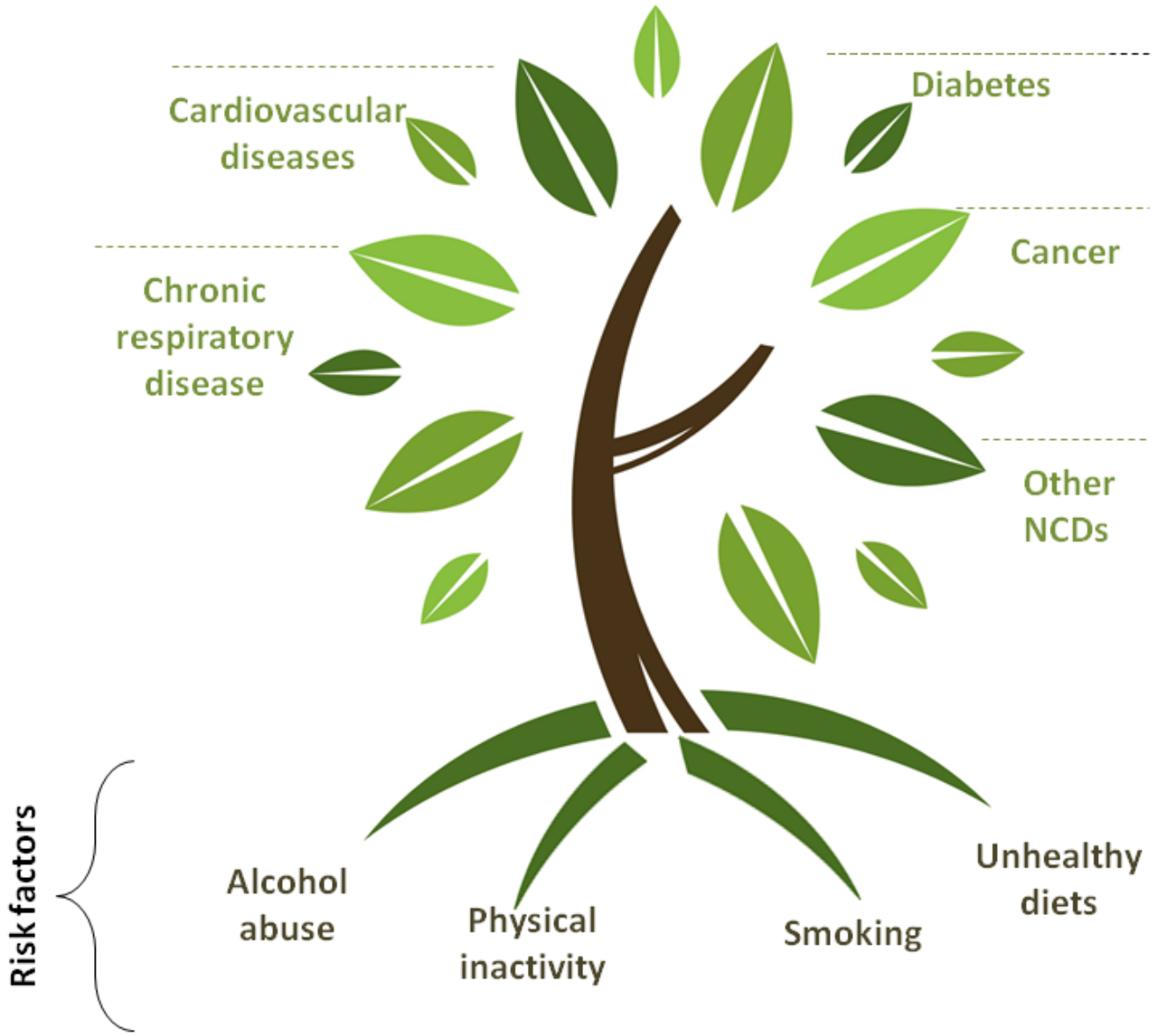
2015 Annual Report

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

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, diagnostic establishments and emergency clinics across the island. Their essential collaboration helps to bring ongoing improvements in stroke and heart attack surveillance.

Authors and contributors

Authors

Rose AMC, Martelly TN, Maul L, Hambleton IR, Henry ARP and the BNR-CVD Surveillance Team

Contributors: BNR-CVD Surveillance Team (2015)]

Ms Angela MC Rose, Head of NCD Surveillance, CDRC

Mrs Tanya Martelly, Director, BNR

Ms Lauren Maul, Senior data abstractor, BNR-CVD

Mrs Abigail Robinson, Data abstractor, BNR-CVD

Mrs Wendy Browne, Data abstractor, BNR-CVD

Ms Coreen Smith, Data abstractor, BNR-CVD

Mrs Martinette Forde, Follow-up nurse, BNR-CVD

Ms Kimberly Hinds, Follow-up nurse, BNR-CVD

Ms Karen Greene, Steno Clerk, BNR

Mr Stewart-Andre Wilkinson, Assistant Quality Control Coordinator, BNR

Ms Ashley Henry, Assistant Quality Control Coordinator, BNR

Dr Rudolph Delice, Clinical Director, BNR-Heart

Prof. David Corbin, Clinical Director, BNR-Stroke

Prof. Ian R Hambleton, Statistician, CDRC

Prof. R. Clive Landis, Director, CDRC

Special thanks

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

Mr Andrew Yearwood, Medical Records Dept, Queen Elizabeth Hospital

Ms, Nicolai Ifill, Medical Records Dept, Queen Elizabeth Hospital

Mrs Linda Simpson, Death Records Dept, Queen Elizabeth Hospital

Mr Stephen Barrow, Medical Records Dept, Queen Elizabeth Hospital

Mr Curtis Nurse, Medical Records Dept, Queen Elizabeth Hospital

Executive Summary

In 2015, 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 in the table below.

The 327 acute myocardial infarction (acute MI) and sudden cardiac death (SCD) registrations gave crude incidence rates (IR) in Barbados of 117.7 per 100,000 population for 2015 (adjusted to the world population, IR=76.9 per 100,000). Of these, 267 (82%) were definite acute MIs classified by standard international criteria, and 39 (12%) were SCDs. Of the 235 (72%) events in hospitalised patients, BNR staff abstracted documented evidence of acute MI from the hospital notes of 90% (211) in 2015 (similar to the 91% in 2014).

The length of hospital stay in 2015 was longer than seen in earlier years: 10 days for those in intensive care units (ICUs); 6 days for those admitted to general wards. Nearly 80% of all hospitalized acute MI patients with abstracted data also had hypertension, while 50% had diabetes, 44% were obese and about 20% had hyperlipidaemia. About 7% had a parent who had also had an acute MI, while about one-third (34%) had themselves had a prior cardiovascular event (acute MI or stroke).

