NHI Clinic Audit Report

April 15, 2020

Dr. Ajay Hotchandani

Executive Summary

National Health Insurance (NHI) conducts a yearly audit of all its clinic medical performance. This year a team of auditors audited clinics in Corozal, Belize, Stann Creek and Toledo. The audits were guided by auditing tools which aided the auditors in determining if the clinics were meeting the minimal standard of care.

The audit results demonstrated that almost all the clinics did a great job in meeting the minimum standard of care put forth by the NHI.

Based on this and previous audits some recommendations were made to help usher the NHI clinics to a new level of care and performance. Some of the recommendations focus on Continuing Medical Education and improvement of auxiliary services.

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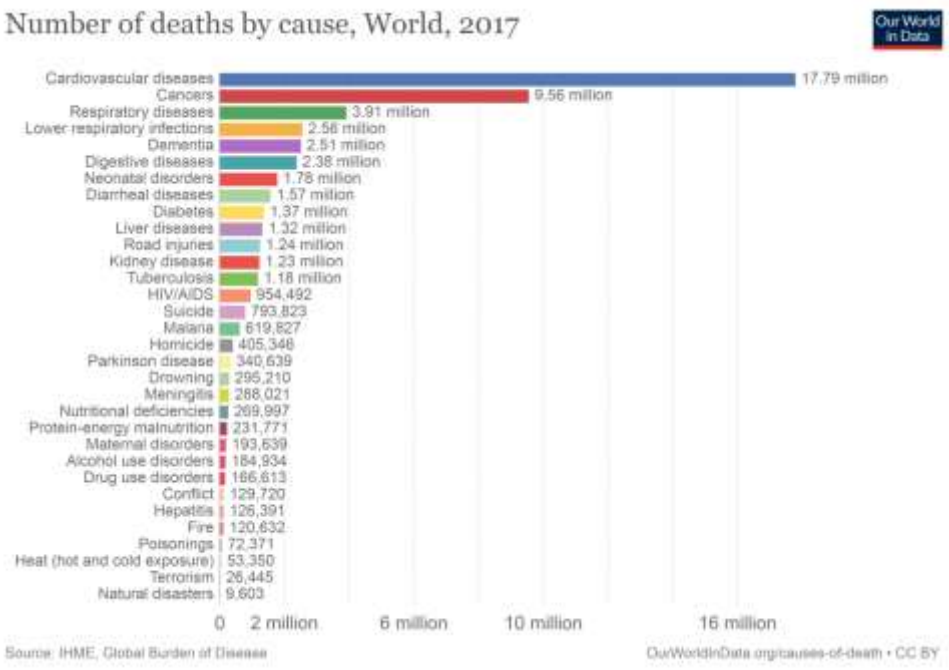
BELIZE CITY - NHI

Introduction

The National Health Insurance (NHI) 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)**. The audit tools were used to capture the key indicators in a more concise manner, facilitating the assessment of overall compliance to protocols as it relates to chronic non-communicable diseases (NCD). NHI clinicians were evaluated in relation to compliance with clinical protocols as it relates to NCD with the main focus being on hypertension (HTN) and diabetes mellitus (DM).



It is important that we focus on HTN and DM as worldwide, Ischemic Heart Disease (#1) and Diabetes (#9) are in the top 10 causes of death[1]. (Figure 1) According to PAHO the leading causes of death in Belize in recent years were chronic non-communicable diseases. Diabetes, cardiovascular disease, cancers, and chronic respiratory diseases are responsible for around 40% of deaths annually [2]. These statistics put Belize in line with global health trends.

Figure 1: Top causes of death worldwide in 2017. Ischemic Heart Disease remains still remains number 1 to this date.

A section of the overall goal of the care NHI provides is to ensure that patients with NCD are properly managed to reduce end organ damage and reduce mortality. This audit helps to determine if NHI clinicians are doing what is necessary to achieve this goal.

Purpose:

- The Medical Audit 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 was being collected and documented. This data would help us determine if 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, treatment, 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 specialist referral and 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 - Belize City

Diabetes Audit Score 2019					
	BFLA	BMA	BHP	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%

Belize Family Life Association (BFLA), Belize Medical Associates (BMA), Belize Healthcare Partners (BHP) Matron Roberts Polyclinic (MR) and Mercy Clinic (MC) had all scored a perfect 100%, indicating that all their files that were assessed met the 90% minimum standard. BHP saw an increase of 5% from last year's report while the remaining clinics maintained their 100% performance.

Overall, the clinics continue to perform very well in the clinical audit. The pattern has demonstrated a consistency in maintaining a high standard of care delivered by the clinics. This a testament to the hard work and dedication by the staff.

Demographics

Demographics	BFLA	BMA	BHP	MR	MC
Gender					
Male	5	8	4	4	3
	26%	42%	21%	21%	16%
Female	14	11	15	15	16
	74%	58%	79%	79%	84%

Based on the audited files the demographics show there were more female patients than male patients who were diabetics. There is no definitive reason for this, however it can be debated that either women are more likely to seek medical attention than men or there is an environmental/genetic factor that make the women more prone to diabetes.

Age Range	BFLA	BMA	BHP	MR	MC
31-45	1	1	2	1	0
	5%	5%	11%	5%	0%
46-55	6	6	2	3	0
	32%	32%	11%	16%	0%
>55	12	12	15	15	19
	63%	63%	79%	79%	100%

The majority of the patients were in the >55 years of age range. There were a small percentage of patients who were within the 31-45 years range, indicating the trend of diabetes (most likely type 2) in a younger population. A quick survey should be done to document cases of diabetes (type 2) in patients younger than 30. This would help identify possible trends that should be addressed as a public health issue.

Ethnicity

Ethnicity	BFLA	BMA	BHP	MR	MC
Creole	11	11	14	13	10
	58%	58%	74%	68%	53%
Mestizo	4	4	1	6	7
	21%	21%	5%	32%	37%
Garifuna	2	1	2	0	1
	11%	5%	11%	0%	5%

The majority of the diabetic patients visiting our clinics were of Creole decent (>50%). This is a stark contrast to the, on average, <10% of patients who were of Garifuna decent.

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%

Of the 95 diabetic files audited only 1 patient was a newly diagnosed diabetic. A note was made regarding the newly diagnosed patient:

"Case File SS#: -------983 Very good file that demonstrates the management of a newly diagnosed diabetic. It is of concern that the patient is 25 years old, BMI of 44 and on both metformin and glyburide."

Classification	BFLA	BMA	BHP	MR	MC
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%

All the files reviewed were of diabetics with type 2 diabetes. No type 1 diabetics were observed.

"Must Do" Process Criteria	BFLA	BMA	BHP	MR	MC
The Diagnosis of Diabetes is correct	2.00	2.00	2.00	2.00	2.00
The doctors did a good job of diagnosing patients with diabetes.					
HbA1c has been checked at least annually	2.00	2.00	2.00	2.00	2.00
Good use was made of HgbA1C. Patients got their tests done on time and it was used appropriately in management of the patients.					
At least annually there has been an assessment of symptoms including hypoglycaemic attack.	2.00	2.00	2.00	2.00	2.00
Appropriate adjustments were made to patients' treatment if it was determined there was a risk for hypoglycemia. Assessment was done both through the patient's history and lab results.					
At least annually the feet have been assessed	2.00	2.00	2.00	1.89	2.00
This was done and properly documented.					
At least annually the patient's urine has been checked for albumin to detect early evidence of nephropathy.	2.00	2.00	2.00	2.00	2.00
This was done and properly documented.					

At least annually the fundi have been examined for retinopathy through either examination with direct fundoscopy with dilated pupil, fundi photo or screened by opthalmologist.	2.00	2.00	2.00	2.00	2.00

This was done and properly documented. Patients were able to access ophthalmologist with minimally documented issues.

At least annually there has been assessment of the smoking habit	2.00	2.00	2.00	2.00	2.00

This was done and properly documented.

The blood pressure has been checked at every diabetes visit	2.00	2.00	2.00	2.00	2.00

This was done and properly documented.

At least annually the blood lipid has been checked	2.00	2.00	1.89	2.00	2.00

This was done and properly documented.

If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	2.00	2.00	1.75	1.83	2.00

This was done and properly documented. Sufficient internist evaluations were noted. This is reassuring that patients are being seen by the specialist when either the doctor felt it was appropriate or protocol dictated it.

"Should Do" Process Criteria	BFLA	BMA	BHP	MR	MC
Each newly diagnosed patient has received education about diabetes management	2.00	2.00	2.00	NA	2.00

There was only one newly diagnosed patient however the doctors did take the time to continuously educate patients on their condition and the dos and don'ts. Continuous patient education is a key component of patient care.

At least annually the patient' s diet has been reviewed by a nutritionist with emphasis on glyceimic index	2.00	2.00	2.00	2.00	2.00

Belize City clinics showed a significant improvement in the use of nutritionist referrals. These were properly documented and easily accessible.

At least annually assessment of Body Mass Index has been checked	2.00	2.00	1.89	2.00	2.00

BMI are checked routinely and properly documented. It might worthwhile to explore the option of tracking BMI for clinics and districts to capture the trend. The trend analysis would help determine if certain interventions may be needed.

At least annually renal function has been assessed (confirmed by BUN and CREAT)	2.00	2.00	2.00	2.00	2.00

Being an important marker for the detection of CKD the clinics have done a great job of monitoring these tests. It was observed throughout the audit that when there was a change in these figures the proper measures were taken to address the changes.

At least annually patient has been educated on the status and importance of adherence	2.00	2.00	2.00	2.00	2.00

This was observed to be done on almost all visits.

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)	2.00	2.00	1.99	2.00	2.00

Over the years the doctors have started to grasp the concept of using the Initial/Annual Forms to summarize the overall progress of the patient and their health. On very rare instances was it observed that the Initial/Annual Form was being used for "Patient came in for refill" without any further summary review.

Outcome Criteria	**BFLA**	**BMA**	**BHP**	**MR**	**MC**
Patient's Hb A1c target established is appropriate if the 7% is not attainable at the time of assessment	2.00	2.00	2.00	2.00	2.00
Patient's Hb A1c target achieved	2.00	2.00	2.00	2.00	2.00

The clinics did a great job of monitoring HgbA1c levels (also known as *glycosylated hemoglobin,* is a subset of the hemoglobin molecule and a calculation reflects your eight- to twelve-week average blood glucose. Where levels were elevated the appropriate actions were engaged in to help remedy it. For patients whom the 7% level was not feasible the doctors did a good job of indicating an adjusted level and the rationale for the adjustment.

