diabetic patients. These are important in the calculation of the estimated glomerular filtration rate for the early detection of chronic kidney disease.

Adherence to medical treatment and to an improved lifestyle for the control and management of diabetes is being done homogenously and regularly at all our clinics. This function has become part of the culture of management of our diabetic population.

The annual summary form review is also being done with excellence by the clinical teams. This form assesses the general health condition of diabetics and serve a summary of the basic health indicators diabetics and their physician should have in mind in overall monitoring and treatment.[1] Our clinics have improved and are maintaining a high level on constancy in the filling out of this form.

Outcome Criteria:

Since the objective of performance measures is to improve the care and health of specified populations, it makes sense to examine outcomes. Treatment of chronic conditions has shifted over the past decade to an approach that is more patient centred and that places the person with diabetes in a joint decision-making role along with the health care professionals. Patient-centered care is respectful of and responsive to individual patient preferences, needs, and values and ensures that patient values guide all clinical decisions. With this in mind, using evidence-based guidance we have set an initial set of outcome indicators. These aimed and measuring the impact of the health interventions in mitigating the negative impact of diabetes.[1]

Outcome Criteria	BFLA	BMA	BHP	MR	MC

HbA1c is challenging to control in the general diabetic patient. The auditing team considered this great difficulty. Our consultant diabetologist agreed that in objective fairness to our clinical teams that we should look to see if an HbA1c baseline was sought to be established and if so, a 2-point score was given. Also, if in the follow-up HbA1c levels found, the 7% is not attainable at the time of assessments, due to challenges not currently within the control of the PCP, that a full score would be given. We note that all our PCPs are following the medical treatment and follow-up guidelines that are nationally and internationally recognized in terms of HbA1c.

Our audit and management team are now planning to look at these outcome measure definitions to redefine their expected goals and the way we audit them. This is to aid in continued objectivity in the audit while being fair to the PCPs in their engaging patients to lower and maintain control of their HbA1c.

Age >= 60 with BP <150/90 * PCP Crosstabulation

			PCP					
			BFLA	BMA	BHP	MR	MC	Total
Age >60 <150/90	Partially met	Count	0	1	1	0	0	2
		% within PCP	.0%	5.3%	5.3%	.0%	.0%	2.1%
	Fully met	Count	7	5	5	7	0	24
		% within PCP	36.8%	26.3%	26.3%	36.8%	.0%	25.3%
	NA	Count	12	13	13	12	19	69
		% within PCP	63.2%	68.4%	68.4%	63.2%	100.0%	72.6%
Total		Count	19	19	19	19	19	95
		% within PCP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Our teams are consistently following guidelines measuring our diabetic patient's blood pressure in our >60 years patients. This ensures that any patient that is hypertensive will be monitored and get concomitant treatment and guidance in this regard. The partially met criteria are for patients who had spikes of >150 / > 90 of blood pressure but maintained the suggested scores more constantly. Most patients who are > 60 years have fully met the criteria by having a blood pressure <150/<90.

Ages >18 to 59 yrs, BP <140/<90 * PCP Crosstabulation

			PCP					
			BFLA	BMA	BHP	MR	MC	Total
>18 140/90	Partially met	Count	0	0	1	0	0	1
		% within PCP	.0%	.0%	5.3%	.0%	.0%	1.1%
	Fully met	Count	12	13	11	12	18	66
		% within PCP	63.2%	68.4%	57.9%	63.2%	94.7%	69.5%
	NA	Count	7	6	7	7	1	28
		% within PCP	36.8%	31.6%	36.8%	36.8%	5.3%	29.5%
Total		Count	19	19	19	19	19	95
		% within PCP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Our teams are consistently following guidelines measuring our diabetic patient's blood pressure in our 18-59 years patients. This ensures that any patient that is hypertensive will be monitored and get concomitant treatment and guidance in this regard. The partially met criteria are for patients who had spikes of >140 / > 90 of blood pressure but maintained the suggested scores more constantly. Most patients who are 18-59 years have fully met the criteria by having a blood pressure <140/<90.