Table ES1. Summary statistics for the Barbados National Registry for Chronic Non-communicable Disease (the BNR) in 2014

		Acute MI	Stroke (all)	Stroke (first-ever)
Population*		277 814	277 814	277 814
No. registrations		327	587	207
Hospital admissions		233	516	207
Deaths		158	255	62
Reporting obligations†	**1**	0.12%	0.21%	0.07%
	2	71%	88%	100%
	3	48%	43%	30%
	4	5 days	6 days	8 days

*Note: Population data from Barbados 2010 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). More than half of patients (57%) presented with three or more symptoms, of which the most common was chest pain (77%). More than half had shortness of breath (55%) and sweating (55%), and one-third experienced sudden vomiting (34%). Eighty-four per cent of patients (175/209) had serial ECGs done (compared with 68% in 2014), with ECG reports available for 95% of these. There was evidence of at least two Troponin-I tests in 78% of hospitalised BNR registrants, while 81% had documented evidence of at least two CK-mB tests.

Of the 209 patients hospitalised in the QEH with data abstracted from their notes, 73 (35%) had documented evidence of being given aspirin within 24 hours of admission, while 122 (71%) surviving patients 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 83 patients (40%) documented as having STEMI, 35 (42%; vs 31% in 2014) were documented as having been administered thrombolysis.

Of the 325 acute MI events registered in 2015, 116 (36%) were registered only from a death certificate (vs 43% in 2014). A little more than one-fifths (24; 21%) of these had the QEH listed as their place of death (vs one-tenth in 2014), 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 doubling in the proportion of "death-certificate only" patient data collected by the BNR team is likely due to a change in QEH note-retrieval process during that year, in which the Medical Records Dept was re-structured and death records were consequently placed in storage and were more difficult to retrieve.

The effect of the difficulty in obtaining deceased patients' notes for abstraction is a lower estimate of the in-hospital case fatality rate (CFR) for those with known outcome when using only abstracted data plus those known to have had a post mortem (51/218; CFR=23%) vs using data from all hospitalised patients (66/233; CFR=28%). This occurs because the deceased patients were under-represented by the in-hospital registry abstractions, for reasons described above. 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 2015, there were 587 stroke events (54% female), for a crude IR of 211.3 per 100,000 population for all strokes in 2015.

Of the 587 events, 103 stroke events were notified only at death (18%). Of the remaining 484 events (82%) for whom data were abstracted from hospital or physician records, 453 (94%) received a CT scan or an MRI, and 71% (316/443) had their scan within 24 hours (similar to 2014). There were 388 ischaemic (80%) and 92 haemorrhagic (19%) stroke events in 2015; most (80; 87%) of the latter were intracerebral. Four (<1%) of the 484 abstracted stroke events could not be classified (vs 3% in 2014). As in 2014, almost all stroke patients (93%) had at least one symptom documented; the most common were facial weakness (364; 75%) and slurred speech (344; 71%).

Of the 314 patients with abstracted notes containing with prior stroke information (65%), about two-thirds (66%) were documented as being first-ever events (vs 56% in 2014). Similarly to previous years, almost all abstracted stroke events had been admitted to the QEH (99%), where the median length of stay was 6 days (same as in 2014). Twenty-two per cent of all admitted stroke patients (103/479) were discharged within 24 hours from the Accident and Emergency (A&E) Department without admission to a hospital ward, similarly to 2014. Of the 480 events with data abstracted from the QEH in 2015, 188 (36%) died before discharge (vs 27% in 2014).

About half (51%) of those dying in hospital were female. Of the 152 who died in hospital with data abstracted by the BNR, a little less than one-third (40; 26%) had severe impairment as measured by the Glasgow Coma Scale (GCS), similar to the 28% in 2014. Of the 328 who were still alive at discharge, in contrast, only 13 (4%) had severe impairment measured by GCS (3% in 2014). Where documented, the most common risk factors for hospital-admitted stroke patients with abstracted data were hypertension (82%; vs 89% in 2014), and diabetes (61%; vs 72% in 2014).

Cardiovascular disease in Barbados, 2015

1. BNR – Heart

Contents

1. Numbers and incidence rates per 100,000 population

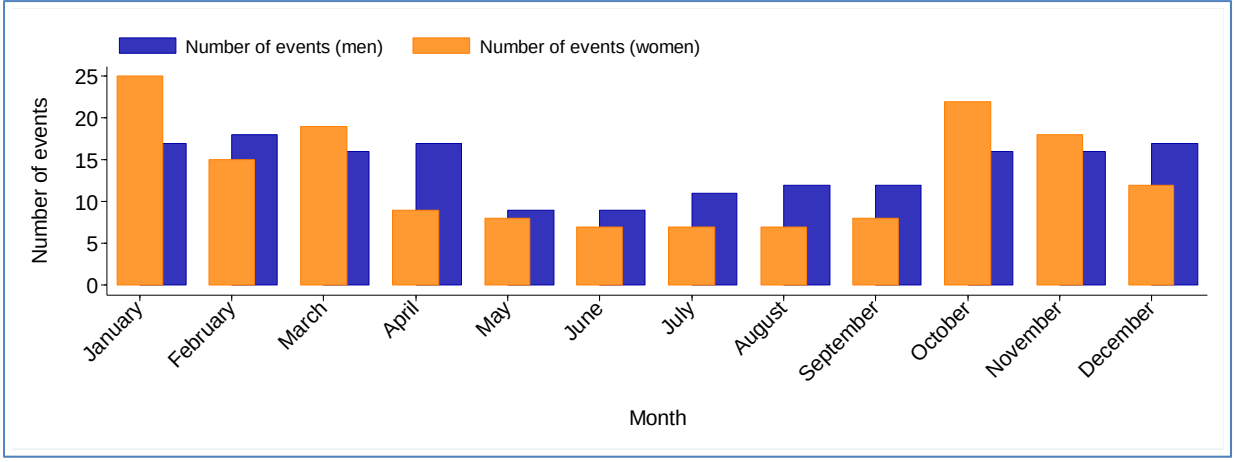
The number of events reported from a surveillance system gives an idea of the burden of disease in a country, and can be used to inform healthcare requirements. The incidence rate takes the population into account, and may be used to assess trends, or to determine differences within groups, once appropriate statistical tests have been applied. Note that the population used in this report (277,814) is from the latest published census (2010), adjusted for undercount.

The period under surveillance for this report was 01 January–31 December 2015, inclusive (Figure 1.1).

There were 327 acute MIs and sudden cardiac deaths recorded in 322 patients in 2015. Of the 327 events, 267 (82%) had a definite acute MI diagnosis (see Appendix A for definitions). Thirty-nine (12%) were sudden cardiac deaths (SCDs), for whom 26 (67%) were obtained from death certificate only (i.e. patient notes were not seen) (Figure 1.2), and 21 were possible acute MIs. Of the 327 acute MIs:

- 209 (64%) had data abstracted from the Queen Elizabeth Hospital (QEH)
- 83/209 (40%) were classified as ST-segment elevation MIs (STEMI) by ECG report
- 111/209 (53%) were classified as non-ST-segment elevation MIs (NSTEMI), according to their final documented diagnoses

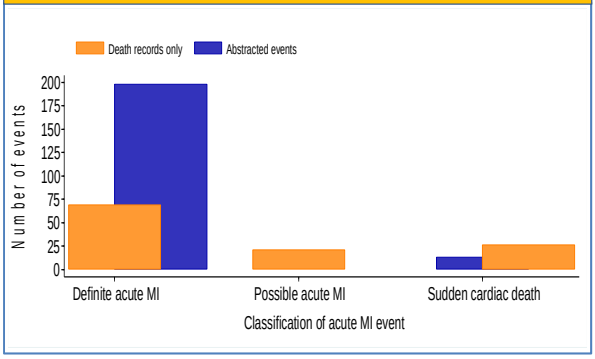
Figure 1.1. Number of patients with acute MI or sudden cardiac death by month of onset, Barbados, 2015 (N=327)



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

Crude incidence rate (IR) per 100,000 population for Barbados in 2015 was 117.7 (95%CI 105.3–131.2); standardized to the WHO world population IR was 76.9 (68.5–86.1).[1]

Figure 1.2 Number of acute MI or sudden cardiac death events by diagnosis, Barbados, 2015 (N=327)



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 2015, there were 157 female and 170 male patients with acute MI in Barbados, for an incidence rate per 100,000 of 108.4 in women (95%CI 92.1–126.8) and 127.8 in men (95%CI 109.3–148.5).