Patient's systolic blood pressure is less than 140 mmHg and diastolic blood pressure less than 90 mmHg. (Patients over 18 yrs)	2.00	2.00	2.00	2.00	NA
Patients over the age 60 150/90	2.00	2.00	1.98	2.00	2.00

The clinics did a great job of monitoring BP and adjusting treatment accordingly to try and achieve this goal. Patients who were compliant the results were well within range and easily maintained. Noncompliant patients posed a problem on this front.

Patient's LDL cholesterol level is less than 135 mg/dl	2.00	2.00	2.00	2.00	2.00

Lipid profiles were done and appropriate action was taken for those whose results warranted pharmaceutical intervention.

Hypertension Results – Belize City

Hypertension Audit Score 2019					
	BFLA	**BMA**	**BHP**	**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%

Overall the clinics did really well in management of hypertensive patients. The trend for the past several years reinforces the observation that the clinics are doing well in management of hypertensive patients.

Demographics	**BFLA**	**BMA**	**BHP**	**MR**	**MC**
Gender					
Male	5	5	4	9	7
	26%	26%	21%	47%	37%
Female	14	14	15	10	12
	74%	73%	79%	53%	63%

Based on the data it appears that the majority of the patients whom were treated for hypertension were female. There is no data to support any theories as to why this is the case.

Age Range	BFLA	BMA	BHP	MR	MC
20-30	1	1	1	0	0
	5%	5%	5%	0%	0%
31-45	6	2	3	2	0
	32%	11%	16%	11%	0%
46-55	6	2	2	3	0
	32%	11%	11%	16%	0%
>55	6	14	13	14	19
	32%	74%	68%	74%	100%

BFLA had a unique distribution of patients in age range with approximately 33% in the three groups between 31->55 years in age. **A worrisome observation is the presence of hypertensive patients in the age range of 20-30 years old.** Last year's audit did not have a 20-30 years category.

Ethnicity	BFLA	BMA	BHP	MR	MC
Creole	16	14	15	16	13
	84%	74%	79%	84%	68%
Mestizo	3	4	2	3	5
	16%	21%	11%	16%	26%
Garifuna	0	0	1	0	0
	0%	0%	5%	0%	0%

Based on the data is appears that the majority of patients being serviced in these areas that are hypertensive are those of Creole decent.

Hypertension	BFLA	BMA	BHP	MR	MC
Case					
Newly Diagnosed	0	1	0	0	0
	0%	5%	0%	0%	0%
Established Cases	19	18	18	19	19
	100%	95%	95%	100%	100%

The majority of NCD cases tend to be established. There is no exception here as the majority of the patients were established hypertensive. Given the trend of younger patients becoming hypertensive we may observe an increase in Newly Diagnosed patients in future audits.

Classification	BFLA	BMA	BHP	MR	MC
Pre-Hypertension	3	0	1	0	0
	16%	0%	5%	0%	0%
Hypertension Stage 1	18	16	15	16	15
	95%	84%	79%	84%	79%
Hypertension Stage 2	1	3	3	3	4
	5%	16%	16%	16%	21%

The majority of the patients were classified as Hypertension Stage 1. Several patients were diagnosed with Hypertension Stage 2, however most were controlled with medication. There were few patients who were Stage 2 but this was due mainly due to noncompliance with medication and lifestyle modification.

Hypertension Controlled	BFLA	BMA	BHP	MR	MC
Yes	18	18	17	18	17
	95%	95%	90%	95%	90%
No	1	1	2	1	2
	5%	5%	11%	5%	11%

The majority of the hypertensive patients were controlled with medication and lifestyle modification. There were few patients whose BP was unable to be controlled. This is mainly due to noncompliance, which was documented. Patients who were serious about their care saw a significant improvement in their BP.

Must Do Criteria					
Diagnosing hypertension/Follow up	**BFLA**	**BMA**	**BHP**	**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.	2.00	2.00	2.00	2.00	2.00
Clinics have become efficient in measuring and recording BP readings.					
If the person presented with severe hypertension, anti-hypertensive drug treatment therapy was administered immediately, without waiting for the results of ABPM or HBPM.	2.00	2.00	2.00	1.90	NA
Clinics demonstrated a good grasp on treating hypertensive emergencies. The majority of the cases were resolved in the clinical settings. It appears that most of the cases of elevated BP were due to noncompliance.					
Hypertension Classification was appropriate based on subsequent BPM readings. (at least three consecutive readings on different consultation days)	2.00	2.00	2.00	2.00	1.99

Clinics demonstrated a good knowledge of hypertension (re)-classification and adjusted treatment accordingly.

Assessing cardiovascular risk and target organ damage	BFLA	BMA	BHP	MR	MC
The records show that at diagnosis the following symptoms and signs of target organ damage have been sought:					
HEART:	1.89	2.00	2.00	2.00	2.00
LVH/Myocardial Infarction: EKG					
Chronic Heart Failure: EKG; Chest Xray					
Angina: Reported history					
BRAIN:	2.00	2.00	2.00	2.00	2.00
Strokes: Reported history					
Transient Ischemic Attack: Reported History					
Kidney:	2.00	2.00	2.00	2.00	2.00
Proteinuria/Microalbuminuria: Lab test results					
BUN/Creatinine					

Vascular Disease:	2.00	2.00	2.00	2.00	2.00
Peripheral Arterial disease: Patient History					
Assymetrical Pulses: BPM in both arms and EKG					
Eyes:	2.00	2.00	2.00	2.00	2.00
Retinopathy: eye fundi exam					
If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	2.00	2.00	2.00	2.00	2.00

Over the years the monitoring for end organ damage has become second nature for the clinics. This was observed in the very well documented Chronic Form, which made the trend analysis far easier.

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.	2.00	2.00	2.00	2.00	2.00
It was noted on all patients' file that lifestyle modification was spoken about, mainly diet and exercise.					
Appropriate guidance on diet and exercise as part of the action plan was offered.	2.00	2.00	2.00	2.00	2.00
Nutritionist assessment was documented in many cases.					
At least annually, alcohol consumption was assessed and advice on reduced intake offered.	2.00	2.00	2.00	2.00	NA
Assessment done on annual form.					
Advice on dietary sodium intake offered, (either by reducing or substituting sodium salt and educating patients on hidden sources of sodium)	2.00	2.00	2.00	2.00	2.00
Done as part of DASH.					
Discuss alternative medicines used by patients for reducing blood pressure.	2.00	2.00	2.00	2.00	2.00
For those who brought up this topic it was discussed with their doctors.					
At least annually smoking practice was assessed and cessation advice offered.	2.00	2.00	2.00	2.00	NA

For those who smoked it was discussed. There appears to be a downward trend in the number of smokers. A sizeable portion of the smokers noted they smoke mainly marijuana.

Initiating and monitoring anti-hypertensive drug treatment, including blood pressure targets	BFLA	BMA	BHP	MR	MC

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	2.00	2.00	2.00	2.00	2.00
Anti-hypertensive drug treatment to people of any age with stage 2 hypertension.	2.00	2.00	2.00	2.00	NA
The doctors have a good grasp of treatment for hypertension stages 1 and 2.					
Choosing antihypertensive drug treatment					
Treatment regimen appropriate and in accordance to reported co-morbidities	2.00	2.00	2.00	2.00	2.00
The main co-morbidity which was taken into consideration as it relates to treatment regimen was diabetes.					
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.	2.00	2.00	2.00	2.00	2.00
Patient education was observed to be an ongoing process. This appears to be done by both nurses and doctors.					
Patients monitored for the presence of unwanted side effects and action taken was appropriate	2.00	2.00	2.00	2.00	2.00
Done and documented.					
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)	2.00	2.00	2.00	2.00	2.00
Done very well on Initial/Annual Form.					
Review and document potential causes of non-adherence and respond accordingly.	2.00	2.00	2.00	2.00	1.89

Non-adherence mainly due to non-compliance with medication appears to be an issue that needs to be addressed at the NHI level. A policy has to be put in place to prevent wasteful distribution of medication to those who are deemed no-compliant.

Outcome Indicators	**BFLA**	**BMA**	**BHP**	**MR**	**MC**
Patients with hypertension have achieved the following	2.00	2.00	2.00	2.00	2.00

target:					
<60 yrs less than 140/90					
> 60 less than 150/90					

Overall all the Belize City NHI clinics did a great job managing their hypertensive patients.

Notes & Observations

Matron Robert

- 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.
- Case Number SS#:-----94: Very good file. Demonstrates a good flow of management – doctors were monitoring results and making appropriate change as issues arose.
- Patients with multiple co-morbidities are receiving care that addresses their complex needs.
- Case Number SS#: -----03: Well managed. Patient identified as Pre-hypertensive and based on follow up results the patient was later deemed to be hypertensive stage 1 and was treated accordingly.

Belize Medical Associates

- Files are well organized.
- Patients with multiple co-morbidities are receiving care that addresses their complex needs.
- 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.
- Case File SS#: -----83 Very good file that demonstrates the management of a newly diagnosed diabetic. It is of concern that the patient is 25 years old, BMI of 44 and on both metformin and glyburide.

Belize Healthcare Partners

- 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. For example, in Case File #-----06 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.

Belize Family Life Association

- 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 co-morbidities are receiving care that addresses their complex needs.
- The use of insulin and its use in difficult to manage patients is good.

Mercy Clinic

- 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 co-morbidities are receiving care that addresses their complex needs.
- They are doing a great job documenting the progression of the patient's overall well being.
- The geriatric population can be a bit difficult to work with as it relates to changing their medication and compliance (I.e. SS# -----62 / -----07). Members of the clinic have done a great job working with patients to accommodate their requests.

REFERENCE

1. https://ourworldindata.org/causes-of-death
2. https://www.paho.org/salud-en-las-americas-2017/?page_id=91

Introduction

The National Health Insurance (NHI) Scheme conducted medical audits at these Primary Care Provider (PCP): **Dangriga, Independence, Punta Gorda and San Antonio.** The audit tools were used to capture the key indicators in a more concise manner, facilitating the assessment of overall compliance to protocols as it relates to chronic non-communicable diseases (NCD). NHI clinicians were evaluated in relation to compliance with clinical protocols as it relates to NCD with the main focus being on hypertension (HTN) and diabetes mellitus (DM).

It is important that we focus on HTN and DM as worldwide, Ischemic Heart Disease (#1) and Diabetes (#9) are in the top 10 causes of death[1]. (Figure 1) According to PAHO the leading causes of death in Belize in recent years were chronic non-communicable diseases. Diabetes, cardiovascular disease, cancers, and chronic respiratory diseases are responsible for around 40% of deaths annually [2]. These statistics put Belize in line with global health trends.

