APPENDIX B: STATISTICAL METHODS

The statistical methods described were used to summarize the data collected from the National Cardiovascular Database (NCVD). In this report, two sources of data have been used for analysis. They were the centre survey data and the NCVD ACS registry data.

Provision of acute coronary care services in Malaysia

Chapter 1 of this report was based on the centre survey data rather than individual patient data reported to the database. This was to provide up-to-date information on patient and centre census in the country and thus overcome the inevitable time lag between processing individual patient data and subsequent reporting of results. The survey was conducted from November 15th 2007 to March 5th 2008. 73 out of 273 hospitals that approached through telephone survey were confirmed with availability of CCU services. Only 69 centres managed to return the survey form completely. Standard error estimates were not reported because no sample was taken. Results on distribution for Malaysia as a whole and also by state were expressed in per million-population since states obviously vary in their population sizes. State population data were based on the last census projection obtained from the Department of Statistics in Malaysia[1]. Missing data on ASC services, admissions, utilization of acute coronary or cardiac services and cardiac care are estimated based on the sampling weight of the total beds in each hospital.

The analyses for the rest of this report were generated based on the NCVD ACS registry data, using the following analysis set:

The data without missing on initial diagnosis, final diagnosis is neither stable angina nor non-cardiac, and age at least 20 that were collected until 31st December 2006 by NCVD-ACS were analyzed. The data was stratified to reflect differences in

- Demography: race, gender, age
- Medical factors: premorbid or past medical history
- Initial diagnoses: ACS stratums
- Therapy: fibrinolytic given, aspirin use

Methods for handling missing data and outliers

Missing age was imputed using the hotdeck method. The outliers were set to missing (see table below)

Fields	Acceptable range
Number of distinct episodes of angina	≤20
Heart rate	25 – 200 beats/min (should not be 0)
Systolic BP	60 – 230 mmHg (should not be 0)
Diastolic BP	10 – 120 mmHg
Height	130cm – 210cm
Weight	30kg - 200kg
Waist circumference	≥ 36cm
Hip circumference	60 - 200cm
Peak CK-MB	<1000 Unit/L (should not be 0)
Peak CK	<10 000 Unit/L (should not be 0)
Peak Troponin – TnT	No range
Peak Troponin – TnI	No range
TC	3 - 20 mmol/L
LDL	1 - 15 mmol/L
HDL-C	0.5 - 5 mmol/L
Tg	1 -15 mmol/L
Fasting Blood Glucose	3 - 30 mmol/L
Left Ventricular Ejection Fraction	5% - 80%
Onset to door	Should not be 0
Door to needle time (mins)	1 min -24 hours (or equivalent minutes) (should not be 0)
Door to balloon time (mins)	1 min-24 hours (or equivalent minutes) Apply only for patients with STEMI and planned for primary angioplasty (should not be 0)

Patient Characteristics

The information on patient characteristics was summarized in chapter 2 of the report. These tables included patients' age, gender, ethnic group, coronary risk factors, anthropometric measurements, co-morbidity, and also the distribution of patients by source data providers (SDP). For summarizing continuous data, the mean, standard deviation, median, minimum and maximum were reported. On the other hand, both the frequency count and percentage were reported for discrete data. Invariably, there were situations where there was missing data. For the purpose of analysis, subjects with missing age had their values imputed by using a hotdeck imputation method. For discrete data, analysis was confined to available data and no imputation was done.

Cardiac Presentation

Chapter 3 of the report basically was to summarize the patient characteristics, vital sign measurements, and laboratory parameters by ACS stratum such as STEMI, NSTEMI and UA, age groups namely young, middle-age and elderly, gender as well as the pre-morbid conditions such as diabetes, hypertension, and dyslipidaemia. For continuous data, the mean, standard deviation, median, minimum and maximum were reported. On the other hand, frequency count and percentage were reported for discrete data. Only the missing age was imputed for the purpose of analysis.

Treatment

The treatments that were provided to the patients were mainly summarized in chapter 4 of the report. This information was cross tabulated by ACS stratum, age group, gender as well as the main ethnic group in Malaysia. No imputation was done for this chapter.

Clinical Outcomes

Chapter 5 of the report summarized the overall in-hospital as well as 30-day outcomes for patients with ACS. Cross tabulations of outcomes by gender, pre-morbid conditions such as diabetes, hypertension, dyslipidaemia, and ACS stratum were included in this chapter. Tabulation of outcomes by fibrinolytic therapy was only presented for STEMI patients. Other tabulations such as outcomes by percutaneous coronary intervention at admission, CABG at admission, and also the pre-admission aspirin use were presented separately for patients with STEMI and NSTEMI/UA. Prognostic factors for in-hospital death as well as death in 30 days were summarized separately for STEMI and NSTEMI/UA patients. No imputation was done for this chapter.

Reference

1. Department of Statistics. Yearbook of Statistics.2002. Malaysia