Within 10-year age-groups (see Figure 1.3), the greater incidence rate in men than women is apparent in particular for those aged 35–74 years. The case-mix of younger patients is predominantly male, with almost three times as many male (n=37) as female (n=13) patients under 55 years.

Incidence increased with age for both sexes; with most of the reported events in men (92%) and women (96%) occurring in those aged 45 years and older. There were more female patients than male in those aged 75 years and older (Figure 1.3).

3. Presentation and diagnosis

Key points

- ≈18 acute MIs/month abstracted from QEH
- ≈10 acute MIs/month notified only at death
- More acute MIs in men vs women 35-74 yrs
- Higher incidence rate in men vs women aged 35–74 years
- 22% of acute MIs in men were <55 yrs
- 8% of acute MIs in women were <55 yrs

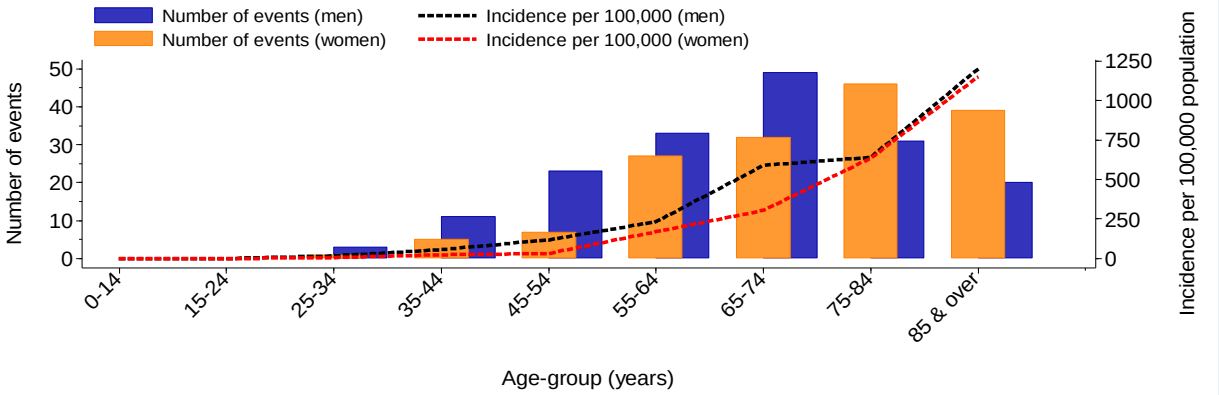
3.1. Hospitalisation and ambulance use

Of the 327 acute MI events in 2015, 233 (71%) were hospitalized at the QEH. Of these, 209 had data abstracted from patient records (90% of all hospitalised patients); while 24 were found through death record information only.

All 209 patients with abstracted data admitted to the QEH had documented information on ambulance use. Of these, 123 (59%) had used an ambulance, 120 (98%) of whom had dates and times clearly

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

Figure 1.3. Incidence rate per 100,000 population of acute MI and sudden cardiac death, Barbados, 2015 (N=327)



documented in their notes (vs 90% in 2014). Median ambulance time to hospital from pick-up for these 120 patients was 12 minutes in 2015. There were 67 patients (56%) with clearly documented ambulance arrival to hospital and chest pain onset times; for these, median time from onset to admission was 4 hours 20 min, vs 5 hours in 2014. "Door-to-needle" time was available for 28 of 37 patients (76%) who received thrombolysis in 2015; the median time was 2.5 hours (range from 48 mins to 46 hrs) in 2015. Less than 10% received thrombolysis within 1 hr, but 29% were thrombolysed within 1.5 hours.

Key points

- Almost 1/3 acute MI patients died outside hospital (vs > 1/2 in previous years)
- About 3/5 hospitalised acute MI patients used ambulance services (vs 2/5 in previous years)
- Median ambulance time from patient pickup: 12 min (vs >25 min in previous years)
- About 1/4 acute MI patients treated in ICU
- Median length of stay in ICU: 7 days
- Median length of stay on ward: 5 days

3.2. Length of hospital stay

Of the 209 admitted patients with abstracted information, none was missing information on hospital stay. Median length of stay was similar to previous years, at 5 days (range: 1–39 days). There were 55 patients (26%) who were treated in the intensive care unit (ICU), vs 24% in 2014. The median length of stay in ICU in 2015 was 7 days (range 1–39).

3.3. Presenting symptoms

One hundred and fifty-three of the 209 patients with abstracted information presented with at least two symptoms (73%) in 2015 (vs 64% in 2014). The most frequent symptoms were chest pain and shortness of breath; as seen in previous years (Table 1.1).

Table 1.1. Main presenting symptoms for acute MI patients in Barbados, Jan–Dec 2015 (N=209)		
Symptom	**Number**	**%**
Chest pain	161	77%
Shortness of breath	115	55%
Sweating	114	55%
Sudden vomiting	71	34%
Light-headedness, nausea/malaise	63	30%
Palpitations	55	26%
Sudden dizziness/vertigo	47	22%
Cough	30	14%
Loss of consciousness	25	12%

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 209 patients in 2015 with abstracted data. The most common reported known CVD risk factors were hypertension (159/190 patients with this information recorded; 84%), obesity (91/117; 78%) and diabetes (105/150; 70%). Almost one in seven of patients providing this information smoked (14%). Fewer than 10% had no known risk factors, while more than half (57%) had three or more.

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

Table 1.2. Prevalence of known risk factors among hospitalised acute MI patients, January–December 2015 (N=209)					
Risk factor type	**Risk factor**	**Number**	**n***	**% (of those with information)**	**% (overall)**
Prior CVD event/disease	Prior acute MI	51	209	24	24
	Prior IHD	26	39	67	12
	Prior stroke	20	98	20	10
Current co-morbidity	Hypertension	159	190	**84**	**76**
	Obesity	91	117	**78**	**44**
	Diabetes	105	150	**70**	**50**
	Hyperlipidaemia	40	72	56	19
Lifestyle-related	Alcohol use	43	156	28	21
	Smoking	23	161	14	11
Family history of acute MI	Mother or father	15	23	65	7
	Sibling	7	23	30	3

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

they were performed, should be recorded in the patient's notes.