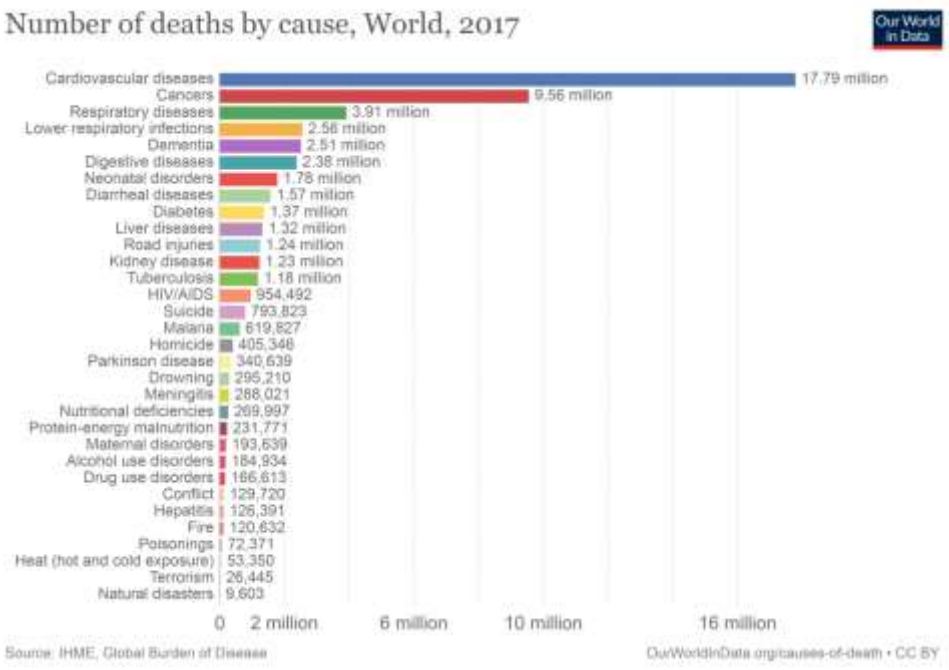


Figure 1: Top causes of death worldwide in 2017. Ischemic Heart Disease remains still remains number 1 to this date.

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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.

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The Medical Audit team comprised of a team of doctors:

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Data Analysis Plan for the Clinical Audit[1]:

Diabetes and Hypertension:

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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:

3. 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, treatment, and potential target organ damage monitoring. It offers a more holistic approach to the case management of the patient.
4. The **"should do"** criteria seek further input on the supportive management of the client to include specialist referral and 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 SR

2019	DAN	IND	PG	SA
Scores (target 90%)	100%	100%	100%	100%

The NHI clinics in the southern region continue to perform really well. They have all scored exceptional in the audits. This continues to highlight the great job the clinics have been doing. This has been the result of a significant investment in time and effort to get the clinics to where they are today.

	DAN	Hopkins	Pomona	Score
# of records assessed	19	5	5	29
# of records that met the target (90%)	19	5	5	29
Total score	100%	100%	100%	100%

Dangriga and its two satellite clinics Hopkins and Pomona scored 100% on their diabetic files. They did well in managing diabetic patients.

	IND	Bella Vista	Placencia	San Juan	Score
# of records assessed	19	5	5	5	34
# of records that met the target (90%)	19	5	5	5	34

Total score	100%	100%	100%	100%	100%

Independence and its three satellite clinics Bella Vista, Placencia and San Juan scored 100% on their diabetic files. They did well in managing diabetic patients.

	PG	Big Falls	Santa Ana	Score
# of records assessed	19	5	5	29
# of records that met the target (90%)	19	5	5	29
Total score	100%	100%	100%	100%

Punta Gorda and its two satellite clinics Big Falls and Santa Ana scored 100% on their diabetic files. They did well in managing diabetic patients.

	SA	Pueblo Viejo	Santa Teresa	SPColumbia	Score
# of records assessed	19	5	5	5	34
# of records that met the target (90%)	19	5	5	5	34
Total score	100%	100%	100%	100%	100%

San Antonio and its three satellite clinics Pueblo Viejo, Santa Teresa and San Pedro/Colombia scored 100% on their diabetic files. They did well in managing diabetic patients.

Demographics

Demographics	DAN	IND	PG	SA
Gender				
Male	12	7	1	4
	41%	21%	3%	12%
Female	17	27	28	30
	59%	79%	97%	88%

There is a variation in the distribution of diabetic patients in the SR. Dangriga has an almost 50-50 split where as PG is on the other end with 97% being female. There are no data to support any theories as to why this is.

Age Range	DAN	IND	PG	SA
31-45	1	11	8	10
	3%	32%	28%	29%
46-55	4	8	4	15

	14%	24%	14%	44%
>55	24	15	17	8
	83%	44%	59%	24%
With the exception of SA, the remainder of the three clinics had their largest diabetic population >55 years old. What is troubling to note is the percentage of patients whom are in the 31-45 years age range.				
Ethnicity	DAN	IND	PG	SA
Maya	1	6	14	27
	3%	18%	48%	79%
Mestizo	10	14	4	0
	35%	41%	14%	0%
Garifuna	9	4	6	0
	31%	12%	21%	0%
Creole	7	5	0	0
	24%	15%	0%	0%

The highest percentage of ethnic group reflects the region of the clinic. It should be noted that there were other ethnicities that were not listed as one of the major four above. This would explain why not all the percentages for the clinic add up to 100%.

Diabetes	DAN	IND	PG	SA
Cases of Diabetes				
Newly Diagnose	0	1	0	0
	0%	3%	0%	0%
Established Case	29	33	29	34
	100%	97%	100%	100%
Classification	DAN	IND	PG	SA
Diabetes Type 1	0	4	0	3
	0%	12%	0%	9%
Diabetes Type 2	29	30	29	31
	100%	88%	100%	91%

The majority were established type 2 diabetic cases. This has been the prevailing trend.

"Must Do" Process Criteria	DAN	Hopkins	Pomona
The Diagnosis of Diabetes is correct	2.00	2.00	1.96
HbA1c has been checked at least annually	2.00	2.00	2.00

At least annually there has been an assessment of symptoms including hypoglycaemic attack.	2.00	2.00	2.00
At least annually the feet have been assessed	2.00	2.00	2.00
At least annually the patient's urine has been checked for albumin to detect early evidence of nephropathy.	2.00	2.00	2.00
At least annually the fundi have been examined for retinopathy through either examination with direct fundoscopy with dilated pupil, fundi photo or screened by opthalmologist.	2.00	2.00	2.00
at least annually there has been assessment of the smoking habit	2.00	2.00	2.00
The blood pressure has been checked at every diabetes visit	2.00	2.00	2.00
At least annually the blood lipid has been checked	2.00	2.00	2.00
If any abnormal finding related to potentential target organ damage was noted, the appropriate action was taken.	1.88	2.00	2.00

As it relates to the "Must Do" these are items that the clinics are required to do in order to ensure that patients are obtaining the services required to improve their overall outcome. Dangriga and its satellites have had and continue to do a great job in providing this care.

"Should Do" Process Criteria	DAN	Hopkins	Pomona
Each newly diagnosed patient has received education about diabetes management	2.00	2.00	2.00
At least annuallly the patient' s diet has been reviewed by a nutritionist with emphasis on glyceimic index	2.00	2.00	2.00
At least annually assessment of Body Mass Index has been checked	2.00	2.00	2.00
At least annually renal function has been assessed (confirmed by BUN and CREAT)	2.00	2.00	2.00
At least annually patient has been educated on the status and importance of adherence	2.00	2.00	2.00

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)	1.98	2.00	2.00

The "Should Do" criteria are items the clinics should engage in as it relates to the overall treatment plan for their patients. This is to help ensure a holistic approach that involves education and planning. Dangriga and its satellites have had and continue to do a great job in providing this care.

Outcome Criteria	DAN	Hopkins	Pomona
Patient's Hb A1c target established is appropriate if the 7% is not attainable at the time of assessment	2.00	2.00	2.00
Patient's Hb A1c target achieved	2.00	2.00	2.00
Patient's systolic blood pressure is less than 140 mmHg and diastolic blood pressure less than 90 mmHg. (Patients over 18 yrs)	1.98	2.00	2.00
Patients over the age 60 150/90	2.00	2.00	2.00
Patient's LDL chlolesterol level is less than 135 mg/dl	1.89	2.00	2.00

The "Outcome Criteria" are end results the clinics hope to achieve as it relates to a patient's treatment. By achieving these goals the clinic can safely assume the patient is on the right track to addressing morbidity and mortality. Dangriga and its satellites have had and continue to do a great job in providing this care.

"Must Do" Process Criteria	IND	Bella Vista	Placencia	San Juan
The Diagnosis of Diabetes is correct	2.00	1.96	2.00	2.00
HbA1c has been checked at least annually	2.00	1.96	2.00	2.00
At least annually there has been an assessment of symptoms including hypoglycaemic attack.	2.00	2.00	2.00	2.00
At least annually the feet have been assessed	2.00	2.00	2.00	2.00
At least annually the patient's urine has been checked for albumin to detect early evidence of nephropathy.	2.00	2.00	2.00	2.00

At least annually the fundi have been examined for retinopathy through either examination with direct fundoscopy with dilated pupil, fundi photo or screened by opthalmologist.	2.00	2.00	2.00	2.00
at least annually there has been assessment of the smoking habit	2.00	2.00	2.00	2.00
The blood pressure has been checked at every diabetes visit	2.00	2.00	2.00	2.00
At least annually the blood lipid has been checked	1.89	2.00	2.00	2.00
If any abnormal finding related to potentential target organ damage was noted, the appropriate action was taken.	1.99	2.00	2.00	2.00

As it relates to the "Must Do" these are items that the clinics are required to do in order to ensure that patients are obtaining the services required to improve their overall outcome. Independence and its satellites have had and continue to do a great job in providing this care.

"Should Do" Process Criteria	IND	Bella Vista	Placencia	San Juan
Each newly diagnosed patient has received education about diabetes management	2.00	2.00	2.00	2.00
At least annuallly the patient' s diet has been reviewed by a nutritionist with emphasis on glyceimic index	2.00	2.00	2.00	2.00
At least annually assessment of Body Mass Index has been checked	2.00	2.00	2.00	2.00
At least annually renal function has been assessed (confirmed by BUN and CREAT)	2.00	2.00	2.00	2.00
At least annually patient has been educated on the status and importance of adherence	2.00	2.00	2.00	2.00
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)	2.00	1.96	2.00	1.96

The "Should Do" criteria are items the clinics should engage in as it relates to the overall treatment plan for their patients. This is to help ensure a holistic approach that involves education and planning. Independence and its satellites have had and continue to do a great job in providing this care.

