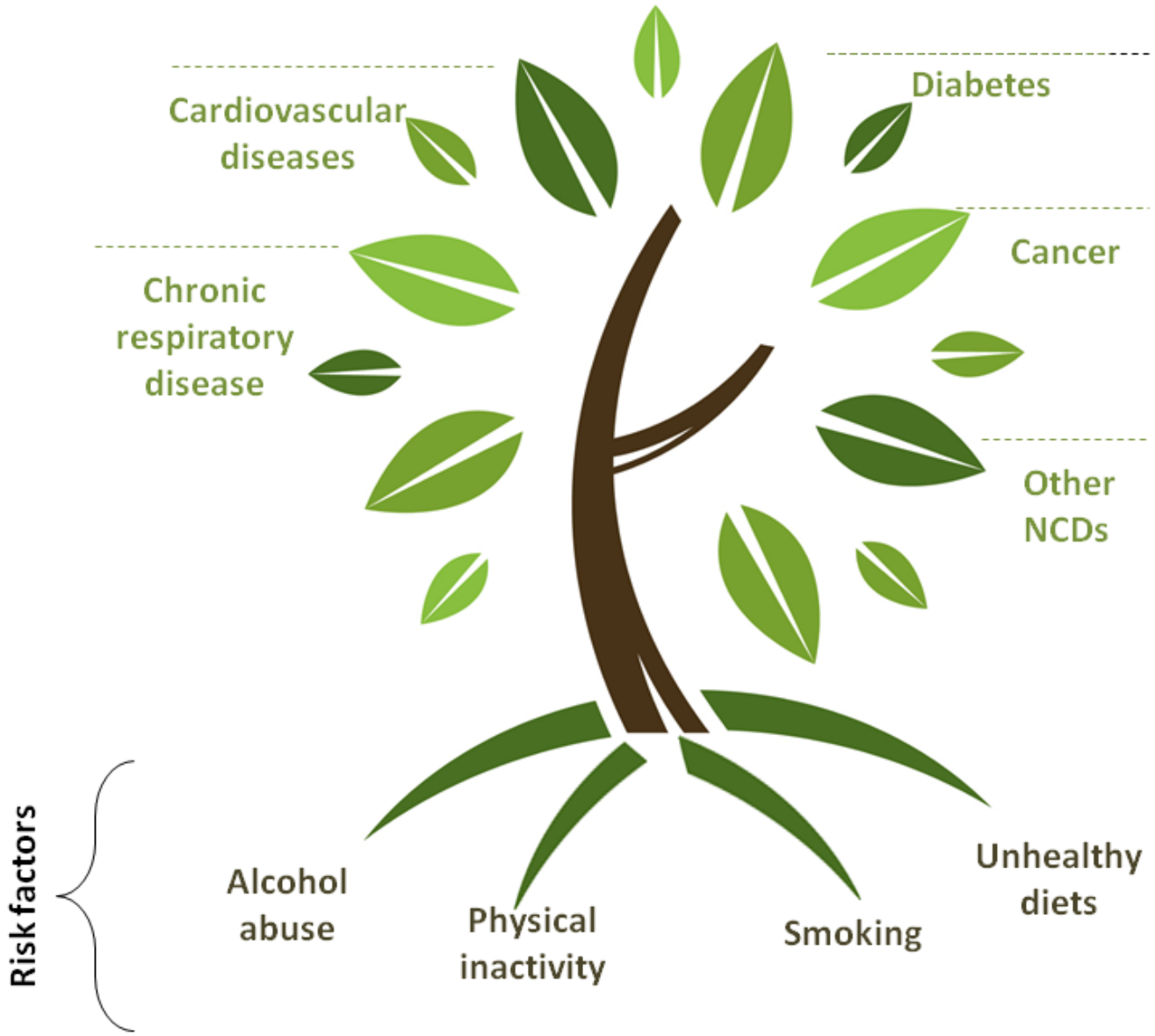
2010 Annual Report

Barbados National Registry



A tree diagram depicting main global non-communicable diseases and their risk factors

NCD tree diagram on front cover courtesy of World health Organization Eastern Mediterranean Regional Office (http://www.emro.who.int/egy/egypt-infocus/stepwise-surveillance.html).

Your Registry, Your Health

Cardiovascular disease registry

Objective

To collect timely and accurate national data on the occurrence of acute myocardial infarction and stroke, in order to contribute to the prevention, control and treatment of these diseases in Barbados.

Acute Myocardial Infarction

occurs due to sudden deprivation of the blood supply to the heart muscle (myocardium).

Stroke is a sudden neurological event involving either an occlusion or haemorrhage from a cerebral blood vessel.

Contents

Executive Summary 5

CVD in Barbados, 2010 9

1.1 BNR-Heart 10

1.2. BNR-Stroke 19

Appendices

Appendix A: Definitions 27

Appendix B: Advisory groups' membership lists 31

Acknowledgements

This report was prepared by the Barbados National Registry for Chronic Non-communicable Disease (the BNR), headquartered at the Chronic Disease Research Centre (CDRC), The University of the West Indies. The BNR is a Ministry of Health initiative, providing surveillance of the three principal causes of ill-health and death among Barbadians: stroke, heart attack and cancer. The National Chronic Non-communicable Disease Commission provides oversight of the BNR.

We gratefully acknowledge all patients with heart attacks and strokes and their families who contributed to the BNR-CVD. This notification process was made possible by the physicians, nursing staff, administrative staff and ancillary personnel of the Queen Elizabeth Hospital, BayView Hospital, parish polyclinics, geriatric and district hospitals, as well as private physicians and diagnostic establishments across the island. Their essential collaboration helps to bring ongoing improvements in stroke and heart attack surveillance.

Authors and contributors

Authors

Rose AMC, Blackman T, Pitts G, Maul L, Hambleton IR, Hennis AJM, and the BNR-CVD Surveillance Team

Contributors: BNR-CVD Surveillance Team (2010)

Ms Angela MC Rose, Director, BNR

Mrs Gina Pitts, Registrar, BNR-CVD

Ms Tracey Blackman, Data Manager, BNR

Ms Joy Vanterpool, Data abstractor, BNR- Heart

Ms Lauren Maul, Data abstractor, BNR-Stroke

Mr Leroy Squires, 28-day follow-up Nurse, BNR

Ms Karen Greene, Steno Clerk, BNR

Mrs Talita Thorpe, Data entry Clerk, BNR

Dr Rudolph Delice, Clinical Director, BNR-Heart

Prof. David Corbin, Clinical Director, BNR-Stroke

Prof. Ian R Hambleton, Statistician, CDRC

Prof. Anselm JM Hennis, Director, CDRC

Special thanks

Prof. Trevor Hassell, Chairman, National Chronic Non-communicable Disease Commission

Mrs Madeline Jordan, Medical Records Dept, Queen Elizabeth Hospital

Mrs Collymore, Medical Records Dept, Queen Elizabeth Hospital

Mrs Phillips, Death Records Dept, Queen Elizabeth Hospital

Mr Barrow, Medical Records Dept, Queen Elizabeth Hospital

Executive Summary

In 2010, the Barbados National Registry for Chronic Non-communicable Disease (the BNR) collected data for all three registries: the BNR-Stroke, the BNR-Heart and the BNR-Cancer. This Annual Report contains data from the two cardiovascular disease (CVD) registries (heart attack and stroke). Summary statistics for the four reporting obligations of these registries are shown below (Table ES1). During 2010, the BNR was still operating with fewer staff than required for such a large surveillance system.

The 347 acute myocardial infarction (acute MI) and sudden cardiac death (SCD) registrations gave a crude incidence rate (IR) per 100,000 population in Barbados of 129 for 2010 (adjusted to the world population, IR = 93 per 100,000). Of these, 263 (76%) were classified as definite acute MIs according to standard international criteria, 78 (22%) were SCDs and the remaining 6 events (2%) were classified as possible acute MIs. Of the 194 (56%) events in hospitalised patients, BNR staff abstracted documented evidence of acute MI from the hospital notes of 126 (65%); up from 59% of hospital notes abstracted in 2009.

The length of hospital stay in 2010 was the same as in 2009: 3 days for those in intensive care units (ICUs) and 6 days for those admitted to general wards. About three-quarters of all hospitalized acute MI patients also had hypertension (74%) while about half were obese (52%) or had diabetes (46%). One-quarter had a parent who had also had an acute MI.