Of the 209 patients for whom data were abstracted from hospital records, there was information on cardiac biomarkers for 187 (89%). Overall, 184 had at least one CK-mB test (88%), while 179 patients admitted to the QEH with acute MI (86%) had at least one Troponin-I test (Table 1.3).

Table 1.3. Number of patients with documented serial (up to three) cardiac biomarker tests in 2015 (N=209)

	1		2		3	
	No.	**%**	**No.**	**%**	**No.**	**%**
CK-mB	184	**88**	169	**81**	124	**59**
Troponin	179	**86**	164	**78**	120	**57**

For the first time since the BNR began reporting, more than half of patients had three Troponin-I tests (57%), or three CK-mB tests (59%) documented (Table 1.3). Of the 187 with at least one biomarker test done, only 33% had their test times clearly documented (vs 80% in 2014).

An ECG report was available for 184 patients (88%; up from 71% in 2014), and for 166 of the 175 (95%; up from 82% in 2014) who had had serial ECGs performed (Table 1.4).

Table 1.4. Ischaemic region on ECG*(N=184)

Region	Number	%
Inferior	31	17
Septal	23	13
Anterior	20	11
Anterolateral	18	10
Lateral	15	8

**Note*: More than one region can be listed.

Only 40% of the patients in 2015 with ECG reports were diagnosed with ST-segment elevation on ECG (down from 50% in 2012–2014) (Table 1.5). Eighty-six patients (47%) had T-wave inversion and 57 patients (31%) had normal ECG readings.

Table 1.5. ECG category* (N=184)

ECG category	Number	%
T-wave inversion	86	47
ST-segment elevation	83	40
Normal	57	31
ST-segment depression	48	26
Left ventricular hypertrophy	26	14
Pathological Q waves	25	14
Atrial fibrillation	19	10
Left bundle branch block	12	7
Non-specific ST-T changes	8	4

**Note:* More than one category can be listed.

Key points

- About 3/4 acute MI patients also have hypertension
- Almost 45% are also obese
- Almost 1/2 acute MI patients also have diabetes while 1/5 have hyperlipidaemia
- Continued improvement in documentation of cardiac biomarker test results
- Poorer documentation of cardiac biomarker test times vs 2014

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).

Of the 209 patients for whom information was abstracted from QEH notes (Table 1.6), 73 (35%; down from 47% in 2014) were documented as having been given aspirin acutely (i.e. within the first 24 hours of admission), while 122 of the 167 surviving patients (73%) were documented as having been given aspirin on discharge from the QEH (similar to the 71% in 2014).

Table 1.6. Routine medication for acute MI patients in Barbados, Jan–Dec 2015

Medication	Acute use* (N=209)		On discharge (N=167)	
	No.	%	No.	%
Clopidrogel (Plavix)	74	35	112	67
Aspirin	73	35	122	71
Heparin (LMW)	69	35	19	11
Oxygen (face-mask)	35	17	0	0
Statin	27	13	129	77
Insulin	27	13	30	18
GI prophylaxis	19	9	24	14

*On arrival or within 24 hours of admission

The two other documented most-prescribed acute-use medications were Clopidogrel (Plavix) and low molecular weight (LMW) Heparin. Statins, aspirin and Plavix were the most commonly prescribed at discharge.

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 209 patients for whom data were abstracted from patient notes, less than half (83; 40%) were diagnosed with ST-segment elevation MI (STEMI) on ECG, although only 56 (17%) had a final diagnosis of STEMI. One hundred and eleven patients (34%) had a final diagnosis of non-ST-segment elevation MI (NSTEMI). A further 130 (40%) were classified only as definite MI, and 28 (<10%) were recorded as possible MI or other diagnosis. Reperfusion was attempted in 37 patients (18%; similar to previous years), with STEMI being documented in 27 (73%; vs 89% in 2014 and 84% in 2012–2013) of those who received reperfusion. As a proportion of all STEMI-diagnosed patients (by ECG), reperfusion was attempted in 42% (35/83).

4.3. In-hospital complications

Fifty-nine patients (28%; up from 17% in 2014) were documented as having had at least one in-hospital complication, while <10 had two or more. The main complications were post-event chest pain or angina (Table 1.7), experienced by over one-third of all patients with documented complications.

4.4. Mortality

In-hospital deaths

Since 2012, final outcomes have been documented for all hospitalised patients with abstracted data (vs 3% with unknown outcome in 2011 and 6% in 2010). Of the 209 patients admitted to hospital with data abstracted from their notes, 42 died in hospital (20%; vs 31% in 2014). A further 24 patients were only notified at death, with place of death listed as the hospital (Table

1.8), for an overall in-hospital CFR of 28% (66/233; down almost 10 percentage points from previous years). This is higher than the overall 'died in hospital' proportion shown in Table 1.8 (20%), as the denominator for the latter is all patients, i.e. including those who had not been hospitalised (92/325).

Table 1.7. In-hospital complications* for patients admitted to the QEH, Jan–Dec 2015

Hospital complication	Number	% (all†)	% (**)
Post MI chest pain/ angina/infarction	25	12	42
Renal impairment/ failure	13	6	22
Cardiac arrest	12	6	20
Infection, decubitus ulcer, GI bleed	12	6	20
Atrial fibrillation, congestive cardiac failure	12	6	20
Cardiogenic shock	10	5	17

*Note: Some patients had more than one complication.
†N=209.
**Of those with recorded complications (N=59).

Unlike previous years, the overall proportion of acute MI patients who died from either acute MI or sudden cardiac death in 2015 was 49% (158/325), vs 61% in 2014. Further, only 10 deceased acute MI patients were documented as having had an autopsy performed (6%), while 57 (36%) were medically certified at death (vs 76% in 2014).

Table 1.8. Outcomes for all acute MI patients diagnosed in 2014 (N=411)

Outcome	Number	%
Alive at discharge	161	39.1
Died outside of hospital	155	37.7
Died in hospital	94	22.9
Hospitalised (unknown outcome)	1	0.2