Outcome Criteria	**BFLA**	**BMA**	**BHP**	**MR**	**MC**
Patient's LDL chlolesterol level is less than 135 mg/dl	1.98	2.0	1.96	2.0	2.0

Low-density lipoprotein (LDL) is being measured at all our clinics in a consistent manner. This action has enabled for the screening of atherosclerotic cardiovascular heart disease risk estimation to be adopted, since we need the LDL and other lipid scores for risk estimation.

Hypertension Audit Results:

Hypertension Audit Score 2018					
	BFLA	BMA	IHC	MR	MC
# of records assessed	19	19	19	19	19
# of records that met the target (90%)	19	19	19	19	19
Total score	100%	100%	100%	100%	100%

All PCP clinics scored over their target of 90%. This signifies that have established a very good baseline standard of care. This is homogenized at all the PCPs. IHC and MR have had improvement in respect of last year's audit and the other clinics have maintained their high standards. Our clinics are to all be commended for these results.

The records that the clinical teams are keeping are being done very well.

Hypertension

Demographics	BFLA	BMA	BHP	MR	MC
Gender					
Male	5	7	1	5	9
	26%	37%	5%	26%	47%
Female	14	12	18	14	10
	74%	63%	95%	74%	53%

Most patients that seen are women. The average for BFLA, BMA, IHC and MR is 76%. Notably IHC has a vast majority of women patients. Mercy Clinic is also, led by female patients, but it is more closely followed by the males at 47%.

Hypertension

Demographics	BFLA	BMA	BHP	MR	MC
Age Range					
31-45	1	1	4	2	0
	5%	2%	21%	11%	0%
46-55	4	0	3	5	0
	21%	0%	15%	26%	0%
>55	14	17	10	12	19
	74%	90%	53%	63%	100%

The majority of patients that are being treated for hypertension are >55 years old for all the clinics. An average of 25% of our patients are between the age of bout a third of BHP's patients are 46-55 years old; both BFLA and BMA have 21% of their patient in this age range.

The predominant ethnic group at all the clinics is Creole. MC also noted a 21% of Mestizo patients.

Hypertension	BFLA	BMA	BHP	MR	MC
Case					
Newly Diagnosed	0	0	2	0	0
	0%	0%	11%	0%	0%
Established Cases	19	19	17	19	19
	100%	100%	90%	100%	100%
Classification					
Pre-Hypertension	3	2	1	0	2
	16%	11%	5%	0%	11%
Hypertension Stage 1	12	9	15	14	17
	63%	47%	79%	74%	90%
Hypertension Stage 2	4	8	3	5	0
	21%	42%	16%	26%	0%

The relationship between blood pressure and risk of CVD events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater the chance of heart attack, HF, stroke, and kidney diseases[8]. Hypertension requires a multifaceted approach in control. A subset of patients requires intense multidisciplinary interventions that work in conjunction with the medical therapy.

Overall most cases that were diagnoses were already established cases (98%). BHP did have a small number of newly diagnosed cases, which were 2% of the overall cases. This was similar to last year's averages (2017: Newly Diagnosed 2%; Established 98%). Due to the population at Mercy Clinic all the cases are established.

Hypertension targets are set by the Seventh Report of the Joint National Committee (JNC7) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure definitions for hypertension[8]. JNC 7 suggests that all people with hypertension (stages 1 (Systolic 140-159mmHg/Diastolic 90-99mmHg) and 2 (Systolic equal or greater than 160mmHg/ Diastolic equal or greater than 100 mmHg) be treated. The treatment goal for individuals with hypertension and no other compelling conditions is <140/90 mmHg.

8% of the patient's charts seen were pre-hypertensive patients (2017: 5%). 71% of the overall population of hypertensives are stage 1 (2017: 83%) and 21% of the population are in stage 2 hypertension (2017: 12%). There is a noted reduction in the pre-hypertensive population, and an increase in the stage 1 hypertensive population. There is a decrease in the number of stage 2 hypertensives being treated in 2018-2019.