Table ES1. Summary statistics for the Barbados National Registry for Chronic Non-communicable Disease (BNR)

		Acute MI	Stroke (all)	Stroke (first-ever)
Population*		268 756	268 756	268 756
No. registrations		347	584	131
Hospital admissions		194	464	123
Deaths		242	291	37
Reporting obligations†	**1**	0.13%	0.22%	0.05%
	2	56%	79%	94%
	3	70%	50%	28%
	4	6 days	4 days	4 days

*Note: Population data from Barbados 2000 census, adjusted for undercount.

†Reporting obligations are defined as: (1) Total number of registrations as a proportion of the population; (2) Total number of hospital admissions as a proportion of registrations; (3) Total number of deaths as a proportion of registrations; (4) Median length of hospital stay (in days).

Current international consensus for acute MI diagnosis includes symptoms of cardiac ischaemia, ECG changes indicative of new ischaemia and serial cardiac biomarker changes (preferably Troponin-I and, if not available, the biomarker CK-mB). Most patients (66%) presented with at least two symptoms, of which the most common was chest pain (90%). Almost half had shortness of breath (46%) or sudden vomiting (39%). As seen in 2009, most patients (83%) had had serial ECGs done, with ECG reports available for the vast majority (>90%) of them. In 2009, only 38% of hospitalised BNR registrants had documented evidence of serial (up to three) Troponin-I tests in their notes. In 2010, however, there was evidence of three Troponin-I tests in more than half (56%) of hospitalised BNR registrants, while two-thirds had had two such tests. For both years, a similar proportion (about two-thirds) had documented evidence of three CK-mB tests.

Of the 126 hospitalised patients with data abstracted from their notes, 86 (68%) had documented evidence of being given aspirin within 24 hours of admission, while 67 (53%) were documented as being given aspirin at discharge. Patients with ECG changes showing ST-segment elevation MI (STEMI) may benefit from specific medications to dissolve clots in the coronary arteries (thrombolysis). Of the 75 patients documented as STEMI, 27 were administered thrombolysis (36%).

Of the 347 acute MI events registered in 2010, 221 (64%) were registered only from a death certificate (vs 73% in 2009). About one-third of these had the QEH listed as their place of death, although the information on these patients was not abstracted by the registry team. This can occur if the initial hospital diagnosis does not include the criteria indicating an acute MI, or if the BNR team is unable to obtain patient notes for abstraction. This is particularly difficult if the patient has died before the information on the notes could be abstracted by the team, as it becomes increasingly complex over time to locate the patient notes.

The effect of the difficulty in obtaining deceased patients' notes for abstraction is a lower case fatality rate (CFR) calculated when using only abstracted data (21/126 died in hospital; CFR=17%) vs data on all hospitalized patients (89/193 died in hospital; CFR=46%). This occurs because the deceased patients will have been under-represented by the in-hospital registry abstractions. This nicely illustrates the value of a population-based registry, which combines data from multiple sources (including the national death register), over a purely hospital-based system.

In 2010, there were 584 stroke events (55% female), for a crude IR per 100,000 population of 217.3 for all strokes (adjusted to the world population, IR = 152.3).

Of the 584 events, 155 (27%) were identified from death certificates only (vs 18% in 2009). Of the remaining 429 events (73%) for whom data were abstracted from hospital or physician records, 387 (90%) received a CT

scan or an MRI, and 70% (262/374) had their scan within 24 hours (vs 65% in 2009). There were 317 ischaemic (74%) and 62 haemorrhagic (15%) stroke events in 2010; most (47) of the latter were intracerebral. Forty-one (10%) of the 429 abstracted stroke events could not be classified (vs 13% in 2009). As in 2009, almost all stroke patients (94%) had at least one symptom documented; the most common were facial weakness (340; 79%) and slurred speech (274; 64%). Only one-third (31%) of abstracted events were documented as being first-ever events (vs 46% in 2009). Similarly to 2009, about 97% (414/429) of all abstracted stroke events were admitted to the QEH, where the median length of stay was 4 days. Almost one-third of all admitted stroke patients (30%; 129/429) were discharged within 24 hours from the Accident and Emergency (A&E) Department without admission to a hospital ward, vs 94 (21%) in 2009. Of the 414 events with data abstracted from the QEH, 135 (33%) died before discharge. A little more than half (58%) of those dying in hospital were female. Of those who died in hospital, almost one-third (36; 30%) had severe impairment as measured by the Glasgow Coma Scale (GCS), vs only 15 (7%) of those who were still alive at discharge. The most common risk factors for hospital-admitted stroke patients were hypertension (86%) and diabetes (53%).

Cardiovascular disease in Barbados, 2010

1. BNR – Heart

Contents

1. Numbers and incidence rates
2. Demographic characteristics
3. Presentation and diagnosis
4. Treatment and outcomes

1. Numbers and incidence rates per 100,000 population

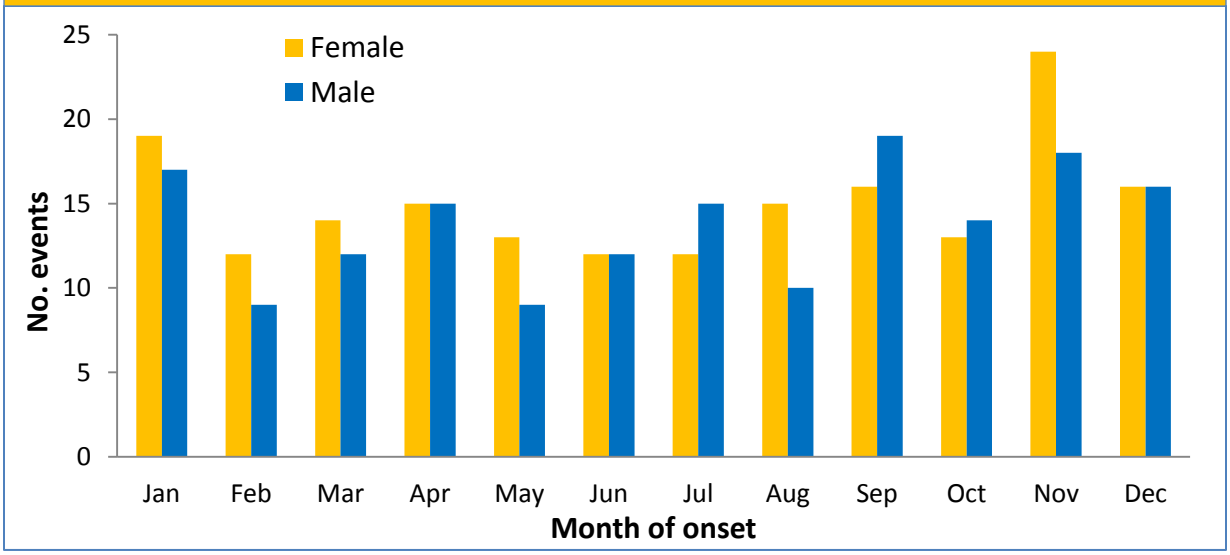
The number of events reported from a surveillance system gives an idea of the burden of disease in a country, and can be used to inform healthcare requirements. The incidence rate takes the population into account, and may be used to assess trends, or to determine differences within groups, once appropriate statistical tests have been applied. Note that the population used in this report is from the latest published census (2000), i.e. 10 years out of date. As the Barbadian population is likely to be greater now than 10 years ago, incidence rates presented here will be slightly higher.

The period under surveillance for this report was 01 January – 31 December 2010, inclusive (Figure 1.1).