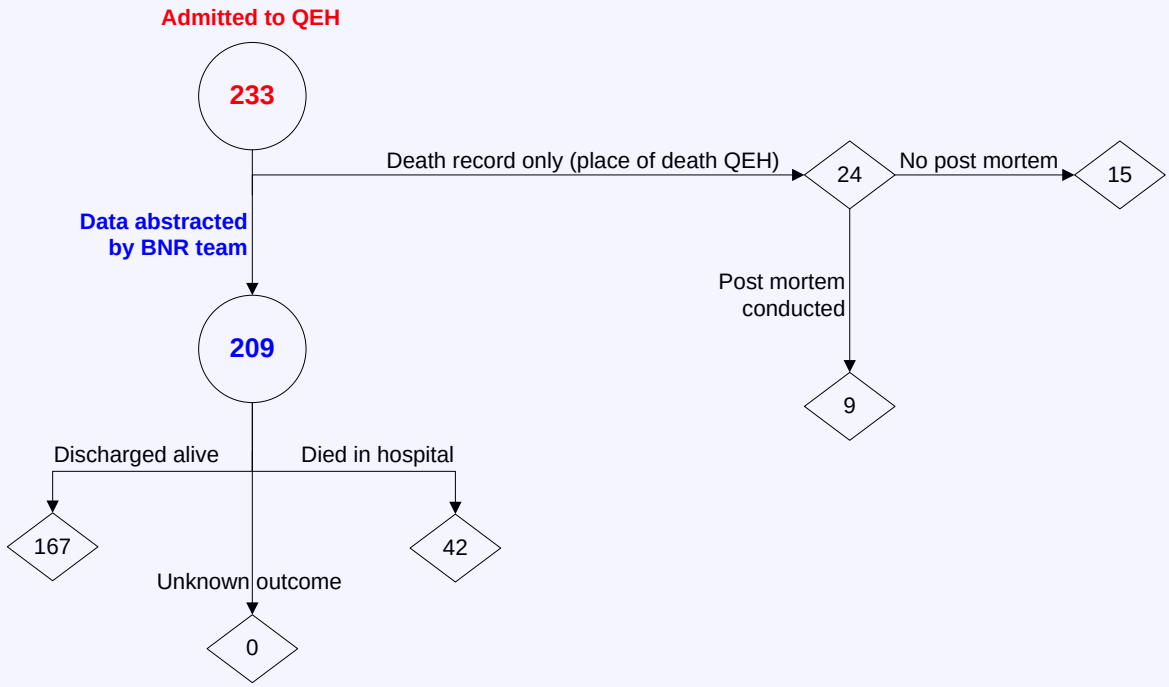
By 28 days post-event, 138 of the 167 patients discharged alive had survived (83%), 8 had died (5%) and the remaining 21 (12%) had been lost to follow-up.

Key points

- Only about 1/3 of all hospitalised patients were given aspirin or Plavix in the acute stage (within 24 hours of arrival)
- More than 1/4 patients (28%) had a documented hospital complication
- In-hospital death rate was estimated at 28%

Focus on acute MI in-hospital outcomes

Although today, in the developed world setting, in-hospital case fatality rates (CFRs) for acute MI are rarely more than 17% (and often are closer to 12%), the overall in-hospital CFR for the QEH for 2014 is **28%** (66/233). This is an improvement on previous years (37% in 2014; 35% in 2011–2013; 48% in 2010). These estimates should be interpreted with caution, however, as there remains 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 (15 patients; see graphic below).



A more accurate in-hospital CFR estimate would be calculated using patients with abstracted data (209) and "death record only" reports where the patient has had a post mortem (9 patients; note that there were no patients with unknown outcome in 2015). This CFR would therefore be **23%** (51/218); down from 34% in 2014 (27% in 2012–2013).

2. BNR – Stroke

Contents

1. Numbers and incidence rates

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

(a) The period under surveillance for this report was 01 January 2015–31 December 2015, inclusive (Figure 2.1). The total population of Barbados used in analyses (277,814) was from the latest published census (2010), adjusted for undercount.

(b) There were 587 strokes recorded during this reporting period (10 patients had more than one stroke event).

(c) There were 103 stroke events notified only at death (18%). The remaining 484 had data abstracted from hospital records.

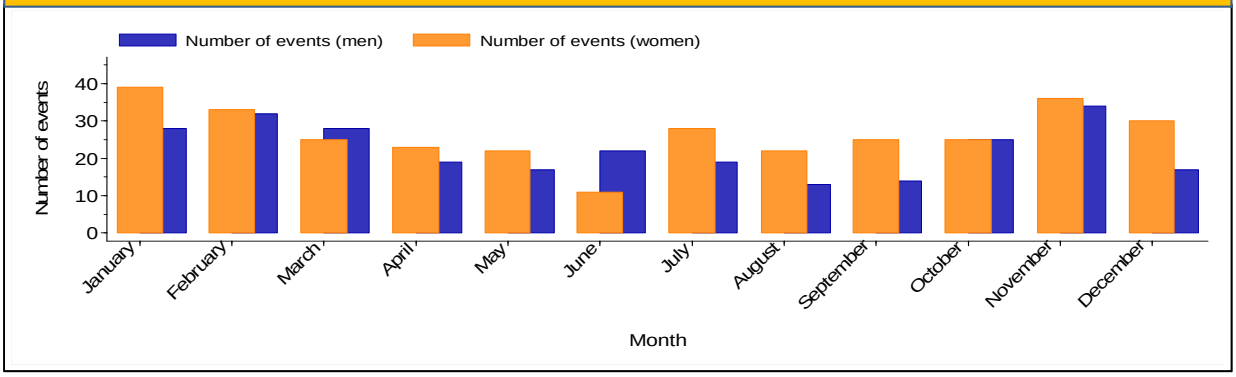
(d) Of the 484 abstracted stroke events, 480 (99%) were classified by sub-type. The two main sub-types were ischaemic (388; 81%) and haemorrhagic stroke (92; 19%). The latter group was further classified into intracerebral (80; 17%) and subarachnoid haemorrhage (12; 3%).

(e) There were 207 first-ever stroke events registered in 2015 (66% of the 314 events for whom this information was documented).

(f) There were approximately 49 strokes registered per month in Barbados in 2015 (Figure 2.1). The crude incidence rate was 211.2 per 100,000 population (95%CI 194.5–229.10) for all strokes. For first-ever events, this was 74.5 per 100,000 (95%CI 64.7–85.4).

(g) Incidence rates standardised to the WHO world population were 133.4 per 100,000 population per year (95%CI 122.4–145.2) for all events in 2015.

Figure 2.1. Number of stroke events by month of onset, Barbados, 2015 (N=587)



For first-ever stroke events, the standardised rates per 100,000 population per year were 48.1 (95%CI 41.6–55.5) for 2014. [Note: directly standardised rates with CI based on the gamma distribution (Fay and Feuer[1])].

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 2015, 319 females and 268 males had stroke events, for overall incidence rates in 2015 of 220.3 (95%CI 196.8–245.9) and 201.5 per 100,000 (95%CI 178.1–227.1) for females and males, 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 decreased with age for both sexes.