BMA has the greater number of stage 2 hypertensives (42%), followed by MRPC (26%). MC has the greater number of stage 1 hypertensives (90%), followed by BHP (79%) and MR (74%).

Hypertension	BFLA	BMA	BHP	MR	MC
Hypertension Controlled					
Yes	18	16	12	16	19
	95%	84%	63%	84%	100%
No	1	3	7	3	0
	5%	16%	37%	16%	0%

Overall 85% of treated patients had good hypertension control. This is an increase of 6% from the 2017-2018 audit (79%). This may reflect the continued improvement of the standards of care of our clinics.

Must Do Criteria					
Diagnosing hypertension/Follow up	**BFLA**	**BMA**	**IHC**	**MR**	**MC**
If blood pressure measured in the clinic is 140/90 mmHg or higher: • A second measurement during the consultation was taken. • If the second measurement was substantially different from the first, a third measurement was taken.	1.9	2.0	1.8	2.0	2.0
If the person presented with severe hypertension, anti-hypertensive drug treatment therapy was administered immediately, without waiting for the results of ABPM or HBPM.	2.0	NA	2.0	2.0	NA
Hypertension Classification was appropriate based on subsequent BPM readings. (at least three consecutive readings on different consultation days)	2.0	2.0	2.0	2.0	2.0

In all clinics blood pressure readings are being corroborated at second and even third instances when there are high measurements.

Hypertensive emergencies are characterized by severe elevations in blood pressure (BP >180/120 mmHg) complicated by evidence of impending or progressive target organ dysfunction. They require immediate BP reduction (not necessarily to normal) to prevent or limit target organ damage. Examples include hypertensive encephalopathy, intracerebral haemorrhage, acute myocardial infarction (MI), acute left ventricular failure with pulmonary edema, unstable angina pectoris, dissecting aortic aneurysm, or eclampsia.[8] *Hypertensive urgencies* are those situations associated with severe elevations in BP without progressive target organ dysfunction. Examples include upper levels of stage II hypertension associated with severe headache, shortness of breath, epistaxis, or severe anxiety. The majority of these patients present as noncompliant or inadequately treated hypertensive individuals, often with little or no evidence of target organ damage.[8]
Clinics are monitoring for hypertensive emergencies and urgencies that would require acute medical treatment. BMA and MC did not have any files audited with a hypertensive urgency.

As we have highlighted previously we can note that hypertension classification based on JNC 7 is being done consistently well throughout out program. JNC 7 suggests that all people with hypertension (stages 1 (Systolic 140-159mmHg/Diastolic 90-99mmHg) and 2 (Systolic equal or greater than 160mmHg/ Diastolic equal or greater than 100 mmHg) be treated. The treatment goal for individuals with hypertension and no other compelling conditions is <140/90 mmHg.[8] All our patients were well classified according to JNC 7 and were in their appropriate classification.

Must Do Criteria					
Diagnosing hypertension/Follow up	**BFLA**	**BMA**	**IHC**	**MR**	**MC**
Assessing cardiovascular risk and target organ damage					
The records show that at diagnosis the following symptoms and signs of target organ damage have been sought:					
HEART:	2.0	2.0	2.0	2.0	2.0
LVH/Myocardial Infarction: EKG					
Chronic Heart Failure: EKG; Chest X-ray					
Angina: Reported history					
BRAIN:	2.0	2.0	2.0	2.0	2.0
Strokes: Reported history					
Transient Ischemic Attack: Reported History					
Kidney:	2.0	2.0	2.0	2.0	2.0
Proteinuria/Microalbuminuria: Lab test results					
BUN/Creatinine					
Vascular Disease:	2.0	2.0	2.0	2.0	2.0
Peripheral Arterial disease: Patient History					
Asymmetric Pulses: BPM in both arms and EKG					
Eyes:	2.0	1.8	2.0	2.0	2.0
Retinopathy: eye fundi exam					
If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	2.0	2.0	2.0	2.0	2.0