There were 347 acute MIs and sudden cardiac deaths recorded in 344 patients during this period. Of the 347 events, 263 (76%) had a definite acute MI diagnosis (see Appendix A for definitions). Seventy-eight were sudden cardiac deaths (SCDs), for whom data were obtained from death records only (i.e. patient notes were not seen) and 6 were possible acute MI (Figure 1.2). Of the 269 definite and possible MIs:

- 126 (47%) had data abstracted from the Queen Elizabeth Hospital (QEH)

Figure 1.1. Number of patients with acute MI or sudden cardiac death by month of onset, Barbados, 2010

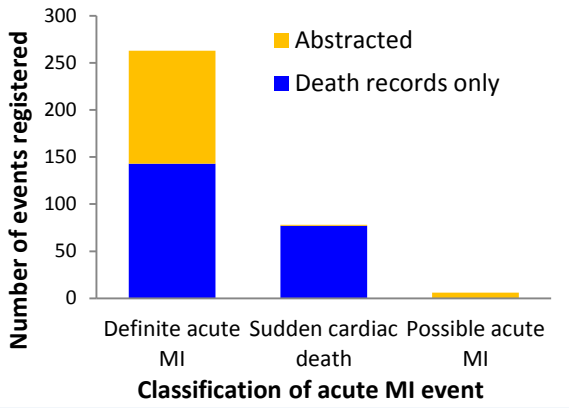


**Note*: for events recorded from death records only, month of death was used as month of onset

- 46 (17%) were classified as non-ST-segment elevation MIs (NSTEMI)
- 75 (28%) were classified as ST-segment elevation MIs (STEMI)

The crude incidence rate per 100,000 population for Barbados in 2010 was 129.1 (95%CI 115.9–143.4). The incidence rate standardized to the WHO world population was 93.2 (95%CI 83.0–104.3).* Using updated population census data (N=286,000) from the US Census Bureau,[2] the incidence rate per 100,000 would be 121.3 (95%CI 108.9–134.8). Incidence rates will be updated in the next Annual Report, after publication of the Barbados 2010 census.

Figure 1.2. Number of acute MI or sudden cardiac death events by diagnosis, Barbados, 2010 (N=347)



2. Demographic characteristics

National surveillance data are usually described by age-group and sex, to give a clinical picture of the case-mix for the disease in a country. Unless statistical tests have been performed, however, any between-group differences reported should not be taken as statistically significant, despite their potential clinical relevance.

In 2010, there were 181 female and 166 male patients with acute MI in Barbados, for an incidence rate per 100,000 of 129.7 in women (95%CI 111.5–150.0) and 128.5 in men (95%CI 109.7–149.6). Although the incidence rates are very similar overall, and even within 10-year age-groups (see Figure 1.3), the case-mix of younger patients is predominantly male, with twice as many male as female patients under 55 years, while females comprise a greater proportion of older patients (about 23% more females are 55 years and over).

Key points

- ≈11 acute MIs/month abstracted from QEH
- ≈18 acute MIs/month notified only at death
- More acute MIs in men than women 45-64 yrs
- Higher incidence rate in men aged 35-94 yrs
- 21% of acute MIs in men were <55 yrs
- 11% of acute MIs in women were <55 yrs

The incidence increased with age for both sexes, with most of the reported events in men occurring in those aged 45 years and older, while most reported acute MI events in women occurred in those aged 75 years and over (Figure 1.3).

3. Presentation and diagnosis

3.1. Hospitalisation and ambulance use

Of the 347 acute MI events in 2010, 193 (56%) were hospitalised at the QEH. One

*Note: directly standardized rates were calculated with CI based on the gamma distribution, as described by Fay and Feuer (1997).[1]

hundred and twenty-six had data abstracted from patient records (65% of all hospitalised patients; up from 59% in 2009), while 221 were found through death record information only.

Of the 126 patients with abstracted data, 119 (94%) had documented information on ambulance use, and of these, 83 (70%) had used an ambulance and all but one of these had dates and times of ambulance arrival and hospital admission clearly documented in their notes (up from 60% in 2009). Median ambulance time to hospital from pick-up for these patients was 26 minutes. Fifty-four patients had clearly documented ambulance arrival and chest pain onset times; for these, median time from onset to admission was 4.8 hours (vs 2.5 hours in 2009 for the 18 patients with this information documented).

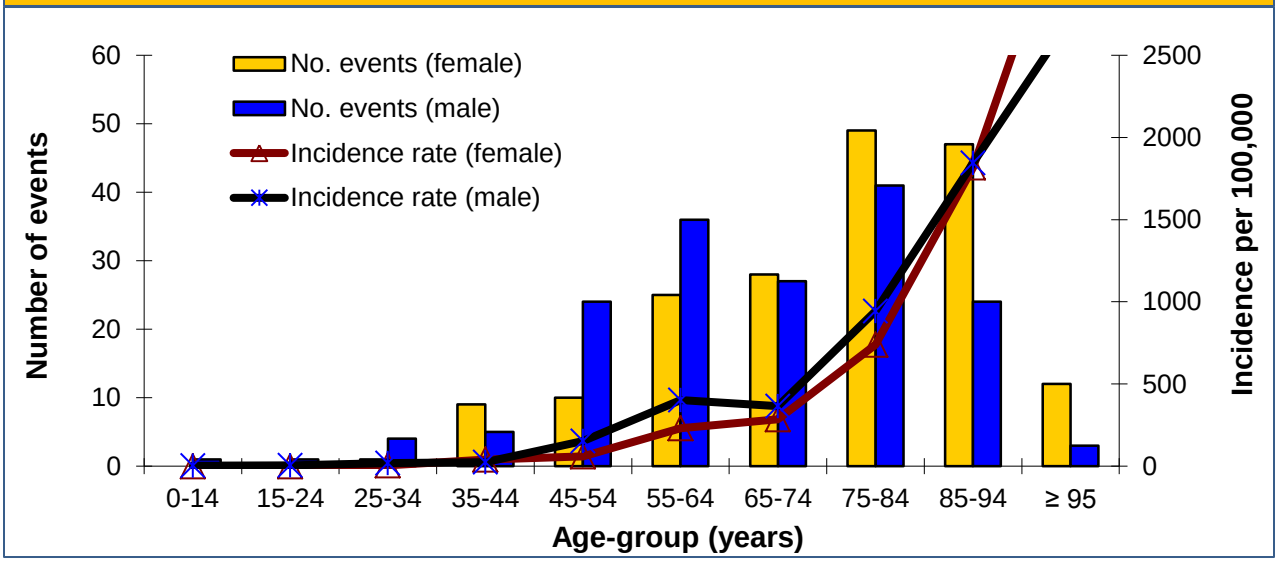
3.2. Length of hospital stay

Of the 126 patients with abstracted information, information on hospital stay was missing for 16 (13%), as the discharge forms had not been completed. For the remaining 110, median length of stay was 6 days (range 0-89 days). For the 27 patients (26%) who were treated in the intensive care unit (ICU), the median length of stay in ICU was 3 days (range 1-10 days).

Key points

- 2/5 acute MI patients died outside hospital
- 2/3 acute MI patients used ambulance
- Ambulance time from patient pickup: 26 min
- 1/4 acute MI patients treated in ICU
- Median length of stay in ICU: 3 days
- Median length of stay on ward: 6 days

Figure 1.3. Incidence rate per 100,000 population of acute MI and sudden cardiac death, Barbados, 2010 (N=347)



*Missing data from 2 events and †1 event for this symptom.

**Weakness (3), slurred speech (3), confused/ disorientated (2), fatigue/lethargy (2), swollen legs (2), seizures (2), dyspnoea (2), impaired vision (1).

3.3. Presenting symptoms

Sixty-seven of the 126 patients with abstracted information presented with at least 2 symptoms (53%). The most frequent symptoms, as in 2009, were chest pain and shortness of breath (Table 1.1).

3.4. Prevalence of known risk factors

Known risk factors are characteristics for which prior research has shown an association with acute MI. These can be biological (e.g. having a current co-morbidity, or having had a prior CVD event), lifestyle-related (e.g. smoking), or even family-history-related (e.g. having a family member who has had a prior CVD event).

Table 1.2 shows the prevalence of known CVD risk factors among the 126 patients in 2010 with abstracted data. The most common reported known CVD risk factors were hypertension (92 patients; 74%), obesity (65; 52%) and diabetes (57; 46%). Almost 1 in 5 patients were smokers (18%). Only 5 patients (4%) had had a prior coronary intervention (data not shown).

Table 1.1. Presenting symptoms for acute MI patients in Barbados, Jan-Dec 2010 (N=126)

Symptom	Number	%
Chest pain*	111	90
Shortness of breath	58	46
Sudden vomiting†	49	39
Palpitations†	21	17
Sudden dizziness/vertigo	19	15
Cough	11	9
Light-headedness, nausea/malaise	12	10
Diarrhoea	7	6
Decreased responsiveness	7	6
Headache	5	4
Numbness (limbs, fingers)	5	4
Abdominal pain	5	4
Other**	17	13

*Missing data from 2 events; †missing data from 1 event; **weakness (3), slurred speech (3), confusion (2), fatigue (2), swollen legs (2), seizures (2), dyspnoea (2), impaired vision (1).