Outcome Criteria	IND	Bella Vista	Placencia	San Juan
Patient's Hb A1c target established is appropriate if the 7% is not attainable at the time of assessment	2.00	2.00	2.00	2.00
Patient's Hb A1c target achieved	2.00	1.92	2.00	2.00
Patient's systolic blood pressure is less than 140 mmHg and diastolic blood pressure less than 90 mmHg. (Patients over 18 yrs)	1.98	2.00	2.00	2.00
Patients over the age 60 150/90	2.00	2.00	2.00	2.00
Patient's LDL chlolesterol level is less than 135 mg/dl	2.00	2.00	2.00	2.00

The "Outcome Criteria" are end results the clinics hope to achieve as it relates to a patient's treatment. By achieving these goals the clinic can safely assume the patient is on the right track to addressing morbidity and mortality. Independence and its satellites have had and continue to do a great job in providing this care.

"Must Do" Process Criteria	PG	Big Falls	Santa Ana
The Diagnosis of Diabetes is correct	2.00	2.00	2.00
HbA1c has been checked at least annually	2.00	2.00	1.96
At least annually there has been an assessment of symptoms including hypoglycaemic attack.	2.00	2.00	2.00
At least annually the feet have been assessed	2.00	2.00	2.00
At least annually the patient's urine has been checked for albumin to detect early evidence of nephropathy.	2.00	2.00	2.00
At least annually the fundi have been examined for retinopathy through either examination with direct fundoscopy with dilated pupil, fundi photo or screened by opthalmologist.	2.00	2.00	2.00
at least annually there has been assessment of the smoking habit	2.00	2.00	2.00

The blood pressure has been checked at every diabetes visit	2.00	2.00	2.00
At least annually the blood lipid has been checked	2.00	2.00	2.00
If any abnormal finding related to potentential target organ damage was noted, the appropriate action was taken.	2.00	2.00	2.00

As it relates to the "Must Do" these are items that the clinics are required to do in order to ensure that patients are obtaining the services required to improve their overall outcome. Punta Gorda and its satellites have had and continue to do a great job in providing this care.

"Should Do" Process Criteria	PG	Big Falls	Santa Ana
Each newly diagnosed patient has received education about diabetes management	2.00	2.00	2.00
At least annuallly the patient' s diet has been reviewed by a nutritionist with emphasis on glyceimic index	2.00	2.00	2.00
At least annually assessment of Body Mass Index has been checked	2.00	2.00	2.00
At least annually renal function has been assessed (confirmed by BUN and CREAT)	2.00	2.00	2.00
At least annually patient has been educated on the status and importance of adherence	2.00	2.00	2.00
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)	1.99	2.00	2.00

The "Should Do" criteria are items the clinics should engage in as it relates to the overall treatment plan for their patients. This is to help ensure a holistic approach that involves education and planning. Punta Gorda and its satellites have had and continue to do a great job in providing this care.

Outcome Criteria	PG	Big Falls	Santa Ana
Patient's Hb A1c target established is appropriate if the 7% is not attainable at the time of assessment	2.00	2.00	2.00
Patient's Hb A1c target achieved	2.00	2.00	2.00

Patient's systolic blood pressure is less than 140 mmHg and diastolic blood pressure less than 90 mmHg. (Patients over 18 yrs)	2.00	NA	2.00
Patients over the age 60 150/90	2.00	NA	NA
Patient's LDL chlolesterol level is less than 135 mg/dl	2.00	2.00	2.00

The "Outcome Criteria" are end results the clinics hope to achieve as it relates to a patient's treatment. By achieving these goals the clinic can safely assume the patient is on the right track to addressing morbidity and mortality. Punta Gorda and its satellites have had and continue to do a great job in providing this care.

"Must Do" Process Criteria	SA	Pueblo Viejo	Santa Teresa	SPColumbia
The Diagnosis of Diabetes is correct	2.00	2.00	2.00	2.00
HbA1c has been checked at least annually	1.99	2.00	2.00	2.00
At least annually there has been an assessment of symptoms including hypoglycaemic attack.	2.00	2.00	2.00	2.00
At least annually the feet have been assessed	2.00	2.00	2.00	2.00
At least annually the patient's urine has been checked for albumin to detect early evidence of nephropathy.	2.00	2.00	2.00	2.00
At least annually the fundi have been examined for retinopathy through either examination with direct fundoscopy with dilated pupil, fundi photo or screened by opthalmologist.	2.00	2.00	2.00	2.00
at least annually there has been assessment of the smoking habit	2.00	2.00	2.00	2.00
The blood pressure has been checked at every diabetes visit	2.00	2.00	2.00	2.00
At least annually the blood lipid has been checked	2.00	2.00	2.00	2.00
If any abnormal finding related to potentential target organ damage was noted, the appropriate action was taken.	2.00	2.00	2.00	2.00

As it relates to the "Must Do" these are items that the clinics are required to do in order to ensure that patients are obtaining the services required to improve their overall outcome. San Antonio and its satellites have had and continue to do a great job in providing this care.

"Should Do" Process Criteria	SA	Pueblo Viejo	Santa Teresa	SPColumbia

Each newly diagnosed patient has received education about diabetes management	2.00	2.00	2.00	2.00
At least annuallly the patient' s diet has been reviewed by a nutritionist with emphasis on glyceimic index	2.00	2.00	2.00	2.00
At least annually assessment of Body Mass Index has been checked	2.00	2.00	2.00	2.00
At least annually renal function has been assessed (confirmed by BUN and CREAT)	2.00	2.00	2.00	2.00
At least annually patient has been educated on the status and importance of adherence	1.89	2.00	2.00	2.00
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)	1.97	2.00	2.00	2.00

The "Should Do" criteria are items the clinics should engage in as it relates to the overall treatment plan for their patients. This is to help ensure a holistic approach that involves education and planning. San Antonio and its satellites have had and continue to do a great job in providing this care.

Outcome Criteria	SA	Pueblo Viejo	Santa Teresa	SPColumbia
Patient's Hb A1c target established is appropriate if the 7% is not attainable at the time of assessment	2.00	2.00	2.00	2.00
Patient's Hb A1c target achieved	1.78	2.00	1.96	2.00
Patient's systolic blood pressure is less than 140 mmHg and diastolic blood pressure less than 90 mmHg. (Patients over 18 yrs)	2.00	2.00	2.00	2.00
Patients over the age 60 150/90	2.00	2.00	NA	NA
Patient's LDL chlolesterol level is less than 135 mg/dl	2.00	2.00	2.00	2.00

The "Outcome Criteria" are end results the clinics hope to achieve as it relates to a patient's treatment. By achieving these goals the clinic can safely assume the patient is on the right track to addressing morbidity and mortality. San Antonio and its satellites have had and continue to do a great job in providing this care.

All Southern Region NHI Clinics and Satellite Clinics

It should be noted that overall the clinics did a great job providing care and service to their patients. Over the years the trend has shown an improvement in management not only of the patient's condition but also the holistic approach.

- Overall patients are being managed well.
- The team is using good evidence-based principles for management.
- Co-morbidities are being well screened for.
- There is a good standard of care that has been established.
- The use of insulin and its use in complex patients continues to be well done.
- There is an appropriate referral to internist evaluation in challenging patients.

Hypertension Results – SR

2019	DAN	IND	PG	SA
Scores (target 90%)	100%	100%	100%	100%

Overall the clinics in the Southern Region did a great job in management of their hypertensive patients. All of the clinics scored 100%.

	DAN	Hopkins	Pomona	Score
# of records assessed	19	5	5	29
# of records that met the target (90%)	19	5	5	29
Total score	100%	100%	100%	100%

Dangriga and its satellites performed well on management of their hypertensive patients.

	IND	Bella Vista	Placencia	San Juan	Score
# of records assessed	19	5	5	5	34
# of records that met the target (90%)	19	5	5	5	34
Total score	100%	100%	100%	100%	100%

Independence and its satellites performed well on management of their hypertensive patients.

	PG	Big Falls	Santa Ana	Score
# of records assessed	19	5	5	29
# of records that met the target (90%)	19	5	5	29
Total score	100%	100%	100%	100%

Punta Gorda and its satellites performed well on management of their hypertensive patients.

	SA	Pueblo Viejo	Santa Teresa	SPColumbia	Score
# of records assessed	19	5	5	5	34
# of records that met the target (90%)	19	5	5	5	34
Total score	100%	100%	100%	100%	100%

San Antonio and its satellites performed well on management of their hypertensive patients.

Demographics

Demographics	DAN	IND	PG	SA
Gender				
Male	7	9	5	3
	24%	27%	17%	9%
Female	22	25	24	31
	76%	74%	83%	91%

For all the clinics approximately >75% of the hypertensive patients were women, with San Antonio having the most.

Age Range	DAN	IND	PG	SA
31-45	1	5	3	0
	10%	15%	10%	0%
46-55	2	11	8	10
	7%	32%	28%	29%
>55	23	18	18	24
	79%	53%	62%	71%

For all the clinics at least 50% or more of the patients were 55 years or older. Independence had 15% of their patents under the age of 45 (compared to 0% in San Antonio), a worrying trend that should be further examined.

Ethnicity	DAN	IND	PG	SA
Creole	5	15	3	1
	17%	44%	10%	3%
Mestizo	4	11	4	1
	14%	32%	14%	3%
Garifuna	18	5	5	0
	62%	15%	17%	0%
Maya	1	1	7	26
	3%	3%	24%	77%

In Dangriga the greatest population were the Garifuna, where as in Independence it was Creole and down south in PG and San Antonio it was the Mayan people.

Hypertension	DAN	IND	PG	SA
Case				
Newly Diagnosed	2	1	1	0
	7%	3%	3%	0%
Established Cases	26	33	28	34
	90%	97%	97%	100%
Classification				
Hypertension Stage 1	22	22	20	29
	76%	65%	69%	85%
Hypertension Stage 2	7	11	9	3
	24%	32%	31%	9%
Hypertension Controlled				
Yes	22	28	24	34
	76%	82%	83%	100%
No	7	5	5	0
	24%	15%	17%	0%

For all the clinics the majority were established stage 1 hypertensive patients where were controlled. Dangriga had the highest population of uncontrolled hypertensive and it appears that may be mainly due to patient noncompliance.

Must Do Criteria			
Diagnosing hypertension/Follow up	**DAN**	**Hopkins**	**Pomona**
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.	2.00	2.00	2.00
If the person presented with severe hypertension, anti-hypertensive drug treatment therapy was administered immediately, without waiting for the results of ABPM or HBPM.	2.00	2.00	NA
Hypertension Classification was appropriate based on subsequent BPM readings. (at least three consecutive readings on different consultation days)	2.00	2.00	2.00

Dangriga and its satellite clinics did well in the management of their hypertensive patients.