3. Presentation and diagnosis

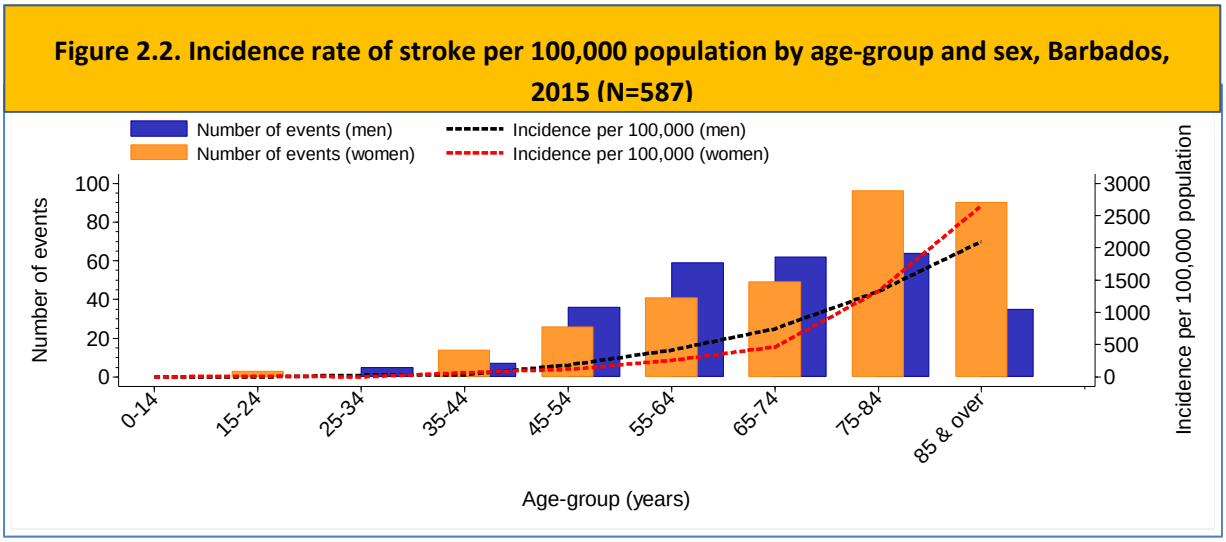
3.1. Diagnostic tests used

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).

The rest of this report concerns only the 484 hospitalised and community-treated stroke events for which data were abstracted from hospital or clinic records.

Of the 484 abstracted stroke events in 2015, 453 (94%) received a CT scan (fewer than five of these also had an MRI). Of the 451 patients for whom this information was documented, 320 (71%) had their scan within 24 hrs. One hundred and twenty-three patients (27%) were scanned more than 24 hrs after onset but within 7 days. About 11% (54) of these stroke patients went on to receive a secondary diagnostic test (cerebral/carotid angiography, carotid ultra-sound, or lumbar puncture). Overall, 460 stroke patients were definite strokes (95%) while 24 (5%) were possible strokes.

Figure 2.2. Incidence rate of stroke per 100,000 population by age-group and sex, Barbados, 2015 (N=587)



Key points

- ≈49 strokes/month occur in Barbados
- Greater number of strokes reported for women than men in those aged ≥75 yrs
- Proportion with documented stroke status (i.e. whether first-ever event or not) improving; however, still too many with undocumented status

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.

As in previous years, most registered strokes in 2015 were classified as ischaemic (388; 80%) with only 92 (19%) haemorrhagic strokes (Table 2.1).

Table 2.1. Classification of stroke subtypes for 2015 (N=484)

Stroke subtype	Number	%
Ischaemic stroke	388	80
Intracerebral haemorrhage	80	17
Subarachnoid haemorrhage	12	2
Unclassified/unspecified*	4	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 452 (93%) patients with at least one symptom documented. Of these the most common were facial weakness (364; 81%) and slurred speech (344; 76%). Fewer than 7% of patients (32) had no recorded symptoms, while 12% (58) had no documented signs. Just over 50% of all patients with signs (218/426) experienced at least two, the most common of which were limb weakness (377; 88%) and slurred speech (177; 42%).

3.4. Length of hospital stay

Of the 480 patients with abstracted data admitted to the QEH, fourteen were in-hospital events, excluded for the length of stay calculations. All but one of the remaining 466 (>99%) had length of stay documented. Of these, 103 (22%) were discharged within 24 hrs from the Accident and Emergency Department without admission to a hospital ward. Median length of hospital stay was 6 days, with a range from 1 to 201 days ("1 day" is inclusive of those discharged on the day of admission). For the 41 patients (8%) who received intensive care in 2015, the median length of stay on an intensive care ward was 13 days, with a range from 1 to 201 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. Prevalence of known risk factors among hospitalised stroke patients, 2015 (N=484)					
Risk factor type	**Risk factor**	**Number**	**n***	**% (of those with information)**	**% (overall)**
Prior CVD event/disease	Prior stroke or TIA	119	319	**37**	**25**
	Atrial fibrillation	34	57	**60**	**7**
	Prior/current IHD/CVD/PVD/acute MI	10	153	7	2
	Congestive cardiac failure or deep vein thrombosis	17	42	40	4
Current co-morbidity	Hypertension	334	407	**83**	**70**
	Diabetes	195	322	**61**	**40**
	High cholesterol	67	124	54	14
	Obesity	53	153	35	11
Lifestyle-related	Smoking	34	324	10	7
	Alcohol use	44	153	29	9
Family history of stroke	Mother, father or sibling	39	144	27	8

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

Table 2.2 shows the prevalence of known CVD risk factors among hospitalised patients with documented risk factors. Of all abstracted cases, 422 (87%) had at least one risk factor, while about two-thirds (303; 63%) had at least two risk factors. The most common were hypertension (334; 70%), diabetes (195; 40%) and prior stroke or transient ischaemic attack (119; 25%). Slightly more than half (54%) of patients with documented information had high cholesterol, while 35% were obese. One in every 14 patients was a smoker (7%).

Key points

- Almost 7/10 strokes are ischaemic
- Most common stroke symptoms in Barbadian patients: facial weakness and slurred speech
- About 7/10 stroke patients also have hypertension
- About 2/5 stroke patients also have diabetes
- 1/4 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 2015, fewer than 1% of stroke patients were given thrombolysis through the clot-busting drug T-PA. Information on medication use was available for up to 480 patients admitted to the QEH (Table 2.3). There was documented evidence of 212 (44%) patients being given aspirin acutely (i.e. within

the first 24 hours of admission or 24 hours of symptoms), while 155 (47%) 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 1/6 of all patients) were heparin, GI prophylactic medication and statins (Table 2.3). Statins and aspirin were also the most commonly prescribed at discharge, being given to about half of all patients.

Table 2.3. Routine medication for hospitalised stroke patients discharged alive in Barbados, 2015

Medication	Acute use* (N=480)		On discharge† (N=328)	
	No.	%	No.	%
Aspirin	212	44%	155	47%
Heparin	99	21%	5	2%
GI prophylaxis	77	16%	52	16%
Statins	78	16%	190	58%
Insulin	58	12%	30	9%
Clopidrogel (Plavix)	21	4%	25	8%
Warfarin	<5	<1%	8	2%
T-PA	<5	<1%	-	-

*Within 24 hours of admission or 24 hours of symptoms.
†Patients discharged alive.

4.2. Hospital complications

Seventy-one patients (15% of the 480 hospitalised patients with abstracted data in 2015) had at least one in-hospital complication, while 15 (3%) had two or more. The main complication, reported by about half of those with complications, was pneumonia (Table 2.4).

4.3. Mortality

Of the 587 stroke patients in 2015, 188 (32%) died before discharge from the QEH (Table 2.5).

Table 2.4. In-hospital complications*

Hospital complication	Number	% (**)
Pneumonia	35	49
Decubitus ulcer	14	20
Renal impairment/failure, dehydration, deep vein thrombosis	13	18
Urinary tract infection	11	15
Seizures/septic shock	10	14

**Note*: Some patients had >1 complication.
**Of those with recorded complications (N=71).

The in-hospital death rate (proportion of all 480 admitted patients who died while still in hospital), was 36% (188/516). Of the 188 events in hospitalised patients that led to death, data were abstracted by the BNR for 152 (81%; vs 88% in 2014).