Table 1.2. Prevalence of known risk factors among acute MI patients, Jan-Dec 2010 (N=126)

Risk factor type	Risk factor	Number	Percentage	(N*)
Prior CVD event/disease	Prior acute MI	17	24	70
	Prior IHD	18	14	126
	Prior stroke	5	4	119
Current co-morbidity	Hypertension	92	74	124
	Obesity	65	52	125
	Diabetes	57	46	124
	Hyperlipidaemia	25	20	124
Lifestyle-related	Alcohol use	31	25	125
	Smoking	14	11	126
	Drug use	4	3	126
Family history	Mother or father (acute MI)	13	25	51
	Sibling (acute MI)	6	12	51
	Mother, father or sibling (stroke)	4	16	24

*N = denominator (i.e. total number reporting information about that risk factor).

Key points

- Most acute MI patients (74%) also have hypertension
- More than half of acute MI patients (52%) are also obese
- Almost half (46%) acute MI patients also have diabetes
- Good documentation of cardiac bio-marker test results
- Poor documentation of cardiac bio-marker test times

3.5. Diagnosis

Diagnosis of an acute MI can be complex; combining clinical judgment with biochemical marker and ECG results (see Appendix A) Current international consensus diagnostic guidelines[3] include serial tests for the cardiac biomarker Troponin (an indicator of recent heart muscle damage) over a certain period. Prior to Troponin, the creatine-kinase (CK-mB) tests were in common use. The results of these tests, as well as the times at which they were performed, should be recorded in the patient's notes.

Of the 126 patients for whom data were abstracted from hospital records, there was information on cardiac biomarkers for 102 (81%); these had all had at least one CK-mB test. Ninety-three patients with acute MI (74%) had at least one Troponin-I test (Table 1.3)., vs 54% in 2009.

Table 1.3. Number of patients with serial (up to three) cardiac biomarker tests

	1		2		3	
	No.	**%**	**No.**	**%**	**No.**	**%**
CK-mB	102	**81**	95	**75**	86	**68**
Troponin	93	**74**	82	**65**	71	**56**

More than half of the patients had had three Troponin-I tests (56%), while about two-thirds (68%) had had three CK-mB tests (Table 1.3). Of the 102 with at least one biomarker test, fewer than 20% had test times clearly documented (Table 1.4).

An ECG report was available for 97 patients (83%) of the 105/126 (83%) who had had serial ECGs performed, and of these, the ischaemic region was identified in 88 (91%), as shown in Table 1.5.

As in 2009, most patients (75; 62%) were diagnosed with ST- segment elevation on ECG (Table 1.6). There were 66 patients (55%) with T wave inversion and 56 patients (46%) with ST-segment depression.

Table 1.4. Median times taken from onset to cardiac biomarker tests

	Time from onset to first biomarker			**Time from first to second biomarker**			**Time from second to third biomarker**		
CK-mB		**N=17**			**N=13**			**N=10**	
	Mins	*Hrs*	*Range (h)*	*Mins*	*Hrs*	*Range (h)*	*Mins*	*Hrs*	*Range (h)*
	240	**4.0**	0-21	420	**7.0**	1-35.5	420	**7.0**	3.5-19.6
Troponin		**N=5**			**N=3**			**N=2**	
	Mins	*Hrs*	*Range (h)*	*Mins*	*Hrs*	*Range (h)*	*Mins*	*Hrs*	*Range (h)*
	235	**3.9**	1.5-18.8	540	**9**	1.5-20.3	1020	**17.0**	7.0-27.0

Table 1.5. Ischaemic region on ECG*(N=88)		
Region	**Number**	**%**
Inferior	33	34
Anterolateral	25	26
Anterior	23	24
Lateral	17	18
Septal	15	15
Posterior	5	5
Anteroseptal	4	4
Right ventricle	2	2
Inferior lateral	2	2
Undetermined/Unknown	16	16

*Note: patients can have more than one region listed.

Table 1.6. ECG* category (N=121)		
ECG category	**Number**	**%**
ST-segment elevation	75	62
T wave inversion	66	55
ST-segment depression	56	46
Pathological Q waves	26	21
Left ventricular hypertrophy	19	16
Atrial fibrillation	9	7
Left bundle branch block	7	6
Right bundle branch block	6	5
Old MI	6	5
Non-specific ST-T changes	5	4
Normal	4	3
Other†	7	6
Unknown	5	4

**Note*: patients can have more than one category listed.

†Other: Left atrial hypertrophy (3); acute ventricular failure (2); right ventricular hypertrophy (1); sinus tachycardia (1).

4. Treatment and outcomes

4.1 Routine medication

The initial treatment of an acute MI relates specifically to the underlying cause of the problem. For NSTEMI events, the initial treatment normally focuses on preventing the constricted artery from becoming completely blocked, e.g. through "blood-thinning" medication (e.g. aspirin). Best-practice guidelines[5] suggest that five oral medications are given to patients with an acute MI diagnosis during hospitalization and following discharge (see Appendix A).

Information on medication use was available for 97 of the 126 patients (77%) for whom information was abstracted from hospital notes (Table 1.7). Of these, 86 (89%) were given aspirin acutely (i.e. within the first 24 hours of admission), and 67 (69%) were given aspirin on discharge from the QEH. The three other most-prescribed medications in the acute stage (given to almost 2/3 of all patients) were Clopidogrel (Plavix), low molecular weight Heparin (Heparin LM), and statins. Plavix and statins were also the most commonly prescribed at discharge (apart from aspirin).

Table 1.7. Routine medication for acute MI patients in Barbados, Jan-Dec 2010				
Medication	**Acute use***		**On discharge**	
	No.	**%**	**No.**	**%**
Aspirin	86	89	67	69
Clopidrogel (Plavix)	66	68	55	57
Heparin LM	66	68	7	7
Statin	60	62	65	67
GI prophylaxis	52	53	27	28
Insulin	24	25	14	14
Heparin SC	10	10	-	-
Warfarin	4	4	5	5

*On arrival or within 24 hours of admission.

4.2 Reperfusion

For STEMI events, the treatment aim would usually be to open the artery as quickly as possible in order to restore normal blood flow, either through "clot busting" medication (e.g. thrombolytics) or angioplasty.

Of the 126 patients for whom data were abstracted from patient notes, most (75; 60%) were diagnosed with ST-segment elevation MI (STEMI). Thirty-three (26%) were diagnosed as non-ST-segment elevation MI (NSTEMI). A further 12 (10%) were classified only as definite MI, and 5 (4%) as possible MI. Reperfusion was attempted in 28 of these 126 patients (22%), with STEMI being documented in 27 (96%) of these patients. As a proportion of all STEMI patients, reperfusion was attempted in 36% (27/75).

4.3. Hospital complications

Fifty-one patients (40%) had at least one in-hospital complication, and 18 (13%) had two or more. The main complication was chest pain/angina (Table 1.8).

Table 1.8. In-hospital complications*

Hospital complication	Number	% (all†)	% (**)
Post MI chest pain/angina	27	21	42
Cardiac arrest	9	7	14
Infection	4	3	6
Left ventricular failure	4	3	6
Cardiogenic shock	4	3	6

*Note: Some patients had more than one complication.
†N=126.
**Of those with recorded complications (N=51)

4.4. Mortality

In-hospital deaths

Of the 126 patients admitted to hospital for whom data were abstracted from their notes, 8 had an unknown outcome (6%). Of the remaining 118, 21 died in hospital (18%). A further 68 patients were only notified at death, with place of death listed as the hospital (Table 1.9), for an overall in-hospital CFR of 48% (89/186). This is higher than the overall 'died in hospital' proportion shown in Table 1.9 below (26%), as the denominator for the latter is all patients, i.e. including those who were not hospitalised (89/347).