Assessing cardiovascular risk and target organ damage	DAN	Hopkins	Pomona

The records show that at diagnosis the following symptoms and signs of target organ damage have been sought:			
HEART:	1.98	2.00	2.00
LVH/Myocardial Infarction: EKG			
Chronic Heart Failure: EKG; Chest Xray			
Angina: Reported history			
BRAIN:	2.00	2.00	2.00
Strokes: Reported history			
Transient Ischemic Attack: Reported History			
Kidney:	2.00	2.00	2.00
Proteinuria/Microalbuminuria: Lab test results			
BUN/Creatinine			
Vascular Disease:	2.00	2.00	2.00
Peripheral Arterial disease: Patient History			
Assymetrical Pulses: BPM in both arms and EKG			
Eyes:	2.00	NA	NA
Retinopathy: eye fundi exam			
If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	2.00	2.00	2.00

Dangriga and its satellite clinics did well in assessing cardiovascular risk and target end organ damage. When presented they took the necessary measures to help provide the patient with the best care.

Should Do Criteria			
Lifestyle interventions	**DAN**	**Hopkins**	**Pomona**
Lifestyle advice was offered initially and then periodically to people undergoing assessment or treatment for hypertension.	2.00	2.00	2.00
Appropriate guidance on diet and exercise as part of the action plan was offered.	2.00	2.00	2.00
At least annually, alcohol consumption was assessed and advice on reduced intake offered.	2.00	2.00	2.00
Advice on dietary sodium intake offered, (either by reducing or substituting sodium salt and educating patients on hidden sources of sodium)	2.00	2.00	2.00
Discuss alternative medicines used by patients for reducing blood pressure.	2.00	2.00	2.00
At least annually smoking practice was assessed and cessation advice offered.	2.00	2.00	2.00

Initiating and monitoring anti-hypertensive drug treatment, including blood pressure targets	DAN	Hopkins	Pomona
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	1.99	2.00	2.00
Anti-hypertensive drug treatment to people of any age with stage 2 hypertension.	2.00	2.00	NA
Choosing antihypertensive drug treatment			
Treatment regimen appropriate and in accordance to reported co-morbidities	2.00	2.00	2.00
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.	2.00	2.00	2.00
Patients monitored for the presence of unwanted side effects and action taken was appropriate	2.00	2.00	2.00
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)	2.00	2.00	2.00
Review and document potential causes of non-adherence and respond accordingly.	2.00	2.00	2.00

As it relates to the overall treatment of hypertensive patients both pharmacological and life style modification, Dangriga and its satellite clinics did a great job.

Outcome Indicators	**DAN**	**Hopkins**	**Pomona**
Patients with hypertension have achieved the following target:	1.95	1.96	2.00
<60 yrs less than 140/90			
> 60 less than 150/90			

The patients being seen at Dangriga and its satellite clinics met their target blood pressure goal. This has been achieved by a combination of continuous patient education and the effort put in by the staff to provide patients with the best possible care under the circumstances.

Must Do Criteria				
Diagnosing hypertension/Follow up	**IND**	**Bella Vista**	**Placencia**	**San Juan**
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.	2.00	1.96	2.00	2.00
If the person presented with severe hypertension, anti-hypertensive drug treatment therapy was administered immediately, without waiting for the results of ABPM or HBPM.	2.00	2.00	2.00	2.00
Hypertension Classification was appropriate based on subsequent BPM readings. (at least three consecutive readings on different consultation days)	2.00	2.00	2.00	2.00

Independence and its satellite clinics did well in the management of their hypertensive patients.

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:	1.99	2.00	2.00	2.00
LVH/Myocardial Infarction: EKG				
Chronic Heart Failure: EKG; Chest Xray				
Angina: Reported history				
BRAIN:	2.00	2.00	2.00	2.00
Strokes: Reported history				
Transient Ischemic Attack: Reported History				
Kidney:	2.00	2.00	2.00	2.00
Proteinuria/Microalbuminuria: Lab test results				
BUN/Creatinine				
Vascular Disease:	1.89	2.00	2.00	2.00

Peripheral Arterial disease: Patient History				
Assymetrical Pulses: BPM in both arms and EKG				
Eyes:	NA	NA	2.00	2.00
Retinopathy: eye fundi exam				
If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	2.00	2.00	2.00	2.00

Independence and its satellite clinics did well in assessing cardiovascular risk and target end organ damage. When presented they took the necessary measures to help provide the patient with the best care.

Should Do Criteria				
Lifestyle interventions				
Lifestyle advice was offered initially and then periodically to people undergoing assessment or treatment for hypertension.	2.00	2.00	2.00	2.00
Appropriate guidance on diet and exercise as part of the action plan was offered.	2.00	2.00	2.00	2.00
At least annually, alcohol consumption was assessed and advice on reduced intake offered.	2.00	2.00	2.00	2.00
Advice on dietary sodium intake offered, (either by reducing or substituting sodium salt and educating patients on hidden sources of sodium)	2.00	2.00	2.00	2.00
Discuss alternative medicines used by patients for reducing blood pressure.	2.00	2.00	2.00	2.00
At least annually smoking practice was assessed and cessation advice offered.	2.00	2.00	2.00	2.00
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	2.00	2.00	2.00	2.00
Anti-hypertensive drug treatment to people of any age with stage 2 hypertension.	2.00	NA	2.00	2.00

Choosing antihypertensive drug treatment				
Treatment regimen appropriate and in accordance to reported co-morbidities	2.00	2.00	2.00	2.00
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.	2.00	2.00	2.00	2.00
Patients monitored for the presence of unwanted side effects and action taken was appropriate	2.00	2.00	2.00	2.00
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)	2.00	2.00	2.00	2.00
Review and document potential causes of non-adherence and respond accordingly.	1.99	2.00	1.60	2.00

As it relates to the overall treatment of hypertensive patients both pharmacological and life style modification, Independence and its satellite clinics did a great job.

Outcome Indicators				
Patients with hypertension have achieved the following target:	1.99	1.92	1.96	2.00
<60 yrs less than 140/90				
> 60 less than 150/90				

The patients being seen at Independence and its satellite clinics met their target blood pressure goal. This has been achieved by a combination of continuous patient education and the effort put in by the staff to provide patients with the best possible care under the circumstances.

Must Do Criteria			
Diagnosing hypertension/Follow up	**PG**	**Big Falls**	**Santa Ana**

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.	2.00	2.00	2.00
If the person presented with severe hypertension, anti-hypertensive drug treatment therapy was administered immediately, without waiting for the results of ABPM or HBPM.	2.00	2.00	NA
Hypertension Classification was appropriate based on subsequent BPM readings. (at least three consecutive readings on different consultation days)	2.00	2.00	2.00

Punta Gorda and its satellite clinics did well in the management of their hypertensive patients.

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:	1.87	2.00	2.00
LVH/Myocardial Infarction: EKG			
Chronic Heart Failure: EKG; Chest Xray			
Angina: Reported history			
BRAIN:	2.00	2.00	2.00
Strokes: Reported history			
Transient Ischemic Attack: Reported History			
Kidney:	1.99	2.00	2.00
Proteinuria/Microalbuminuria: Lab test results			
BUN/Creatinine			
Vascular Disease:	2.00	2.00	2.00
Peripheral Arterial disease: Patient History			
Assymetrical Pulses: BPM in both arms and EKG			
Eyes:	2.00	2.00	2.00
Retinopathy: eye fundi exam			
If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	1.78	2.00	2.00

Punta Gorda and its satellite clinics did well in assessing cardiovascular risk and target end organ damage. When presented they took the necessary measures to help provide the patient with the best care.

Should Do Criteria			
Lifestyle interventions			
Lifestyle advice was offered initially and then periodically to people undergoing assessment or treatment for hypertension.	2.00	2.00	2.00
Appropriate guidance on diet and exercise as part of the action plan was offered.	2.00	2.00	2.00
At least annually, alcohol consumption was assessed and advice on reduced intake offered.	2.00	2.00	NA
Advice on dietary sodium intake offered, (either by reducing or substituting sodium salt and educating patients on hidden sources of sodium)	2.00	2.00	2.00
Discuss alternative medicines used by patients for reducing blood pressure.	2.00	2.00	2.00
At least annually smoking practice was assessed and cessation advice offered.	2.00	2.00	NA
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	2.00	2.00	2.00
Anti-hypertensive drug treatment to people of any age with stage 2 hypertension.	1.94	2.00	2.00
Choosing antihypertensive drug treatment			
Treatment regimen appropriate and in accordance to reported co-morbidities	1.99	2.00	2.00
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.	2.00	2.00	2.00

Patients monitored for the presence of unwanted side effects and action taken was appropriate	2.00	2.00	2.00
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)	1.98	2.00	2.00
Review and document potential causes of non-adherence and respond accordingly.	2.00	2.00	2.00

As it relates to the overall treatment of hypertensive patients both pharmacological and life style modification, Punta Gorda and its satellite clinics did a great job.

Outcome Indicators			
Patients with hypertension have achieved the following target:	1.96	1.96	2.00
<60 yrs less than 140/90			
> 60 less than 150/90			

The patients being seen at Punta Gorda and its satellite clinics met their target blood pressure goal. This has been achieved by a combination of continuous patient education and the effort put in by the staff to provide patients with the best possible care under the circumstances.

Must Do Criteria				
Diagnosing hypertension/Follow up	**SA**	**Pueblo Viejo**	**Santa Teresa**	**SPColumbia**
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.	1.99	2.00	2.00	2.00
If the person presented with severe hypertension, anti-hypertensive drug treatment therapy was administered immediately, without waiting for the results of ABPM or HBPM.	2.00	2.00	2.00	NA
Hypertension Classification was appropriate based on subsequent BPM readings. (at least three consecutive readings on different consultation days)	1.98	2.00	2.00	2.00

San Antonio and its satellite clinics did well in the management of their hypertensive patients.

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:	2.00	2.00	2.00	2.00
LVH/Myocardial Infarction: EKG				
Chronic Heart Failure: EKG; Chest Xray				
Angina: Reported history				
BRAIN:	2.00	2.00	2.00	2.00
Strokes: Reported history				
Transient Ischemic Attack: Reported History				
Kidney:	2.00	2.00	2.00	2.00
Proteinuria/Microalbuminuria: Lab test results				
BUN/Creatinine				
Vascular Disease:	2.00	2.00	2.00	2.00
Peripheral Arterial disease: Patient History				
Assymetrical Pulses: BPM in both arms and EKG				
Eyes:	2.00	2.00	NA	NA
Retinopathy: eye fundi exam				
If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	2.00	2.00	2.00	1.93

San Antonio and its satellite clinics did well in assessing cardiovascular risk and target end organ damage. When presented they took the necessary measures to help provide the patient with the best care.