Table 2.5. Outcomes for all stroke patients diagnosed in 2015 (N=587)

Outcome	Number	%
Alive at hospital discharge	328	56
Died in hospital	188	32
Died outside of hospital	67	11
Alive in the community	4	1

In-hospital abstracted stroke survivors (N=328)

Of the 328 hospital-admitted patients with abstracted data who were discharged alive in 2015, 259 (79%) survived to 28 days, 22 died (7%) and 47 (14%) were lost to follow-up.

In-hospital abstracted stroke deaths (N=152)

Most admitted patients with abstracted data who died before discharge (129; 85%) had been hospitalised for at least 24 hours. A CT scan was performed on 138 (91%), while 115 (76%) had at least two symptoms documented. Table 2.6 compares selected characteristics between the 152 patients who died before discharge from

hospital and the 328 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 151 of the 152 patients who died before discharge. Of these, about one-third (40; 26%) had severe impairment (Table 2.6). In contrast, only 13 (4%) 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, 2015

	Alive at discharge (N=328)		Died in hospital (N=152)	
Median age (range)	67 years (17–100)		76 years (34–105)	
Median length of stay (range)	5 days (1–140)		8 days (1–201)	
	No.	**(%)**	**No.**	**(%)**
Females	175	(53)	78	(51)
Males	153	(47)	74	(49)
First-ever stroke*	145	(68)	62	(61)
Total GCS score *Total tested*	315	(96)	151	(99)
<9†	13	(4)	40	(26)
9-14	83	(26)	79	(52)
15‡	218	(69)	32	(21)
Stroke sub-type				
Ischaemic	271	(83)	114	(75)
Intracerebral haemorrhage	44	(13)	35	(23)
Subarachnoid haemorrhage	10	(3)	2	(1)
Unclassified	3	(<1)	1	(<1)

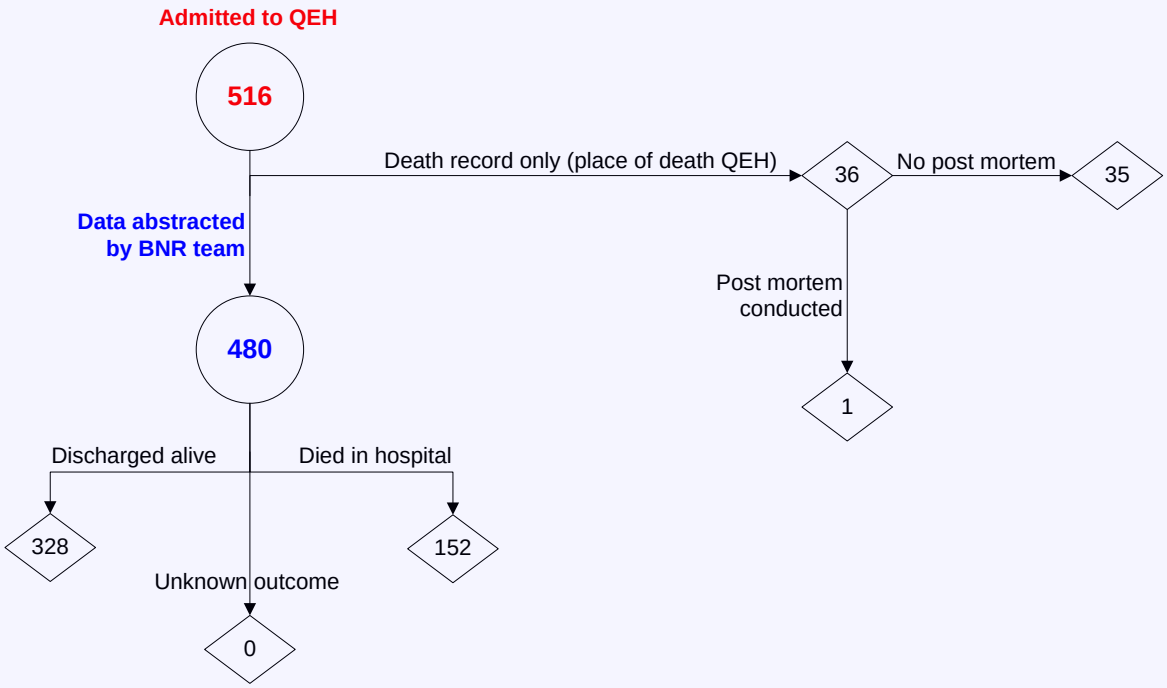
*One hundred and thirteen patients (34%) who survived to discharge and 51 who died in hospital (34%) lacked documentation on whether or not they had had a prior stroke. These proportions are therefore only out of all those *with documented information on prior stroke status*.

†Severe impairment.

‡No impairment.

Focus on stroke in-hospital outcomes

The overall QEH in-hospital case fatality rate (CFR) for stroke in 2015 is **36%** (188/516 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 (35 patients).