In the assessment of cardiovascular damage and target organ damage our clinics are monitoring the target organs. This is crucial for patient management. As mentioned before the relationship between blood pressure and risk of cardiovascular disease (CVD) events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater the chance of heart attack, HF, stroke, and kidney diseases.[8] Hypertensive patients are at increased risk for myocardial infarction (MI) or other major coronary events and may be at higher risk of death following an acute MI. Cardiomegaly in these hypertensive cases is usually due to left ventricular hypertrophy (LVH), which is an increase in left ventricular mass. In untreated or poorly treated individuals, LVH becomes a major risk factor for dilated cardiomyopathy and heart failure (HF). The coexistence of hypertension in diabetes is particularly pernicious because of the strong linkage of the two conditions with all CVD, stroke, progression of renal disease and diabetic retinopathy.[8]

Our clinics are screening patients for other target organ damage: chronic heart failure, angina, stroke history, transient ischemic attack, hypertensive kidney disease and peripheral artery disease. Electrocardiograms are being done and the internist noted that they are technically correct. There is sporadic discrepancy in its interpretation, but this is controlled, particularly with internal medicine referrals.

Of note dementia and cognitive impairment occur more commonly in people with hypertension. Reduced progression of cognitive impairment may occur with effective antihypertensive therapy.[8] As our population ages and lives longer we will need to improve our monitoring of the effects of hypertension on brain function. Our clinics are screening patients very well for the stroke and transient ischemic attack history.

Cardiovascular disease (CVD) is the most common cause of death in individuals with CKD, and CKD is an independent risk factor for CVD. Microalbuminuria (30–300 mg/day) is associated with increased CVD risk in diabetics and other high-risk patients. Urinary albumin excretion has diagnostic and prognostic value equivalent to reduced estimated glomerular

filtration rates (eGFRs).[8] Creatinine and blood urea nitrogen are being monitored in patients consistently, and this is important in order to calculate the GFR. Our internal medicine auditors congratulate NHI and their teams for monitoring of the glomerular filtration rate (GFR).[3] This would be another layer in outcome measurement that would add more detail to the renal function of patients. This was a recommendation from last years clinical audit that has come to fruition.

Peripheral artery disease (PAD) is a narrowing of the peripheral arteries to the legs, stomach, arms, and head — most commonly in the arteries of the legs. PAD is similar to coronary artery disease (CAD). Both PAD and CAD are caused by atherosclerosis that narrows and blocks arteries in various critical regions of the body.[18]

Major risk factors for peripheral arterial disease (PAD) are hypertension, diabetes, and smoking. Symptomatic PAD is associated with a greatly increased risk of death from CVD, in part because diffuse atherosclerosis, CAD, and renovascular disease frequently coexist in these patients. Therefore, more intensive screening for these related cardiovascular disorders is appropriate in persons with PAD.[8]

Differences in systolic blood pressure (SBP) of 10 mm Hg or more or 15 mm Hg or more between arms have been associated with peripheral vascular disease and attributed to subclavian stenosis. It is a useful indicator of risk of vascular disease and death.[19]

Our clinics are screening well for vascular disease compromise, as they all scored 2 in this area.

Hypertension can affect the retina, choroid, and optic nerve of the eye, particularly with stage 2 hypertension. These changes can be appreciated with inspection of the retinal vessels by direct ophthalmoscopy.[8] Our clinics are complying with these screening guidelines and ordering these for our hypertensive patients consistently. The auditors noted that there is a still a gap in ordering ophthalmology screens and receiving a result report at this clinic for physician reference. This a process that NHI must endeavour to fix.

Target organ damage is being sought out for diagnosis and prevention in our patients.
The auditing team noted that BFLA, BMA, BHP, MR and MC all performed appropriate target organ damage and took appropriate action in these cases.