Should Do Criteria				
Lifestyle interventions				
Lifestyle advice was offered initially and then periodically to people undergoing assessment or treatment for hypertension.	2.00	2.00	2.00	2.00
Appropriate guidance on diet and exercise as part of the action plan was offered.	2.00	2.00	2.00	2.00
At least annually, alcohol consumption was assessed and advice on reduced intake offered.	2.00	2.00	2.00	2.00
Advice on dietary sodium intake offered, (either by reducing or substituting sodium salt and educating patients on hidden sources of sodium)	2.00	2.00	2.00	2.00

Discuss alternative medicines used by patients for reducing blood pressure.	2.00	2.00	2.00	2.00
At least annually smoking practice was assessed and cessation advice offered.	2.00	2.00	2.00	2.00
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	1.99	2.00	2.00	2.00
Anti-hypertensive drug treatment to people of any age with stage 2 hypertension.	2.00	2.00	NA	NA
Choosing antihypertensive drug treatment				
Treatment regimen appropriate and in accordance to reported co-morbidities	2.00	2.00	2.00	2.00
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.	2.00	2.00	2.00	2.00
Patients monitored for the presence of unwanted side effects and action taken was appropriate	2.00	2.00	2.00	2.00
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)	2.00	2.00	2.00	2.00
Review and document potential causes of non-adherence and respond accordingly.	2.00	2.00	2.00	2.00

As it relates to the overall treatment of hypertensive patients both pharmacological and life style modification, San Antonio and its satellite clinics did a great job.

Outcome Indicators				
Patients with hypertension have achieved the following target:	1.98	2.000	2.00	1.92

<60 yrs less than 140/90				
> 60 less than 150/90				

The patients being seen at San Antonio and its satellite clinics met their target blood pressure goal. This has been achieved by a combination of continuous patient education and the effort put in by the staff to provide patients with the best possible care under the circumstances.

Notes & Observations

The following can be said about all the clinics in the Southern Region:

- Overall patients are being managed well.
- The team is using good evidence-based principles for management.
- Co-morbidities are being well screened for.
- There is a good standard of care that has been established.
- Files are well organized. Handwriting is good.
- Overall the clinic's performance was good.
- They have done a good job managing both hypertensive and diabetic cases.
- Patients with multiple co-morbidities are receiving care that addresses their complex needs.

Dangriga & Satellite Clinics

Dangriga and its satellite clinics have and continue to perform well in serving their patient population. They did mention the ongoing issue of double entry in the BHIS and NHI notes diverting time that could have been spent on patient care. They also noted a lack of proper access to diabetic retinopathy screening for some patients.

Independence & Satellite Clinics

Independence and its satellite clinics have and continue to perform well in serving their patient population. In addition to providing primary care services the polyclinic also provides emergency services that include dealing with labour and delivery, trauma and chronic conditions such as CHF and asthma. They also note the time consuming practice of double entry. The double entry combined with additional secondary care services has really put a strain on Independence clinic, yet they continue to perform well.

Punta Gorda & Satellite Clinics

Punta Gorda and its satellite clinics have and continue to perform well in serving their patient population. Their overall operation appears to be in order. They continue to deliver quality care for a growing population. They also noted the burden of double entry and its effect on time spent with patients.

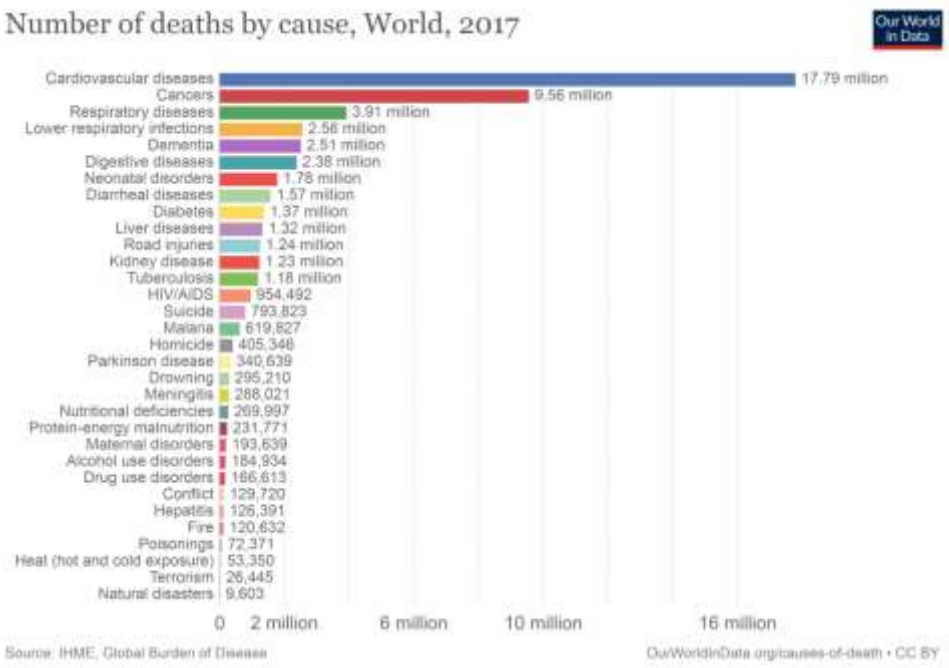
San Antonio & Satellite Clinics

San Antonio and its satellite clinics have and continue to perform well in serving their patient population. Over the years they have done an exceptional job working with the community in educating them about the importance of a healthy lifestyle and compliance with medication.

Corozal – NHI

Introduction

The National Health Insurance (NHI) Scheme conducted medical audits at these Primary Care Provider (PCP): **Corozal and Patchakan.** The audit tools were used to capture the key indicators in a more concise manner, facilitating the assessment of overall compliance to protocols as it relates to chronic non-communicable diseases (NCD). NHI clinicians were evaluated in relation to compliance with clinical protocols as it relates to NCD with the main focus being on hypertension (HTN) and diabetes mellitus (DM).



It is important that we focus on HTN and DM as worldwide, Ischemic Heart Disease (#1) and Diabetes (#9) are in the top 10 causes of death[1]. (Figure 1) According to PAHO the leading causes of death in Belize in recent years were chronic non-communicable diseases. Diabetes, cardiovascular disease, cancers, and chronic respiratory diseases are responsible for around 40% of deaths annually [2]. These statistics put Belize in line with global health trends.

Figure 1: Top causes of death worldwide in 2017. Ischemic Heart Disease remains still remains number 1 to this date.

A section of the overall goal of the care NHI provides is to ensure that patients with NCD are properly managed to reduce end organ damage and reduce mortality. This audit helps to determine if NHI clinicians are doing what is necessary to achieve this goal.

Purpose:

- The Medical Audit 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:

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 for the main clinics and 5 records from satellite clinics 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. 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 was being collected and documented. This data would help us determine if 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:

5. 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, treatment, and potential target organ damage monitoring. It offers a more holistic approach to the case management of the patient.
6. The **"should do"** criteria seek further input on the supportive management of the client to include specialist referral and 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 Corozal

2019	CZL	PAT
Scores (target 90%)	68%	100%

Diabetes Audit Score 2019		
	CZL	PAT
# of records assessed	19	19
# of records that met the target (90%)	13	19
Total score	68%	100%

Patchakan continues to score well on their files. Unfortunately the Corozal NHI Clinic did not fare so well. This is not necessarily a reflection of the care they provide but rather has to do with the simple lack of documentation. A total of 19 files were audited for both clinics of which Patchakan had all their 19 files meet the minimum requirement to be considered a passing file, where as Corozal had 13 of their 19 files qualify resulting in 68%.

Demographics

Demographics	**CZL**	**PAT**
Gender		
Male	7	1
	37%	5%
Female	12	18
	63%	95%

For both Patchakan and Corozal diabetic patients were predominantly females, overwhelmingly so in Patchakan. No data to support why this is the case.

Age Range	CZL	PAT
31-45	0	1
	0%	5%
46-55	7	4
	37%	21%
>55	12	14
	63%	74%

The majority of the patients for both locations were over the age of 55 years. Interestingly Corozal had zero patients between the ages of 31-45 years old. This is a noticeable difference when compared to a place like Independence with 11 patients (32%) of their sampled population in this age range.

Ethnicity	CZL	PAT
Creole	6	0
	32%	0%
Mestizo	13	19
	68%	100%

The predominant ethnicity for both locations was Mestizo, with Patchakan recording 100% of its population being one ethnicity. This may be the only location where the sample size was 100% one ethnicity.

Diabetes	**CZL**	**PAT**
Cases of Diabetes		
Newly Diagnose	0	0
	0%	0%
Established Case	19	19
	100%	100%

Classification		
Diabetes Type 1	0	0
	0%	0%
Diabetes Type 2	19	19
	100%	100%

For both locations all the sampled patients were established cases of type two diabetes.

"Must Do" Process Criteria	CZL	PAT
The Diagnosis of Diabetes is correct	2.00	2.00
Both locations were able to successfully diagnose diabetes.		
HbA1c has been checked at least annually	1.67	2.00
Patchakan did a great job of checking HgbA1Cannually. The issue with Corozal is we cannot determine if their low score was due to noncompliance or lack of documentation.		
At least annually there has been an assessment of symptoms including hypoglycaemic attack.	1.79	2.00
Patchakan did a great job assessing for hypoglycemia annually. The issue with Corozal is we cannot determine if their low score was due to noncompliance or lack of documentation.		
At least annually the feet have been assessed	1.68	2.00
Patchakan did a great job of checking patient's feet for diabetic neuropathy and ulcers. The issue with Corozal is we cannot determine if their low score was due to noncompliance or lack of documentation.		
At least annually the patient's urine has been checked for albumin to detect early evidence of nephropathy.	1.58	1.89
Patchakan did a great job of checking patient's albuminuria annually. The issue with Corozal is we cannot determine if their low score was due to noncompliance or lack of documentation.		
At least annually the fundi have been examined for retinopathy through either examination with direct fundoscopy with dilated pupil, fundi photo or screened by opthalmologist.	0.11	1.89
Patchakan did a great job of requesting annual fundi exam. The issue with Corozal is we cannot determine if their low score was due to noncompliance or lack of documentation.		
At least annually there has been assessment of the smoking habit	1.60	2.00
Patchakan did a great job of checking patient's smoking habits. The issue with Corozal is we cannot determine if their low score was due to noncompliance or lack of documentation.		
The blood pressure has been checked at every diabetes visit	2.00	2.00
Both clinics did a great job of checking and documenting blood pressures.		
At least annually the blood lipid has been checked	1.47	2.00

Patchakan did a great job of checking patient's feet for diabetic neuropathy and ulcers. The issue with Corozal is we cannot determine if their low score was due to noncompliance or lack of documentation.

If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	1.69	2.00

Patchakan did a great job of checking and exploring abnormal findings. The issue with Corozal is we cannot determine if their low score was due to noncompliance or lack of documentation.

"Should Do" Process Criteria	CZL	PAT
Each newly diagnosed patient has received education about diabetes management	NA	NA

There were no newly diagnosed patients in the audited files.