Table 1.9. Outcomes for all acute MI patients diagnosed in 2010 (N=347)

Outcome	Number	%
Died outside of hospital	153	44
Died in hospital	89	26
Alive at discharge	97	28
Hospitalised but outcome unknown	8	2

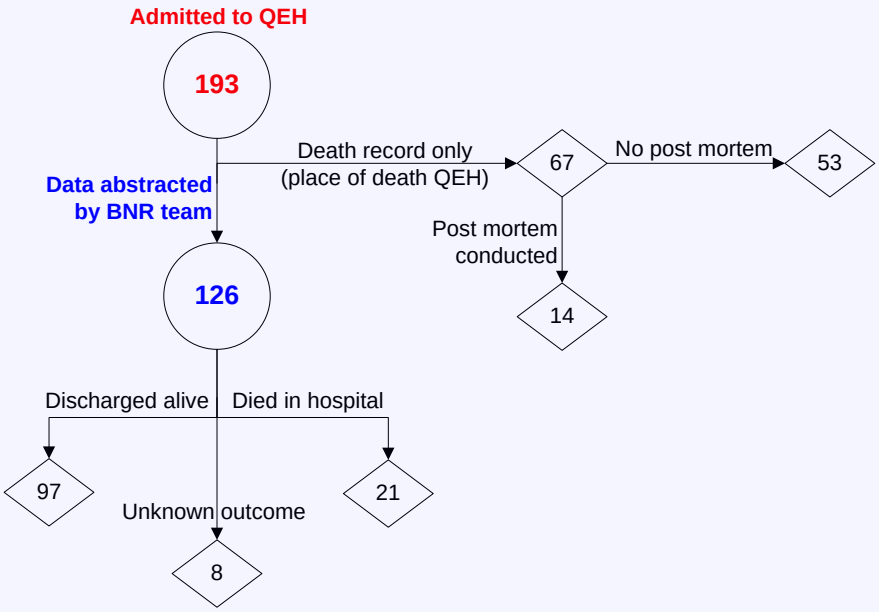
The overall proportion of acute MI patients who died from either acute MI or sudden cardiac death in 2010 was 71% (242/339). Thirty-five of these (14%) had no information on certification of death. Nine deaths were certified by the Coroner (4%), 140 (58%) were medically certified, and 58 (24%) had had a post mortem performed.

Key points

- ≥ 2/3 hospitalised patients were given aspirin, heparin or Plavix in the acute stage (within 24 hours of arrival)
- About 2/5 patients had a documented hospital complication
- In-hospital death rate is estimated at 48%

Focus on acute MI in-hospital outcomes

Although today, in the developed world setting, in-hospital case fatality rates (CFR) for acute MI are rarely more than 17% (and often are closer to 12%), the overall in-hospital CFR for the QEH for 2010 is **48%** (88/185 with known outcome). This estimate should be interpreted with caution, however, as there is a degree of uncertainty about those for whom information was not abstracted by the team (i.e. event information was obtained from death certificate information only) and for whom no post mortem was conducted (53 patients; see graphic below).



A more accurate in-hospital CFR estimate would be calculated using abstracted data and "death certificate only" reports where the patient has had a post mortem (140 patients). This CFR would be **25%** (35/140). Hospital admission diagnoses for the remaining 53 patients whose acute MI information only came from a death certificate and who had not had a post mortem were reviewed by the BNR, in order to elucidate whether they should have been abstracted by the team while in hospital. Of the 53, only 5 admitting diagnoses should have triggered case-finding by the BNR (9%), while the remaining were either missing information from A&E records (38%) or would not have triggered case-finding, as their admitting diagnoses were not part of the criteria for an acute MI (53%).

2. BNR – Stroke

Contents

1. Numbers and incidence rates

2. Demographic characteristics

3. Presentation and diagnosis

4. Treatment and outcomes

1. Numbers and incidence rates

For notes on incidence rates and population, please see this section for acute MI on page 10.

The period under surveillance for this report was 01 January – 31 December 2010, inclusive (Figure 2.1). The total population of Barbados used for analyses was 268 756.

(a) There were 584 strokes recorded during this reporting period (4 patients had more than one stroke event in 2010).

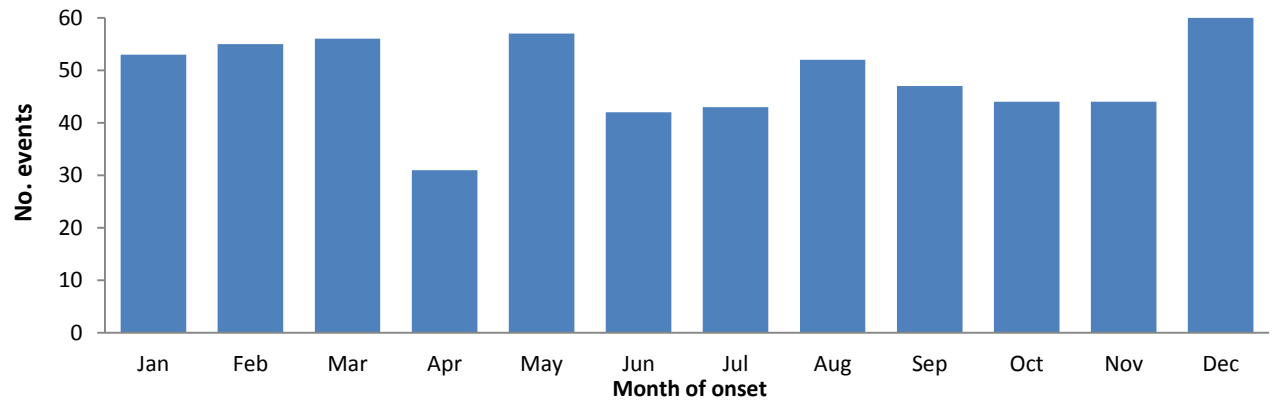
(b) There were 155 stroke events (27%) notified only at death. The remaining 429 had data abstracted from hospital (414; 69%) or private physician records (15; 3%).

(c) Of the 429 abstracted stroke events, 379 (88%) were classified by sub-type. The two main groups were ischaemic stroke (317; 84%) and haemorrhagic stroke (62; 16%). The latter group was further classified into intracerebral (47; 76%) and subarachnoid haemorrhage (15; 24%).

(d) There were 131 first-ever stroke events registered (57% of the 228 events for whom this information was documented).

There were approximately 49 strokes registered per month in Barbados in 2010 (Figure 2.1). Crude incidence rate was 217.3 per 100,000 population (95%CI 200.0-235.7) for all strokes. For first-ever strokes, this was 48.7 (95%CI 40.8-57.8). Incidence standardised to the WHO world population was 152.3 per 100,000 population per year (95%CI 139.4-166.0) for all events, and 35.7 per 100,000 per year (95%CI 29.5-42.8) for first-ever stroke events. [Note: directly standardized rates with CI based on the gamma distribution (Fay and Feuer[1])]. Using updated population census data (N=286,000) from the US Census Bureau,[2] the incidence rate per 100,000 would be 204.2 (95%CI 188.0–221.4). Incidence rates will be updated in the next Annual Report, after publication of the Barbados 2010 census.

Figure 2.1. Number of stroke events by month of onset, Barbados, 2010



2. Demographic characteristics

National surveillance data are usually described by age-group and sex, to give a clinical picture of the case-mix for the disease in a country. Unless statistical tests have been performed, however, any between-group differences reported should not be taken as statistically significant, despite their potential clinical relevance.

In 2010, 323 females and 261 males had stroke events, for overall incidence rates of 231.4 (95%CI 206.9–258.1) and 202.1 per 100 000 (95%CI 178.3–228.1), respectively. The number of stroke events registered by age-group and sex is shown below in Figure 2.2. The incidence per 100 000 population increased with age for both sexes.

3. Presentation and diagnosis

3.1. Diagnostic tests used

A stroke event is generally diagnosed clinically, with imaging tests providing information for stroke sub-type classification. The primary imaging tests used in stroke diagnosis in Barbados are the CT and the MRI (see Appendix A).