"Should do" indicators place a high emphasis on the proper follow up, education and adherence counselling offered to patients. These interventions if applied, further prevent potential target organ damage and assesses the overall outcome of the current management of the patients.[1]

Should Do Criteria					
Lifestyle interventions	**BFLA**	**BMA**	**BHP**	**MR**	**MC**
Lifestyle advice was offered initially and then periodically to people undergoing assessment or treatment for hypertension.	2.0	2.0	2.0	2.0	2.0
Appropriate guidance on diet and exercise as part of the action plan was offered.	2.0	2.0	2.0	2.0	2.0
At least annually, alcohol consumption was assessed and advice on reduced intake offered.	2.0	2.0	2.0	2.0	2.0
Advice on dietary sodium intake offered, (either by reducing or substituting sodium salt and educating patients on hidden sources of sodium)	2.0	2.0	2.0	2.0	2.0
Discuss alternative medicines used by patients for reducing blood pressure.	2.0	2.0	2.0	1.9	2.0
At least annually smoking practice was assessed, and cessation advice offered.	2.0	2.0	2.0	2.0	2.0

The benefits of modest **lifestyle** changes on cardiovascular risk factors are well documented. Behavioural models suggest that the most effective therapy prescribed by the most careful clinician will control hypertension only if the patient is motivated to take the medication as directed and to establish and maintain a health-promoting lifestyle. Motivation improves when patients have positive experiences with, and trust in, their clinicians. Better communication improves outcomes; empathy builds trust and is a potent motivator.[8]

Comparing these results to our last clinics audit we note continued good practices with all our clinics scoring high here. Overall our patients are being spoken to and guided by our clinical teams in lifestyle modifications for the improvement of their hypertension. Our clinics are documenting their strategies in lifestyle modification and have scored well in this regard. This continues to be the bedrock of our public health treatment strategy.

The emphasis for **weight management** should be on avoidance of excess total energy intake and a regular pattern of physical activity. Reducing food portion sizes and limiting fat intake can assist in reducing overall calorie intake. For example, adoption of the well-studied low sodium DASH eating plan provides heart healthy foods that can be used to promote weight loss, reduce blood pressure in both hypertensive and prehypertensive individuals, and reduce low density lipoproteins (LDL).[8]

Adoption of the well-studied **low sodium** DASH (Dietary Approaches to Stop Hypertension) eating plan provides heart healthy foods that can be used to promote weight loss, reduce blood pressure in both hypertensive and prehypertensive individuals, and reduce low density lipoproteins (LDL).[8]
Our clinics continue to promote this diet and speaking to patients about the realities of their dietary needs, tailoring the diets to the needs of patients. It is important for a nutritionist to be available to continue to lay good dietary foundations for our hypertensive population.

Increased **physical activity**, when combined with a reduction in calories, is essential to weight loss success. Based on the available evidence, the recommendation is to engage in regular physical activity at least 30 minutes per day, most days of the week (see table 9). In addition, physical activity is critical to the maintenance of weight loss and is important for overall reduction in cardiovascular risk; 60–90 minutes per week of walking can reduce CHD mortality by about 50 percent.[8]

NHI does recognize that we need to embark on innovative strategies and revisit past ones to improve patient buy-in for lifestyle interventions adoption.

Consumption of **alcohol** (e.g., >30 grams of ethanol a day or approximately two "drinks" daily) have a dose-related effect on BP, both in hypertensive and normotensive subjects.[8] Our at-risk patients received information to prevent the excessive use of alcohol intake in all our clinics.

Physicians should be aware of the possible indications and side effects related to the use of **herbal medications**. Physicians should improve their knowledge of herbal medications to adequately weigh the clinical implications related to their use, and be able to discuss with patients their possible benefits and side effects, and explain that natural does not always mean safe.[20]

Use of herbal medications for the treatment of cardiovascular diseases is not supported by scientific evidence. Although most of the herbs demonstrate an effect on biological mechanisms associated with cardiovascular disease, available clinical studies are limited in sample size and appropriate controls. Physicians should be certain patients inform them regarding all supplements, particularly herbal, which can result in serious bleeding and drug interactions. And physicians should try to assess whether patients are not taking their medication as prescribed because of the preference for herbal supplements, which they perceive as safe and not "drugs."[21]