At least annually the patient' s diet has been reviewed by a nutritionist with emphasis on glyceimic index	1.79	2.00

Given the limitation of the lack of a nutritionist we sought if appropriate measures were taken to ensure patient's diet was reviewed with them. Overall they did good.

At least annually assessment of Body Mass Index has been checked	1.79	2.00

BMIs were checked. Corozal lost point for simply not documenting BMI.

At least annually renal function has been assessed (confirmed by BUN and CREAT)	1.58	1.78

Patchakan did ok with this section while Corozal was sub-par. The availability of testing was one remark we heard.

At least annually patient has been educated on the status and importance of adherence	1.79	2.00

Patchakan did well on this section. Corozal's effort were acceptable. Again, not sure if it is being done but just not being documented.

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)	1.79	2.00

Outcome Criteria	CZL	PAT
Patient's Hb A1c target established is appropriate if the 7% is not attainable at the time of assessment	1.54	2.00
Patient's Hb A1c target achieved	1.29	1.99

Patient's systolic blood pressure is less than 140 mmHg and diastolic blood pressure less than 90 mmHg. (Patients over 18 yrs)	2.00	2.00
Patients over the age 60 150/90	1.98	2.00
Patient's LDL chlolesterol level is less than 135 mg/dl	1.68	2.00

Overall, Patchakan did well in this section also, while Corozal performed sub-par. We must emphasize that we cannot determine if appropriate measures were done but just not documented or they were not done.

Hypertension Results – Corozal

2019	CZL	PAT
Scores (target 90%)	63%	95%

Hypertension Audit Score 2018		
	CZL	PAT
# of records assessed	19	19
# of records that met the target (90%)	12	18
Total score	63%	95%

Patchakan continues to score well on their files. Unfortunately the Corozal NHI Clinic did not fare so well. This is not necessarily a reflection of the care they provide but rather has to do with the simple lack of documentation. Patchakan had 18 of their 19 files pass while Corozal only had 12 of their 19 pass.

Demographics	CZL	PAT
Gender		
Male	5	5
	26%	26%
Female	14	14
	74%	74%

Both clinics registered approximately 75% of their hypertensive patients as female. No data to support this ratio.

Age Range	CZL	PAT
31-45	2	3
	11%	16%
46-55	3	4

	16%	21%
>55	14	12
	74%	63%

For both clinics, the majority of the patients were over the age of 55. There was an almost even distribution of patients in the other two age ranges.

Ethnicity	CZL	PAT
Creole	5	0
	26%	0%
Mestizo	11	19
	58%	100%
East Indian	3	0
	16%	0%

The majority of the patients were Mestizo, with Patchakan being 100% Mestizo.

Hypertension	**CZL**	**PAT**
Case		
Newly Diagnosed	0	0
	0%	0%
Established Cases	19	19
	100%	100%
Classification	CZL	PAT
Hypertension Stage 1	17	15
	90%	79%
Hypertension Stage 2	2	4
	11%	21%
Hypertension Controlled	CZL	PAT
Yes	18	18
	95%	95%
No	1	1
	5%	5%

For both clinics all the patients were established with the majority being staged as Hypertension 1. Both clinics files show 18 of their 19 patients were controlled with current medical treatment.

Must Do Criteria		
Diagnosing hypertension/Follow up	**CZL**	**PAT**

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.	1.88	2.00
Overall both clinics did well in documenting blood pressures.		
If the person presented with severe hypertension, anti-hypertensive drug treatment therapy was administered immediately, without waiting for the results of ABPM or HBPM.	1.00	2.00
Patchakan did well in addressing elevated blood pressures. Corozal either did not offer treatment when it was required by protocol or did not document it. (Auditors do not have access to BHIS).		
Hypertension Classification was appropriate based on subsequent BPM readings. (at least three consecutive readings on different consultation days)	2.00	1.98

Both clinics did well in (re)-classification of patient's hypertension status.

Assessing cardiovascular risk and target organ damage	CZL	PAT
The records show that at diagnosis the following symptoms and signs of target organ damage have been sought:		
HEART:	1.89	1.87
LVH/Myocardial Infarction: EKG		
Chronic Heart Failure: EKG; Chest Xray		
Angina: Reported history		
BRAIN:	1.26	1.88
Strokes: Reported history		
Transient Ischemic Attack: Reported History		
Kidney:	1.89	1.88
Proteinuria/Microalbuminuria: Lab test results		
BUN/Creatinine		
Vascular Disease:	1.26	1.88
Peripheral Arterial disease: Patient History		
Assymetrical Pulses: BPM in both arms and EKG		
Eyes:	NA	1.87
Retinopathy: eye fundi exam		
If any abnormal finding related to potential target organ damage was noted, the appropriate action was taken.	1.98	2.00

Patchakan scored well in this section. Areas where Corozal did not do well it is uncertain if these were not investigated or were not documented. There is an issue with getting retinopathy exams done. This was voiced by both clinics.

Should Do Criteria		
Lifestyle interventions	**CZL**	**PAT**
Lifestyle advice was offered initially and then periodically to people undergoing assessment or treatment for hypertension.	2.00	2.00
Appropriate guidance on diet and exercise as part of the action plan was offered.	2.00	2.00
At least annually, alcohol consumption was assessed and advice on reduced intake offered.	2.00	2.00
Advice on dietary sodium intake offered, (either by reducing or substituting sodium salt and educating patients on hidden sources of sodium)	2.00	2.00
Discuss alternative medicines used by patients for reducing blood pressure.	2.00	2.00
At least annually smoking practice was assessed and cessation advice offered.	2.00	2.00
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	2.00	2.00
Anti-hypertensive drug treatment to people of any age with stage 2 hypertension.	2.00	2.00
Choosing antihypertensive drug treatment		
Treatment regimen appropriate and in accordance to reported co-morbidities	2.00	1.98
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.	2.00	2.00

Patients monitored for the presence of unwanted side effects and action taken was appropriate	2.00	2.00
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)	2.00	2.00
Review and document potential causes of non-adherence and respond accordingly.	2.00	2.00

Both clinics did well in these sections.

Outcome Indicators	CZL	PAT
Patients with hypertension have achieved the following target:	1.93	1.99
<60 yrs less than 140/90		
> 60 less than 150/90		

Both clinics have achieved blood pressure targets for their patients. This is a good sign of properly managed patients.

Notes & Observations

Patchakan

Overall Patchakan has and continues to perform well. They are well organized and do a great job of documenting their work. The clinic also appears to have the buy in from the community which puts them in a great position to start a program that takes advantage of the support. It was suggested that a group exercise program and healthy recipe sharing group be formed under the guidance of the clinic. This will help further promote a healthy lifestyle.

It was noted that their patients do have difficulties accessing ophthalmologist for diabetic retinopathy screening.

- Files are well organized. Handwriting is good.
- Overall the clinic's performance was 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.
- The use of insulin and its use in complex patients continues to be well done.
- There is an appropriate referral to internist evaluation in challenging patients.
- Cases in which there has been increased HbA1c throughout the year have had the proper physical exercise and nutritional advice.

Corozal

Unfortunately, from all the NHI clinics audited this year Corozal clinic scored at the bottom. Based on conversations with staff it appears the main issue is the documentation and the lack of time to do

double entry – NHI notes and BHIS. There is overwhelming frustration with the double entry and one staff noted they will deal with the consequences of lack of entry when it happens, but their focus is seeing patients and not writing notes.
It was noted that their patients do have difficulties accessing ophthalmologist for diabetic retinopathy screening. Other issues were mentioned that may be having a negative impact on the overall performance but as there is no evidence to substantiate the claim I reserve the right to withhold those concerns.

- No Chronic Forms filled or No updated chronic form in 19 of the 19 charts examined.
- The organization of the files could be improved. The clinic filing clerk should find a method to secure the documents in the file to avoid it falling out and to help files being placed in the proper order.
- Basic items such as name, NHI# and signatures are missing from notes have been observed on multiple occasions.

Recommendations

The following are recommendations for all the clinics. There are four main topics I would recommend CMEs be conducted on. The CME should occur over a one year period and be part of the KPI. These CMEs should be organized as course with curriculum, lecture notes and videos which can be accessed countrywide.

Based on the audits conducted the following are my recommendations:

1. A Continuing Medical Education to be done for all NHI physicians. The CME will be ongoing and cover the following topics.
    a. Hypertension – establish a protocol (or use an existing one) and have everyone adapt to it. Currently it appears that doctors use a protocol they are familiar with, which may differ from the protocol used by another doctor in the same clinic. As clinics are currently using the ASCVD Risk Estimator, which helps guide treatment, the CME can entail these guidelines.
    b. Diabetes – establish a protocol (or use an existing one) and have everyone adapt to it. During the audit we noticed some doctors were very hesitant to use insulin while others were very comfortable with using it.
    c. Chronic Kidney Disease – a CME to help physicians identify CKD earlier and what intervention can be offered until they are seen by an internist (as the lack of internist accessibility is a challenge).
    d. Congestive Heart Failure – detection, referral and co-management of CHF with internist. The issue is the availability of internist in certain regions. Having the doctors well trained will help with early detection and intervention.

2. Set up an exploration committee to review current core medication and determine what can be added it to the list. The goal is to look for medications that will benefit the patient without incurring a significant increase in cost to NHI. An example of such is the use of Pioglitazone for the management of diabetes. Currently there are only two oral medications available to diabetic patients under the NHI formula.
3. In order to improve access to diabetic retinopathy screening, it is recommended that NHI partner with Retina Global to help improve screening and treatment of retinal pathologies including those stemming from diabetes. Retinal Global is a non-profit organization whose mission is to provide sustainable solutions to people around the world afflicted with retinal disease. Retina Global is focused on outreach programs to such identified areas, with participation from volunteer retina specialist from around the world, who will provide their time and expertise to help make a difference. Initial talks with Retina Global have commenced and a proposal has been submitted. Please see Appendix A. This may significantly improve patient's access to screening with minimal to no cost to NHI.
4. Five Year Strategic Plan – NHI should arrange a private meeting with each of the clinics to discuss their overall performances, establish a goal, do a gap analysis and determine what actions are required to get the clinic to their goal. A Five Year Strategic plan should be done which will chart out the path for each clinic and the entire program.
5. Double Entry – unfortunately this issue has still not been resolved and it appears to be affecting productivity as the patient population continues to grow. If there is a way to get the clinics down to single entry then that would be ideal, but until then a possible solution would be to allow those clinics who have achieved results greater than 90% on documentation to only use BHIS system with the condition that NHI can audit those files upon request.
6. Noncompliance Protocol – on multiple occasions noncompliance of a patient was noted yet they were given a prescription/medication. The rationale behind it is that if no medication is given the doctor believes they will be penalized. There has to be a Patient Non-compliance Protocol that places the responsibility of care also with the patient and protects doctors who withhold free/subsidized medication (not prescription) due to wastage. The sense of entitlement to goods and services regardless of use has and will continue to cost NHI money.