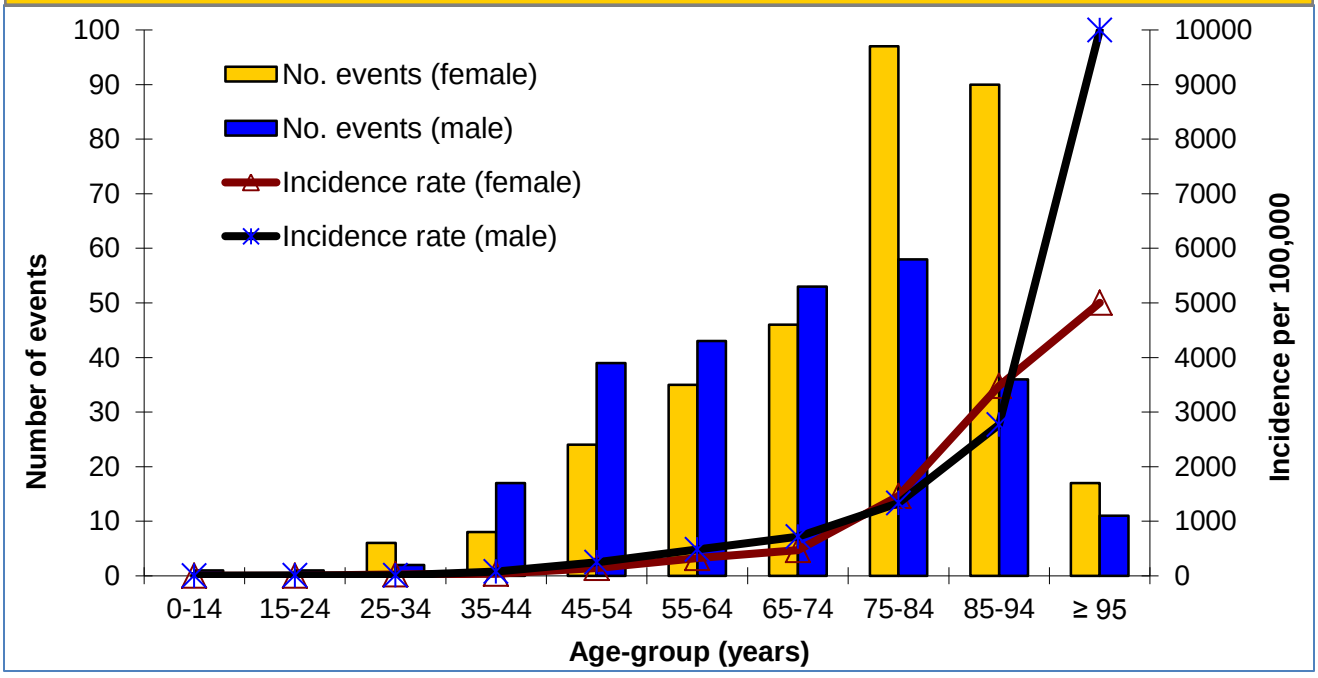
Key points

- ≈49 strokes/month occur in Barbados
- Greater number of strokes reported for women than men in those aged ≥75 yrs
- Number and incidence rate of first-ever stroke events lower than expected based on data from previous registry

The rest of this report concerns only the 429 hospitalised and community-treated stroke events, for which data were abstracted from hospital or clinic records.

Of the 429 abstracted stroke events, 386 (90%) received a CT scan, while 4 (1%) had an MRI. Of the 374 (97%) for whom this information was available, 262 (70%) had their scan within 24h and 101 (27%) were scanned more than 24h after onset but within 7 days. Fewer than 20% (72) of these stroke patients went on to receive

Figure 2.2. Incidence rate of stroke per 100 000 population in Barbados, 2010, by age-group and sex



a secondary diagnostic test (cerebral/carotid angiography, carotid ultrasound, or lumbar puncture).

3.2. Classification of stroke subtypes

Stroke sub-typing provides a classification of the type of stroke (see Appendix A), which is important for determining treatment.

The majority of registered strokes in 2010 were classified as ischaemic (317; 74%) with only 62 (15%) haemorrhagic strokes (Table 2.1).

Table 2.1. Classification of stroke subtypes

Stroke subtype	Number	%
Ischaemic stroke	317	73.9
Intracerebral haemorrhage	47	11.0
Subarachnoid haemorrhage	15	3.5
Unclassified/unspecified*	41	9.6
Not documented	9	2.1

*Unclassified strokes reflect that (1) neither CT nor medical autopsy result was available at time of diagnosis; **or** (2) it was not possible to clinically specify the stroke.

3.3. Presenting symptoms and signs

The symptoms experienced by a patient are usually a part of the presenting complaint, causing them to seek medical attention. Presenting signs, however, are those noted in the patient's record by the physician as having been observed in the patient at first clinical examination. Although often similar, signs do not necessarily correspond with symptoms.

There were 405 patients (94%) with at least one symptom documented. The most common were facial weakness (340; 79%) and slurred speech (274; 64%). Fewer than 10% of patients (24) had no recorded signs. Half of the patients (228) experienced at least two signs, the commonest of which were limb weakness (366; 85%) and slurred speech (191; 45%).

3.4. Length of hospital stay

There were 465 patients with stroke (79%) admitted to the QEH during 2010. Of these, 404 (84%) had length of stay documented. Of these, 126 (31%) were discharged within 24 hours from the Accident and Emergency Department without admission to a hospital ward. Median length of hospital stay was 4 days (range 1–660 days; where "1 day" includes those discharged on the day of admission). For the 19 patients (5%) who received intensive care, median length of stay on an intensive care ward was 11 days (range 1-110 days).

3.4. Prevalence of known risk factors

Known risk factors are characteristics for which prior research has shown an association with stroke. These can be biological (e.g. having a current co-morbidity, or having had a prior CVD event), lifestyle-related (e.g. smoking), or even family-history-related (e.g. having a family member who has had a prior CVD event).

Table 2.2 shows the prevalence of known CVD risk factors among 334 of the 429 hospitalised patients (78%) in 2010 with documented risk factors. The most common were hypertension (287 patients; 86%), diabetes (178; 53%) and prior stroke or transient ischaemic attack (117; 35%). About 1 in 10 patients were smokers (12%), obese (11%) or had high cholesterol (10%). Fewer than 5% of patients had a documented family history of stroke.

Table 2.2. Prevalence of known risk factors among stroke patients, January-December 2010 (N=334)			
Risk factor type	**Risk factor**	**Number**	**Percentage**
Prior CVD event/disease	Prior stroke or TIA	117	35%
	Congestive cardiac failure	22	7%
	Atrial fibrillation	20	6%
	Prior/current IHD/CVD/PVD	17	5%
	Prior acute MI	3	1%
Current co-morbidity	Hypertension	287	86%
	Diabetes	178	53%
	Obesity	38	11%
	High cholesterol	35	10%
Lifestyle-related	Smoking	40	12%
	Alcohol use	35	10%
Family history of stroke	Mother, father or sibling	14	4%

Key points

- Almost 3/4 patients have an ischaemic stroke
- Most common stroke symptoms in Barbadian patients: facial weakness and slurred speech
- More than 8/10 stroke patients also have hypertension
- About 1/2 stroke patients also have diabetes
- 1/7 stroke patients have already had a stroke or a transient ischaemic attack (TIA)

4. Treatment and outcomes

4.1. Routine medication

The initial treatment of a stroke relates specifically to the underlying cause of the problem. For non-haemorrhagic (or ischaemic) events, the initial treatment normally focuses on preventing the constricted artery from becoming completely blocked through "blood-thinning" medication (e.g. aspirin). Best-practice guidelines[5] suggest that reperfusion (e.g. thrombolysis using a "clot-busting" drug) should be attempted on all patients with an ischemic stroke diagnosis (see Appendix A).

In Barbados in 2010, no stroke patients were given thrombolysis. Information on medication use was available for up to 150 patients admitted to the QEH (Table 2.3). There was documented evidence of 149 (35%) patients being given aspirin acutely (i.e. within the first

Table 2.3. Routine medication for hospitalised stroke patients discharged alive in Barbados, Jan-Dec 2010				
Medication	**Acute use* (N=429)**		**On discharge† (N=276)**	
	No.	**%**	**No.**	**%**
Aspirin	149	35%	150	54%
Statins	95	22%	133	48%
GI prophylaxis	108	25%	48	17%
Heparin SC	91	21%	-	-
Insulin	44	10%	22	8%
Heparin LM	10	2%	6	2%
Warfarin	3	1%	11	4%
Clopidrogel (Plavix)	5	1%	9	3%

*On arrival or within 24 hours of admission.
†Patients discharged alive.

24 hours of admission), while 150 (54%) were recorded as being given aspirin on discharge from the QEH. The three other most-prescribed medications in the acute stage (given to at least 1/5 of all patients) were GI prophylactic medication, statins and subcutaneous Heparin (Heparin SC). Statins and GI prophylaxis were also the most commonly prescribed at discharge (apart from aspirin).

4.2. Hospital complications

Sixty-eight patients (16% of 414 hospitalised patients with abstracted data) had at least one in-hospital complication, and 11 (3%) had two or more. The main complication, reported by almost half of those with complications, was pneumonia (Table 2.4).