However, correctly identifying new signs or symptoms of herbal medications is challenging for physicians, due to a lack of knowledge on their effects and common under-reporting from patients. Indeed, about 70% of patients do not notify their physicians about their use of supplements and, at the same time, physicians are unlikely to regularly gather correct information on their use. In fact, on the one hand patients believe that it is pointless to report the use of herbal medications, because they are reputed to be safe and are not perceived as drugs, whereas on the other hand, physicians do not give adequate weight to the clinical implications of such preparations. Moreover, use of herbal medications has been associated with poor adherence to conventional medications, raising significant concerns in terms of safety and effectiveness of concurrent treatments.[20]

To deal with this issue, physicians should carry out a structured interview. Information on use of alternative preparations, herbal medications, and actual drugs should be properly recorded, and signs and symptoms must be evaluated in accordance with the clinical story. Communicating with the patient is a crucial component of the process, where the pros and cons of specific herbal medications should be explained and their risk–benefit profile properly discussed. Eventually, the decision to withdraw or withhold a new herbal medication should be shared with the patient.[20]

Our clinics are discussing the use of alternative medications. This question is of continued relevance with the advent of commercialization and the social media bombardment of patients with multi-cure medications and natural cures. These alternative treatments pose a real barrier to medication adherence and a communication strategy for the bilateral understanding of their use and misuse needs to be developed.

Smoking raises blood pressure acutely. Smoking cessation may be the single most important factor whether peripheral artery disease (PAD) progresses. For overall cardiovascular risk reduction, patients should be strongly counselled to quit smoking.[8] We also know smoking causes type 2 diabetes. In fact, smokers are 30–40% more likely to develop type 2 diabetes than non-smokers. And people with diabetes who smoke are more likely than non-smokers to have trouble with insulin dosing and with controlling their disease. Smokers with diabetes have higher risks for serious complications.[5]

"Effective tobacco dependence treatment should include cessation advice incorporated into primary health-care services… and access to free or low-cost cessation medicines. In Belize there is no smoking cessation support available. Some pharmacological treatment is available."[22]

Our clinical teams continue to screen the population for tobacco smoking. Patients in general replied that they did not at all clinics. Our internal medicine auditor makes note that treatment need to be addressed for smokers.

Should Do Criteria					
Lifestyle interventions	**BFLA**	**BMA**	**IHC**	**MR**	**MC**
Initiating and monitoring anti-hypertensive drug treatment, including blood pressure targets					
Initiating treatment					
Anti-hypertensive drug treatment offered to people aged under 80 years with stage 1 hypertension who have one or more of the following: • target organ damage • established cardiovascular disease • renal disease • diabetes	2.0	2.0	2.0	2.0	2.0
Anti-hypertensive drug treatment to people of any age with stage 2 hypertension.	2.0	2.0	2.0	2.0	NA

Our clinics are initiating and monitoring antihypertensive drug treatments as per international and NHI guidelines in both stages 1 and 2. They are also taking into consideration comorbidities in the treatment regimens. Our internal medicine auditor agrees that overall the treatments are appropriate.

Should Do Criteria					
Lifestyle interventions	**BFLA**	**BMA**	**BHP**	**MR**	**MC**
Choosing antihypertensive drug treatment					
Treatment regimen appropriate and in accordance to reported co-morbidities	2.0	2.0	2.0	2.0	2.0
Patient education and adherence to treatment					
At least annually patient is educated on the benefits of treatment regimen and information provided on potential side effects.	2.0	2.0	2.0	2.0	2.0
Patients monitored for the presence of unwanted side effects and action taken was appropriate	2.0	2.0	1.9	1.9	2.0
An annual summary review done to assess Hypertension management. Summary sheet should indicate suggested modifications proposed in the action plan, discuss lifestyle practices, symptoms and current medication regimens/and or adjustments. (review of annual summary and annual form)	2.0	2.0	2.0	2.0	2.0
Review and document potential causes of non-adherence and respond accordingly.	2.0	2.0	2.0	2.0	2.0

Clinical inertia is the failure to titrate or combine medications and to reinforce lifestyle modifications, despite knowing that the patient is not at goal BP. This may be due in part to clinician focus on relieving symptoms, a lack of familiarity with clinical guidelines, or dis-comfort in titrating to a goal.[23] In the majority of our patients, the treatment regimens are well met in accordance to their co-morbidities.