Conclusion

Overall, most clinics performed very well. The use of the building blocks method is paying dividend as we see the clinics improving the quality of care and the documentation of the this quality of care. It is recommended that a five year strategic plan be put in place to help guide the growth of each clinic to meet their targeted needs.

Report

This document was prepared by Dr. Ajay Hotchandani with data provided by the National Health Insurance. The report is solely for the use of NHI and its relevant parties and is not intended nor should it be relied upon by anyone else.

Information contained in the report is current as of the date of the report and my not reflect any events or circumstances which occurred after the date of the report.

Appendix

Appendix A – Global Retina Proposal

Background:

Belize's population size is estimated to be 383,000 individuals[i], spread over a handful of population centers and more remote villages. As Latin America and the Caribbean face increasing rates of non-communicable diseases, data are questionable in both quality and age. Diabetes prevalence is estimated to be 15-17%[ii, iii, iv] but the most robust diabetes prevalence data was collected in 2005-2006 and published in PAHO's 2008 Central American Diabetes Imitative: Survey of Diabetes, Hypertension and Non-communicable Disease Risk Factors[v]. Of the study respondents with diabetes, 40% were newly diagnosed through the study with higher prevalence among women of all ages. It remains clear that Belize lacks a deep understanding of its current diabetes epidemic, with prevalence likely to be higher than the 2008 estimates. Belize's provider, nurse and community health worker densities are generally low[vi], indicating a significant burden on providers to manage existing disease, while simultaneously screening and educating to prevent future illness. It is hopeful, however, that Belize has taken significant steps to improve patient records and data collection, through the Ministry of Health's Belize Health Information System (BHIS) and the NHI's Registration and Clinical Activity Web Application (RAWA)[vii]. A partnership between local experts and resources (e.g. BHIS, RAWA, and the NHI network of clinics) and international health experts provides an opportunity to improve outcomes associated with diabetes, including diabetic retinopathy, by understanding disease prevalence and providing subsequent treatment opportunities.

Goals:

Retina Global proposes to utilize and expand on existing resources to understand diabetes and diabetic retinopathy prevalence and provide treatment opportunities, through a phased implementation in key districts.

Project Objectives:

This multiphase project aims to

(1) Assess the current diabetes epidemic in Belize;
(2) Complement existing health infrastructure by providing resources to conduct advanced diabetic retinopathy screening;
(3) Build capacity through provider training opportunities in both medical and technical areas;
(4) Provide treatment opportunities for appropriate patients with diabetic retinopathy; and
(5) Reduce burden of disease through targeted enrollment in diabetes prevention or disease management activities with relevant Belizean partner(s).

Project Detailed Objectives:

(1) Understand the current diabetes epidemic;

We propose the use of existing data, available through BHIS and or RAWA, and further data collection through screening activities at key NHI clinics. Data of interest include demographic information, risk factors, health behaviors. Novel screening techniques will be employed for diabetic retinopathy screenings. All data collection and screening will be conducted by trained Belizean personnel, securely transmitted to Retina Global, which will then facilitate analysis and diagnostics.

(2) Complementing existing health infrastructure by providing resources to conduct advanced diabetic retinopathy screening;
Retina Global will work with Local Providers and other relevant Partners to ensure NHI Clinics have relevant technologies needed to conduct screening.

(3) Build capacity through provider training opportunities in both medical and technical areas;
Belizean providers and administrative personnel will implement the program, under oversight of Retina Global. The latter will provide requisite training for Belizean counterparts – i.e. survey methods, program design and implementation, and hands-on training in technical skills including retinopathy screening. Later phases will include advanced retina training for a Belizean physicians ophthalmologist.

(4) Provide treatment opportunities for appropriate patients with diabetic retinopathy;
Through Retina Global's international volunteer network of trained retinal surgeons, patients meeting screening criteria will be eligible for appropriate management by visiting physicians, whose visit frequency will be assessed through the course of the project.

(5) Reduce burden of disease through targeted enrollment in diabetes prevention or disease management activities with relevant Belizean partner(s).
Working with relevant Belizean partners, we can provide patients and local providers with the opportunity to participate in diabetes prevention and management activities.

Project Phases:

Phase 1: Project Planning **Months 1-3**

Project Planning will include identification of Belizean partners, and preliminary scoping of clinics, technology capabilities.

Phase 2: Site 1 provider training, patient screening and treatment **Months 4-12**

Phase 2 will serve as an implementation pilot at the first project site, with the following activities: diabetes and diabetic retinopathy screening in patients, data collection, diagnosis and treatment plans, identifying and training personnel, feasibility and

acceptability testing for project scale up, and ongoing program evaluation. Screening and data collection results will inform subsequent program activities.

Phase 3: Scale-up of Screening Activities **Months 13 - 18 / Year 2**

Phase 3 activities include: identification and implementation at additional NHI clinic project sites nationwide, staff identification and training, and screening activities. Screening responsibilities will be transitioned to Belizean personnel, who will receive ongoing training and supervision. Ongoing program evaluation will be conducted.

Phase 4: Scale-up of Treatment activities **Months 19 - 24 / Year 2**

Phase 4 will include increasing the potential for treatment for patients with diabetic retinopathy at the NHI clinic project sites nationwide, in addition to educational activities for non-qualifying participants. Ongoing program evaluation will be conducted.

Phase 5: Program Maintenance, Advanced Training & Sustainability **Years 3 - 5**

Phase 5 will focus on building sustainability, with ongoing program maintenance and transition of management to Belizean personnel. This may include advanced retinal training opportunities for a Belizean physician, who will be expected to return after completion of training.

Outcome Analysis:

The outcome analysis will include:

- Evaluating the current prevalence of diabetes and diabetic retinopathy in the country; and
- Study outcomes in the cohort to evaluate intervention success and any necessary changes to improve the program.

Project Leadership:

This project is being proposed as a partnership between Retina Global, and the Belize National Health Insurance. Retina Global is an international nonprofit focused on sustainable outcomes to retinal disease management in underserved areas around the world. Currently involved in projects in Central/South America and in Africa, the organization organizes regular visits by trained retinal surgeons from the US and other countries to the project areas, where they evaluate and treat patients, while providing hands-on training to local ophthalmologists. Sponsored retinal training is provided to 1-2 local ophthalmologists who return to continue providing care to the patients, while also training others to allow for long term sustainability. The organization also works with local partners to provide help with instruments and infrastructure.

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Retina Global:

- Jessica Chee, MPH - Project Lead
    - Jessica Chee will be the main point of contact from Retina Global for this project. She has a strong commitment to facilitating improved health outcomes in her native Belize, and has worked in program design, implementation and management for public health and wellness projects in the US and Latin America.
- Raj N Agrawal, MD
    - Raj Agrawal will work with Jessica in the coordination of the project. Being an ophthalmologist and retina specialist, and as CEO of Retina Global, he has significant experience in managing patients with diabetic retinopathy, as well as managing public health programs of this kind in different parts of the world.
- Nidhip Patel, DO
    - Nidhip Patel is the Associate Program Director and Global Health pathway Director for the Internal Medicine Residency Program at Northside Gwinnett Hospital, and an Assistant Clinical Professor at Philadelphia College of Osteopathic Medicine Georgia Campus and at the Medical College of Georgia at Augusta University. He is dual-board certified in Internal Medicine and Pediatrics, and has significant global health experience working as a care provider and educator in resource-limited settings.

Addendum 1: Detailed Implementation Plan

Step	Time range	Action items	Outcomes
Preamble		Agreement	
Phase 1	Months 1-3	• Identification of Belizean Partner organizations • Preliminary scoping of NHI clinics and onsite technology capabilities • Draft of protocols, training, and project processes and flow	• Definition of Partners Organizations • List of NHI clinics • Protocols for screening and treatment activities, projet processes and flow • Training materials
Phase 2	Months 4-12	• Identify 1 NHI clinic for the program pilot; we propose Corozal Community Hospital • Trained personnel visit NHI clinic/s for screening once every 1-2 months • Identify and provide treatment to patients • Identify local personnel for training • Plan/conduct a study to evaluate prevalence of diabetes and diabetic retinopathy (DR)	• Program initiation • Screening and treatment of patients on monthly or bimonthly basis • Identifying personnel to be trained • Initiate online reading • To understand the current prevalence of diabetes and DR in Belize
Phase 3	Months 13-18 / Year 2	• Identification and implementation at additional project sites • Continue to train and monitor NHI staff while the staff takes over screening • To provide cameras on loan to NHI clinic/s • Provide online resources for reading retinal images – grading tool • Expand clinic coverage 4-8 clinics	• Patients screened by trained personnel on the ground • Image reading by Retina Global experts online • Experts visits continue for providing treatment • Program expansion based on learning and experience from previous phases
Phase 4	Months 19-24 / Year 2	• Continued expansion of the program treatment activities for patients identified in Phase 3 • Inclusion of diabetes education activities for both patients and providers	• Treatment activities for eligible patients identified in Phase 3. • Diabetes education activities for noneligible patients and Belizean providers.
Phase 5	Years 3-5	• Identify a Belizean Ophthalmologists for retinal training • Provide adequate training to the above individual • The above individual returns to Belize after completion of training to provide care in screening & treatment, and also train others	• Focus on sustainability • Set up in-country program that will not require outside intervention for the long term, with trained personnel \and equipment

Addendum 2: Data Sources

[i] World Bank 2019 https://databank.worldbank.org/reports.aspx?source=2&country=LCN#

[ii] World Bank 2019 https://databank.worldbank.org/reports.aspx?source=2&country=LCN#

[iii] International Diabetes Federation 2020 https://www.idf.org/our-network/regions-members/north-america-and-caribbean/members/55-belize.html

[iv] PAHO Salud en las Americas 2017 https://www.paho.org/salud-en-las-americas-2017/?p=2362; Sources: Belize, Statistics Institute of Belize, Abstract of Statistics 2013 and Belize, Ministry of Health, Administrative data 2016

[v] PAHO Central American Diabetes Imitative: Survey of Diabetes, Hypertension and Non-communicable Disease Risk Factors 2008 http://health.gov.bz/www/attachments/407_Central%20American%20Diabetes%20Initiative,%20Belize%202008.pdf

[vi] PAHO Salud en las Americas 2017 https://www.paho.org/salud-en-las-americas-2017/?p=2362; Sources: Belize, Statistics Institute of Belize, Abstract of Statistics 2013 and Belize, Ministry of Health, Administrative data 2016

[vii] PAHO Salud en las Americas 2017 https://www.paho.org/salud-en-las-americas-2017/?p=2362; Sources: Belize, Statistics Institute of Belize, Abstract of Statistics 2013 and Belize, Ministry of Health, Administrative data 2016