Table 2.4. In-hospital complications*

Hospital complication	Number	% (**)
Pneumonia	29	43%
Urinary tract infection	12	18%
Cardiac arrest/acute MI	5	7%
Sepsis	4	6%
Decubitus ulcer	4	6%
Seizure	4	6%
Atrial fibrillation	4	6%
Renal impairment/failure	3	4%

**Note*: Some patients had >1 complication.
**Of those with recorded complications (N=68).

4.3. Mortality

Of the 584 stroke patients in 2010, 185 (32%) died before discharge from the QEH (Table 2.5). The in-hospital death rate (proportion of all 429 admitted patients who died while still in hospital), was 43% (185/429). Five hospitalised patients (1%) did not have vital status documented. Of the 185 events in hospitalised patients that led to death, data were abstracted by the BNR for 135 (73%).

Table 2.5. Outcomes for all stroke patients diagnosed in 2010 (N=584)

Outcome	Number	%
Alive at hospital discharge	274	47%
Died in hospital	185	32%
Died outside of hospital	106	18%
Alive in the community	14	2%
Hospitalised with outcome unknown	5	1%

In-hospital abstracted stroke deaths (N=135)

Most admitted patients with abstracted data who died before discharge (112; 83%) had been hospitalised for at least 24 hours. A CT scan was performed on 124 (92%) of those who died in hospital. One hundred and four of the deceased patients (77%) had at least two symptoms documented. Table 2.6 compares selected characteristics between 135 patients who died before discharge from hospital and 274 who were alive at discharge.

The Glasgow coma scale (GCS) is used to assess the severity of brain impairment in somebody with a brain injury, and is the sum of scores given for eye-opening, verbal, and motor responses. The highest score (15) indicates no impairment and a score of 8 or less indicates severe impairment.

Initial GCS scores were documented for 121 (90%) of the 135 patients who died before discharge. Of the 121, almost one-third (36; 30%) had severe impairment (Table 2.6). In contrast, only 15 (7%) of patients who were still alive at discharge had severe impairment based on this scale (Table 2.6).

Table 2.6. Selected characteristics of stroke patients who were alive at discharge vs those who died before discharge from hospital (N=409)				
	Alive at discharge (N=274)		Died in hospital (N=135)	
Median age (range)	68 years (27-95)		80 years (40-98)	
Median length of stay (range)	3 days (1-660)		6 days (1-91)	
	No.	**(%)**	**No.**	**(%)**
Females	136	(50%)	77	(57%)
First-ever stroke	84	(31%)	37	(27%)
Total GCS score *Total tested*	221	(81%)	121	(90%)
<9*	15	(7%)	36	(30%)
9-14	49	(22%)	63	(52%)
15†	157	(71%)	22	(18%)
Stroke sub-type				
Ischaemic	212	(77%)	91	(67%)
Intracerebral haemorrhage	22	(8%)	24	(18%)
Subarachnoid haemorrhage	12	(4%)	2	(2%)
Unclassified**	28	(10%)	18	(13%)

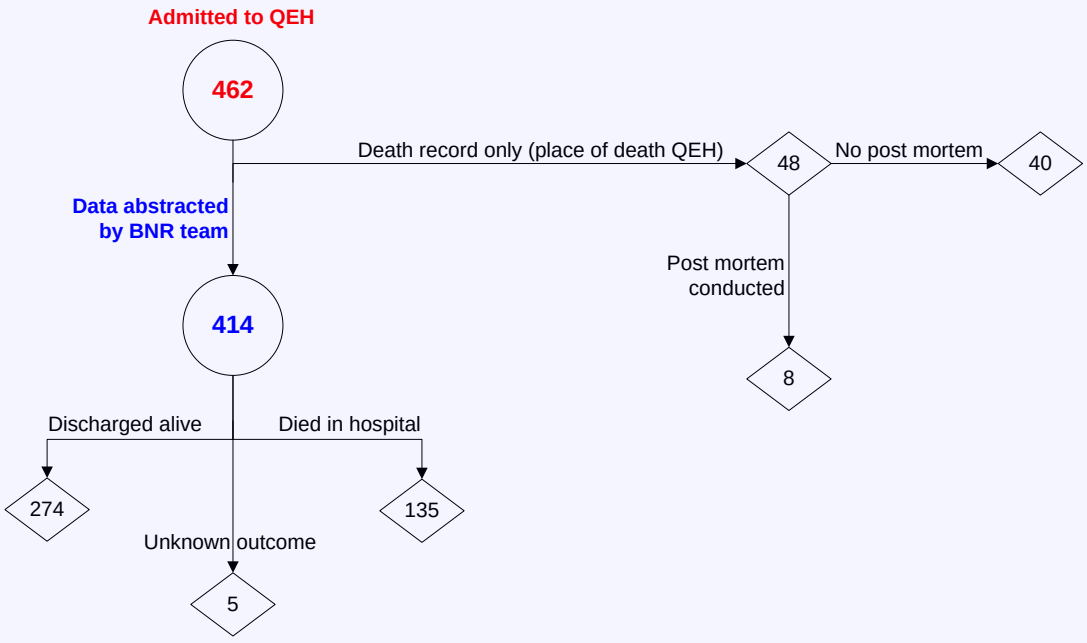
*Severe impairment.

†No impairment.

** Six of those alive at discharge and 3 of those who died in hospital had missing information on stroke subtype.

Focus on stroke in-hospital outcomes

The overall QEH in-hospital case fatality rate (CFR) for stroke in 2010 is **40%** (183/457 with known outcome). This estimate should be interpreted with caution, however, as there is a degree of uncertainty about those for whom information was not abstracted by the team (i.e. event information was obtained from death certificate information only) and for whom no post mortem was conducted (40 patients; see graphic below).



A more accurate in-hospital CFR estimate would be calculated using abstracted data and "death record only" reports where the patient has had a post mortem (417 patients). This CFR would be **34%** (143/417). Hospital admission diagnoses for the remaining 40 patients whose stroke information only came from a death certificate and who had not had a post mortem were reviewed by the BNR, in order to elucidate whether they should have been abstracted by the team while in hospital. Of the 40, 13 admitting diagnoses should have triggered case-finding by the BNR (33%). Nineteen (48%) would not have triggered case-finding, as their admitting diagnoses were not part of the criteria for stroke. The remaining 8 (20%) were not picked up by the team as they were either missing diagnosis information from A&E records or had been admitted directly to a ward.

Appendix A: Definitions

1. Statistics

An **incidence rate** is the number of new disease events occurring in a specified population during a year, usually expressed as the number of events per 100,000 population at risk. That is,

Incidence rate = (New events / Population) × 100,000

The numerator of the incidence rate is the number of new disease events; the denominator is the size of the population. The number of new events may include multiple events occurring in one patient. In general, the incidence rate would not include recurrences (where recurrence is defined as a presentation to the healthcare system within a certain period of the initiating event).

An **age-adjusted rate** is a weighted average of the age-specific rates, where the weights are the proportions of persons in the corresponding age groups of a standard population. The potential confounding effect of age is reduced when comparing age-adjusted rates computed using the same standard population.

A **mortality rate** is the number of deaths, with the disease (stroke or AMI) as the underlying cause of death, occurring in a specified population during a year. Mortality is usually expressed as the number of deaths due to the disease per 100,000 population. That is,

Mortality rate = (Disease Deaths/Population) × 100,000

The numerator of the mortality rate is the number of deaths; the denominator is the size of the population.

2. BNR-Stroke

The BNR uses the WHO stroke definition of a focal or global neurological impairment of sudden onset, lasting more than 24 hours (or leading to death), and of presumed vascular origin.[3]

Global impairment refers to patients with depressed consciousness or coma. The definition excludes:

- Coma of systemic vascular origin
  - Shock
  - Stokes-Adams' syndrome
  - Hypertensive encephalopathy
- Transient ischemic attacks (TIA)
- Subdural haemorrhage
- Epidural haemorrhage
- Poisoning
- Symptoms of trauma

Ischaemic stroke

Stroke symptoms which are known to originate from an occlusion (blockage) of cerebral arteries.

Intracerebral haemorrhage

Stroke symptoms which may arise from the bleeding from intracerebral arteries.

Subarachnoid haemorrhage

Stroke symptoms which arise from bleeding from intra-cranial arteries, resulting in blood arising between the two membranes which surround the brain.