Medication side-effects are always a present risk for those on medication. Racial differences in the incidence of antihypertensive drug side effects may occur; African Americans and Asians have a three to fourfold higher risk of angioedema and have more cough attributed to ACEIs than Caucasians.[23] Our patients are being monitored for potential side-effects and we commend our clinics in continuing this target. This makes our patients safer and engenders trust from our patients that we are monitoring this. Continued communication with our patient is a corner stone of good treatment of our patients.

This summary review is important for the referencing of patient's illnesses. It enables quick reference of illness and the validation of treatment regimens in a new user of the chart. There were annual summary review forms are well filled out by our clinics as seen above. This is a crucial part of the clinical documentation for the review of treatment and the follow-up of that treatment.

Patients are being monitored for side-effects and the benefits of their treatment. Adherence is also being monitored at all clinics.

Behaviour models suggest that the most effective therapy prescribed by the most careful clinician will control hypertension only if the patient is motivated to take the medication as directed and to establish and maintain a health-promoting lifestyle. Motivation improves when patients have positive experiences with, and trust in, their clinicians. Better communication improves outcomes; empathy builds trust and is a potent motivator.[8] It is challenging to get patient buy-in to decrease non-adherence so it's monitoring is important. All our clinics are reviewing nonadherence in high percentages with their patients. This is a crucial part of the clinical assessment and will enable clinicians to optimize treatment and get to their desired clinical outcomes.

Hypertension: By age range:

Achieving blood pressure targets is challenging. Our auditors noted that in a diverse population with comorbidities it can be difficult to get to treatment goals. Partial scores were given for cases in which there was overall control of blood pressure. Our internal medicine auditor notes that referral to a specialist might be appropriate in these cases for possible scaling up of treatment.

< 60 yrs. with Blood Pressure <140 / <90 Score * Clinic Crosstabulation

			Clinic				
			BFLA	BMA	IHC	MR	Total
Score	Partially met	Count	0	0	2	0	2
		% within Clinic	.0%	.0%	15.4%	.0%	5.6%
	Fully met	Count	9	4	11	10	34
		% within Clinic	100.0%	100.0%	84.6%	100.0%	94.4%
Total		Count	9	4	13	10	36
		% within Clinic	100.0%	100.0%	100.0%	100.0%	100.0%

In the patient cohort <60 yrs. old there was fully met outcome in most patients at all the clinics. There were partially met cases at IHC. Overall the management and treatment of patients <60 years old is appropriate and good. In the cases of partially met, our internal medicine auditor suggests that there be continued referral and inter-consultation with and internist to aid in getting these patient's blood pressure controlled better.

- **60 yrs. with Blood Pressure >150 / >90 Score * Clinic Crosstabulation**

			Clinic					
			BFLA	BMA	BHP	MR	MC	Total
Score	Not met	Count	0	0	1	0	0	1
		% within Clinic	.0%	.0%	16.7%	.0%	.0%	1.7%
	Partially met	Count	0	2	0	0	0	2
		% within Clinic	.0%	13.3%	.0%	.0%	.0%	3.4%
	Fully met	Count	10	13	5	9	19	56
		% within Clinic	100.0%	86.7%	83.3%	100.0%	100.0%	94.9%
Total		Count	10	15	6	9	19	59
		% within Clinic	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

In the patient cohort >60 yrs. old most patients met the "fully met "criteria, indicating their blood pressure was well controlled. Overall our clinics are performing well in controlling blood pressure in the >60-year-old population.