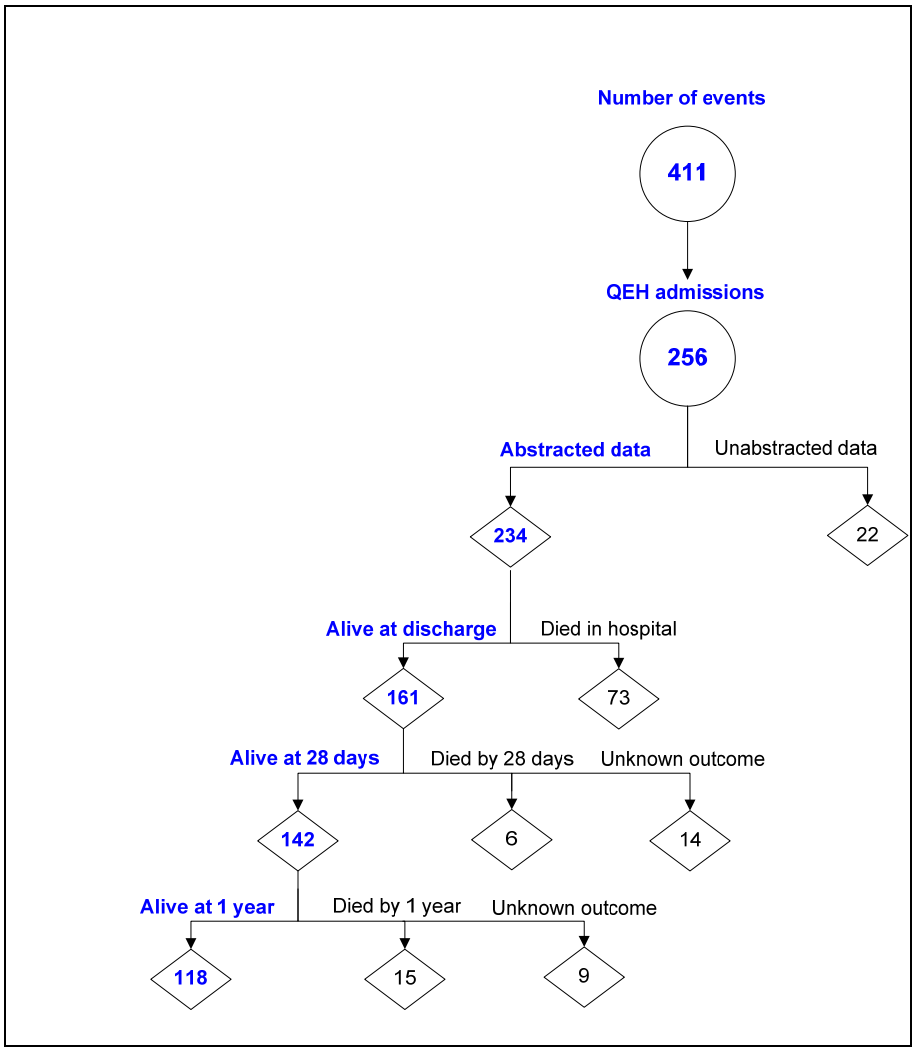


A more accurate in-hospital CFR estimate would be calculated using abstracted data and "death record only" reports where the patient has had a post mortem (480+1 patients). This CFR would be **32%** (153/481).

3. One-year follow-up outcomes: 2014

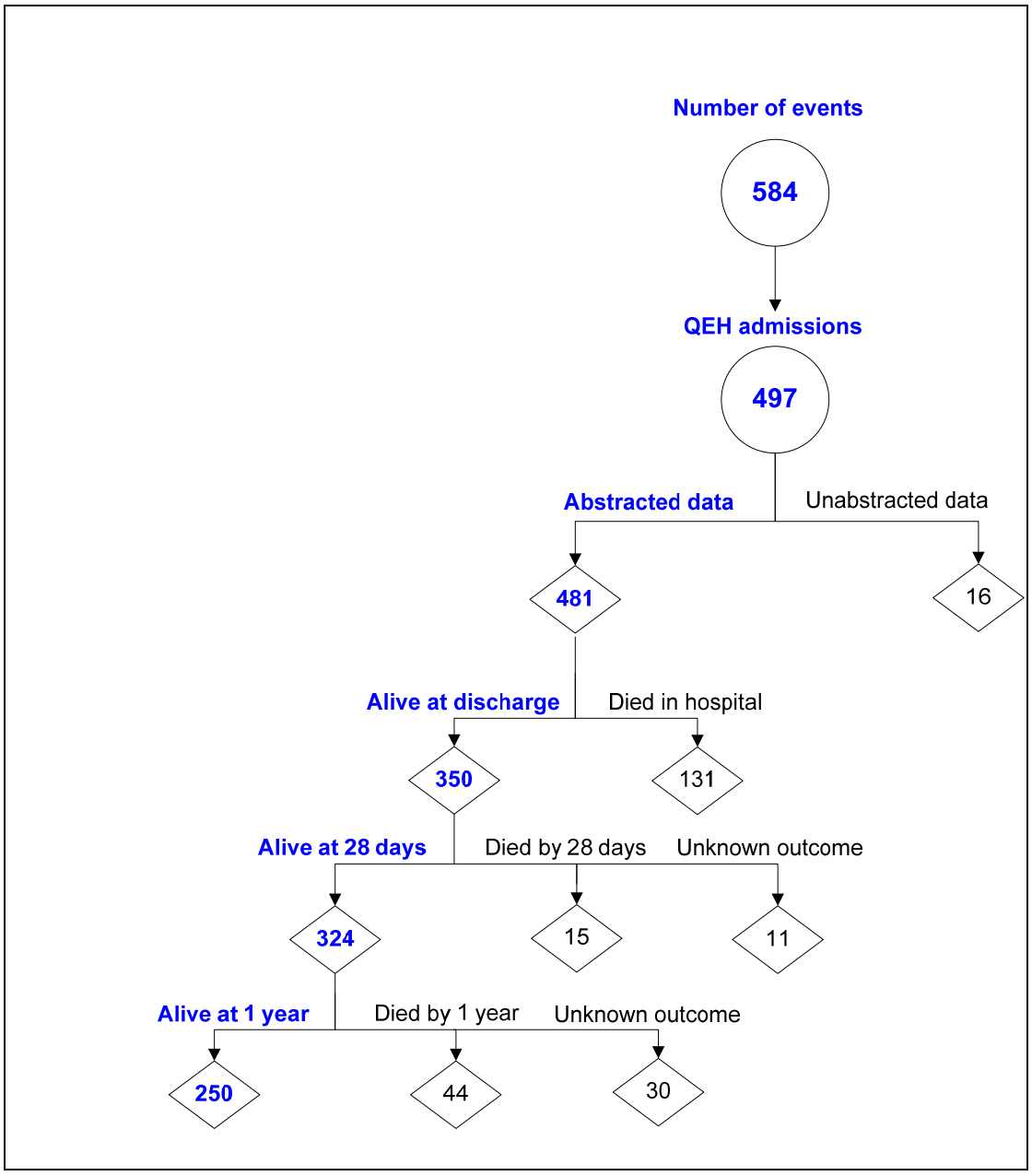
1. **Acute MI 1 year outcomes (for patients diagnosed in 2014)**

There were 411 acute MIs and sudden cardiac deaths recorded in 2014. Of the 411 cases, 256 (62%) were hospitalised at the QEH. Of the 234 patients with abstracted records (91%), 161 (69%) were alive at discharge. These 161 patients were followed up at 28 days to determine vital status: 142 (88%) had survived, six had died (4%) and 14 (8%) had unknown survival status at 28 days ("lost to follow-up": LTFU). Of the 142 survivors followed up at 1 year, 118 (83%) had survived, 15 had died (11%) and 9 (6%) were LTFU.



2. Stroke: 1 year outcomes (for patients diagnosed in 2014)

There were 584 strokes recorded during 2014; of these 497 (85%) were hospitalized at the QEH. Four hundred and eighty-one of these patients (97%) had data abstracted from hospital records. There were 350 patients who survived to hospital discharge (73%), while 324 survived to 28 days (67%). Only about 4% of patients had unknown vital status at 28 days (LTFU). Of the 324 28-day survivors, 250 were known to have survived to 1 year (74%), and fewer than 10% were LTFU.



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 sub-type.

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*

[†]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.

depression 0.5-1.0mm , T wave inversion or flattening in leads with dominant R waves)

- Positive ECG plus missing OR inadequate biomarkers

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 (2015)

Name	Affiliation
Dr Michael Campbell (Chair)	Chairman, Ethics Committee, QEH
Dr Euclid Morris	Lecturer – Faculty of Medical Sciences
Mrs Noreen Merritt	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. Clive Landis	Director, CDRC
Ms Angela Rose	Head of NCD Surveillance, CDRC
Mrs Tanya Martelly	Director, BNR

The Professional Advisory Board of the BNR (2015)

Name	Affiliation
Prof. Trevor Hassell (Chair)	Chair, National Commission for Chronic Non-Communicable Diseases
Dr Tomo Kanda	Specialist Advisor on NCDs, 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. Clive Landis	Director, CDRC
Ms Angela Rose	Head of NCD Surveillance, CDRC
Mrs Tanya Martelly	Dircetor, BNR