CT (computerised tomography) and **MRI** (magnetic resonance imaging) refer to two of the most common tests which may be used to diagnose a stroke event, and to classify its subtype.

Treatment guidelines (stroke)

Current best practice for ischaemic stroke treatment[4,5] suggests two main medications to be given during hospitalization with the aim of decreasing mortality.

- **Thrombolysis**, for urgent clot lysis, within 4.5 hours of symptom onset
- **Antiplatelet therapy,** to lower risk of a recurrent event: aspirin, or (if intolerant to aspirin) clopidogrel or dipyridamole
- **Anti-coagulants,** routine use discouraged unless patient has recurrent embolic stroke, atrial fibrillation, deep vein thromboses or pulmonary embolus
- **Statins,** to lower cholesterol and the risk of recurrence: not routine, but recommended if patient already on statins or once not contra-indicated

3. BNR-Heart

The working definition for acute MI in Barbados is based on the current universal and epidemiological definitions.[6] The 99th percentile upper reference limits (URL) for the levels of specific cardiac biomarkers in a healthy Barbadian population are not available at this time.

Definite acute MI

A definite acute MI is defined as:

- Diagnostic cardiac biomarkers *(serial measurements ~6-9 hours apart, level elevated above lab URL, rise/fall in levels demonstrated*) with **at least one** of:
  - Typical or atypical acute MI symptoms and/or signs of cardiac failure (*Killip Class II-IV*)[†]
  - Imaging changes *(New wall motion abnormalities)*
  - Positive ECG (STE/NSTE/New LBBB/ Path Q waves)[‡]
- Sudden (unexpected) cardiac death
  - Post CABG or PCI with cardiac biomarkers 5X and 3X laboratory upper reference limit (lab URL)[§] respectively
  - Pathological findings of acute MI

Probable acute MI

A probable acute MI is defined as:

- Positive ECG with one of the following:
  - Cardiac symptoms and/or signs plus missing biomarkers OR inadequate biomarkers (*samples measured > 10hrs apart OR no serial measurements*)
  - Equivocal biomarkers (*only 1 biomarker elevated>lab URL OR only 1 with rise/fall not in the setting of clinical cardiac ischaemia OR non-ischaemic causes of biomarker elevation present*)

Possible acute MI

A possible acute MI is defined as:

- Equivocal biomarkers plus cardiac symptoms and/or signs OR non-specific ECG (*ST depression 0.5-1.0mm , T wave inversion or flattening in leads with dominant R waves*)
- Positive ECG plus missing OR inadequate biomarkers

[†]Class II= crackles, S3 gallop and elevated JVP; Class III=frank pulmonary oedema; Class IV=cardiogenic shock.

[‡]NEW findings in at least two contiguous leads of either evolving ST elevation (ST elevation ≥1.0mm), or evolving non-ST elevation (horizontal/down-sloping ST depression ≥1.0mm and/or T inversion of ≥1.0mm with R wave prominence or R/S ratio>1) or evolving pathological Q waves (≥0.04s and > ¼ of R wave amplitude) or LBBB.

[§]Threshold levels for biomarkers=upper lab reference limit for AST, CK-MB, CK-MBm and > 0.1µg/L for Troponin.

Treatment guidelines (acute MI)

Current best practice[7] suggests five oral medications are often given to patients during hospitalization and following discharge with an acute myocardial infarction diagnosis; all with the aim of decreasing mortality and protecting heart muscle:

- **Aspirin,** to lower the risk of another event
- Additional **blood thinners** (e.g. Clopidrogel), to lower the risk of another event and to prevent clots from building up on stents
- **Beta-blockers,** to lower the risk of abnormal heart rhythms and to promote healing of heart muscle damage
- **ACE inhibitors or angiotensin receptor blockers,** to promote healing of the heart and to lower the risk of another heart attack
- **Statins,** to lower cholesterol and the risk of another heart attack

References

1. Fay MP, Feuer EJ. Confidence intervals for directly standardized rates: a method based on the gamma distribution. *Stat Med* 1997; 16(7): 791-801.
2. http://www.census.gov/population/international/data/idb/region.php?N=%20Results%20&T=13&A=separate&RT=0&Y=2010&R=-1&C=BB
3. World Health organisation. WHO STEPS Stroke Manual: The WHO STEPwise approach to stroke surveillance. 2006: Geneva, World Health Organisation.
4. National Institute for Health and Clinical Excellence, 2008. Stroke: Diagnosis and immediate management of acute stroke and transient ischaemic attack. High Holborn: London.
5. Adams HP Jr, del Zoppo G, Alberts MJ, Bhatt DL, Brass L, Furlan A, Grubb RL, Higashida RT, Jauch E, Kidwell C, Lyden PD, Morgenstern LB, Wureshis AI, Rosenwasser RH, Scott PA, Wijdicks RM. Guidelines for the early management of adults with ischemic stroke : A guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Athero-sclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Interdisciplinary Working Groups: The American Academy of Neurology affirms the research value of this guideline as an educational tool for neurologists. *Stroke*. 2007(38):1655-1711.
6. Thygesen K, Alpert JS, White HD, on behalf of the Joint ESC/ACCF/AHA/WHF Task Force for the Redefinition of Myocardial Infarction. Universal Definition of Myocardial Infarction. *Circulation* 2007; 116:2634-2653.
7. UK Dept of Health Vascular Programme Team. Treatment of Heart Attack National Guidance, Final Report of the National Infarct Angioplasty Project (NIAP) Last down-loaded on 27 October 2010 from: http://www.bcis.org.uk/resources/documents/NIAP%20Final%20Report.pdf

Appendix B: Advisory groups' membership lists

The Technical Advisory Committee of the BNR (2010)

Name	Affiliation
Dr Michael Campbell (Chair)	Chairman, Ethics Committee, QEH
Dr Euclid Morris	Lecturer – Faculty of Medical Sciences
Mr John Grace	President, Diabetes Association of Barbados
Ms Hyacinth Grimes	President, Myeloma, Lymphoma & Leukaemia Foundation of Barbados
Dr Stephen Moe	President, Heart & Stroke Foundation of Barbados
Mr Aubrey Blackett	President, Cancer Support Services
Ms Yvonne Lewis	Vice President, Cancer Support Services
Dr Dorothy Cooke-Johnson	Honorary Secretary, Barbados Cancer Society
Ms Harriet Brathwaite	Corporate Communication Specialist, Sagicor
Dr Kenneth George	Senior Medical Officer of Health, MoH
Mr Mitchell Clarke	Chief Nursing Officer, MoH
Ms Louise Bobb	DSS (Ag), QEH
Dr RK Shenoy	Consultant Radiotherapist, QEH
Prof. David Corbin	Consultant Neurologist, QEH; Clinical Director, BNR – Stroke
Dr Rudolph Delice	Head of Dept of Medicine, QEH; Clinical Director, BNR – Heart
Prof. Patsy Prussia	Honorary Consultant Pathologist, QEH; Clinical Director, BNR – Cancer
Prof. Anselm Hennis	Director, CDRC
Ms Angela Rose	Director, BNR
Ms Tracey Blackman	Data Manager, BNR
Mrs Gina Pitts	CVD Registrar, BNR
Ms Rhea Harewood	Cancer Registrar, BNR

The Professional Advisory Board of the BNR (2010)

Name	Affiliation
Prof. Trevor Hassell (Chair)	Chairman of the National Commission for Chronic Non-Communicable Diseases
Dr Bernadette Theodore-Gandi	Caribbean Programme Co-ordinator, PAHO/WHO
Dr Joy St John	Chief Medical Officer, MoH
Dr Kenneth George	Senior Medical Officer of Health, MoH
Dr Dexter James	CEO of the QEH
Dr Richard Ishmael	Consultant cardiologist, QEH
Dr RK Shenoy	Consultant radiotherapist, QEH
Prof. David Corbin	Consultant Neurologist, QEH; Clinical Director, BNR – Stroke
Dr Rudolph Delice	Head of Dept of Medicine, QEH; Clinical Director, BNR – Heart
Prof. Patsy Prussia	Honorary Consultant Pathologist, QEH; Clinical Director, BNR – Cancer
Prof. Anselm Hennis	Director, CDRC
Ms Angela Rose	Director, BNR
Mrs Gina Pitts	CVD Registrar, BNR
Ms Rhea Harewood	Cancer Registrar, BNR