General Observations Applicable to all Clinics:

- A general excellent standard of care has been established.
- The use of colored paper and other means of identifying different chart sections improves chart functionality.
- There is improved use of resources available, particularly in referrals to internists, nutritionists, and specialists.
- There is improved documentation as to why treatment goals are not met. For example, in cases where HBA1c is not met, there is documentation of non-compliance.
- The color coded sheets for those clinics with written files are a good idea and should continue.

Observation per Clinic:

Belize Medical Associates Clinical Audit:

Diabetes:

- Cases in which there has been increased HbA1c throughout the year have had the proper physical exercise and nutritional advice.
- The use of insulin and its use in difficult to manage patients is good.
- There is appropriate referral to internist evaluation in challenging patients.

Hypertension:

- Stage 2 hypertension cases are getting good interdisciplinary care.

Overall:

- Files are well organized.
- Overall the clinic's performance was very good. They have done a good job managing both hypertensive and diabetic cases.
- Patients with multiple comorbidities are receiving care that addresses their complex needs.
- Case Note Observation (SSN 529067): patient with pan-abdominal USG May 2018 reported normal; USG repeated November 2018 reported liver hemangioma. Consider evaluation by Gastroenterologist.

Integral Health Center Clinical Audit:

Diabetes:

- There is improved interdisciplinary collaboration noted. For example, in SS#30806 with diabetes and marked dyslipidemia there was much improvement is their dyslipidemia: 6/11/18 Total Cholesterol 403 mg/dl and LDL of 270 mg/dL; on 21/2/19 Total Cholesterol 210 mg/dl and LDL of 101 mg/dL. The HbA1c remained stable at 7.4% during this time.
- The use of insulin and its use in difficult to manage patients is good.
- There is appropriate referral to internist evaluation in challenging patients.

Hypertension:

- Stage 2 hypertension cases are getting good interdisciplinary care.
- Patients with multiple comorbidities are receiving care that addresses their complex ne eds.

Overall:

- Files are well organized.
- Overall the clinic's performance was very good. They have done a good job managing both hypertensive and diabetic cases.
- There is improved interdisciplinary collaboration noted.
- SS# 370483: July 18, 2018 an abdominal CT shows a gastric mass. On follow-up notes there does not seem to be references of this for continued follow-up on the problem.

Matron Roberts Clinical Audit:

Diabetes:

- There is improved interdisciplinary collaboration noted.
- There is good overall management.

Hypertension:

- There is improved interdisciplinary collaboration noted.
- Stage 2 hypertension cases are getting good interdisciplinary care.
- Patients with multiple comorbidities are receiving care that addresses their complex needs.

Overall:

- Files are well organized. Documentation of encounters is good. The use of colored paper for section identification is good.
- Overall the clinic's performance was very good. They have done a good job managing both hypertensive and diabetic cases.

Belize Family Life Association Clinical Audit:

Diabetes:

- The use of insulin and its use in difficult to manage patients is good.
- There is appropriate referral to internist evaluation in challenging patients.

Hypertension:

- There is improved interdisciplinary collaboration noted.
- Stage 2 hypertension cases are getting good interdisciplinary care.
- Patients with multiple comorbidities are receiving care that addresses their complex needs.

Overall:

- Files are well organized.
- Overall the clinic's performance was very good.
- They have done a good job managing both hypertensive and diabetic cases.
- Patients with multiple comorbidities are receiving care that addresses their complex needs.

Mercy Clinical Audit

Diabetes:

- The use of insulin and its use in difficult to manage patients is good.
- There is appropriate referral to internist evaluation in challenging patients.

Hypertension:

- There is improved interdisciplinary collaboration noted.
- Stage 2 hypertension cases are getting good interdisciplinary care.
- Patients with multiple comorbidities are receiving care that addresses their complex needs.

Overall:

- Files are well organized.
- Overall the clinic's performance was very good.
- They have done a good job managing both hypertensive and diabetic cases.
- Patients with multiple comorbidities are receiving care that addresses their complex needs.

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