

MORTALITY REVIEW—MEDICAL UNIT II OUTRAM ROAD GENERAL HOSPITAL, SINGAPORE 1972-73

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SYNOPSIS

A mortality review of 1135 deaths over the two-year period of 1972-73 was conducted in a medical unit of Outram Road General Hospital, Singapore. The information was derived from data recorded during death rounds.

Of the 1135 deaths, 973 (86%) had documented causes. 50% of the documented deaths occurred in the 7th and 8th decades of life, while 13% were below the age of 40. There was a male preponderance of deaths. The authors also noted a higher proportion of Indian deaths and a lower proportion of Malay deaths than would be expected from the ethnic composition of Singapore. The autopsy rate was 13.5%.

Cerebrovascular disorder was the most frequent event encountered in the causation of death, involving 222 (23%) of these 973 deaths. Most of the cerebrovascular deaths had underlying hypertensive disease. Approximately 10% of deaths resulted from acute myocardial infarct. 9% had diabetes mellitus, mainly as a contributory cause. Renal failure was the terminal presentation in 124 deaths (12.5%). The major causes of young adult deaths include specific infections and poisoning.

INTRODUCTION

An attempt is made in this paper to review all deaths in Medical Unit II, Outram Road General Hospital in the years 1972 and 1973. This would provide a statistical record of the mortality pattern of one medical unit in Singapore. The authors hope to indicate the underlying major and minor causes of death in such a unit, and to define the group of 'young' adult deaths.

MATERIAL AND METHOD

Outram Road General Hospital is the largest general hospital in Singapore with a total of 1521 beds. Medical Unit II is one of three medical units in the Hospital, and one of two medical units of the Department of Medicine, University of Singapore. It has 158 "general" medical beds, divided into 2 female and 3 male wards and admits patients above the age of 10 years. In addition, it has 10 "renal beds" and this functions as the "Renal Dialysis Unit" of the Hospital. Four of the "general" beds were used, during the period of study, as "coronary care" beds.

All deaths between 1st January 1972 to 31st December 1973 in the unit are included in the study.

Unit deaths of the preceding week were read at a weekly lunch time "Death Round", on a Friday. All cases were reviewed and discussed by the unit medical staff, with post-mortem reports whenever available. The following items of information were put on record: name, registration number, date of death, age, sex, ethnic group, cause(s) of death (immediate, underlying, and contributory), and whether a post-mortem was performed. Altogether, there were 1135 deaths during the study period of 2 years: 973 of the deaths were read; in 162 the causes of death were not entered. The data so obtained from the mortality records were transferred to punch cards, collated and analysed.

RESULTS

Table I. Age Distribution of Deaths.

Table II. Sex Distribution of Deaths.

Table III. Ethnic Group Distribution of Deaths.

Table IV. Post-mortem examination.

Table V. Causes of Death for 973 Deaths Reviewed at Death Round Tabulated according to list of 50 causes. (International lists of Diseases and Causes of Death. WHO 8th Revision 1965).

Table VI. Death from Acute Myocardial Infarct: Immediate Causes.

Table VII. Deaths from Chronic Renal Failure: Association with Hypertension.

Table VIII. Cerebro-Vascular Deaths.

Table IX. Diabetic Deaths.

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TABLE I
AGE DISTRIBUTION OF DEATHS

Age	Number of Deaths
0—	1
10—	32
20—	47
30—	49
40—	123
50—	181
60—	290
70—	194
80—	40
90—	2
Unknown	14
Total	973

TABLE II
SEX DISTRIBUTION OF DEATHS

Sex	Number of Deaths
Male	627
Female	345
Unknown	1
Total	973

TABLE III
ETHNIC DISTRIBUTION OF DEATHS

Ethnic Group	Number of Deaths
Malay	69
Indonesian	
Chinese	761
Indian	
Pakistani	109
Ceylonese	
Others	17
Unknown	17
Total	973

TABLE IV
POST-MORTEM

Performed	: 132
Not Performed	: 841
Total with Records	: 973

DISCUSSION

Of the 1135 deaths in this study period, full information is available in 973 cases. In 162 cases the causes of death are not recorded. Some of the case-notes of these unrecorded cases are misplaced or lost. In many instances, however, failure of recording is the result of the change-over of housemen.

Of the 973 cases analysed in detail the following observations can be made:—

Age distribution of deaths (Table I)

484 deaths (about 50%) are between the ages of 60 and 79 years, that is, within the 7th and 8th decades. This reflects the life expectancy in Singapore, which was 65.1 years for males and 70.0 years for females at birth in 1970. In 14, the age at death is unknown. Most of these are vagrants brought in quite ill by police. There is a death below 10 years. This was a patient who was referred by the paediatric unit for dialysis and who subsequently died of renal failure.

Sex distribution of deaths (Table II)

There are 627 male deaths and 345 female deaths giving a ratio of 1.8:1. Why is there this male preponderance? First, there are much fewer female beds in the unit. Secondly, among the older immigrant population in Singapore, there are many more males. The fact that males are more prone to myocardial infarction probably influences this ratio to some extent.

Ethnic group distribution of deaths (Table III)

The distribution of deaths of the major racial groups is as follows: Chinese 761 (78.2%), Malays 69 (7.1%), and Indians 109 (11.2%). It is interesting to compare this with the ethnic group distribution of the Singapore population (1973) which is: Chinese 76.1%, Malays 15.1%, and Indians 6.9%.

The proportion of "Malay deaths" in the unit is only half that which can be expected from the ethnic group distribution in the population. There are probably many reasons for this:

- (i) To Muslims, autopsy is culturally objectionable. Autopsy examination is popularly believed to be enforced on hospital deaths.
- (ii) The Malays still have considerable faith in their "bomohs" and their native medicine.
- (iii) Accessibility to institutional care, in particular Outram Road General Hospital, may present problems to the more rural Malay population.
- (iv) There might be less awareness of proper utilisation of hospital services.

On the other hand, there appear to be more deaths among Indians in the unit than would be expected from the racial distribution in the population. Again, there is probably more than one reason for this:

- (i) Many of the South Indian immigrant population are without families or immediate relatives in Singapore, and therefore need institutional care when they fall ill.
- (ii) Surgical procedures or autopsies are not objectionable to them, in particular.
- (iii) They are more prone to myocardial infarction.

Autopsy rate (Table IV)

Out of 973 deaths, 132 post-mortems are performed. The necropsy rate is, therefore, 13.5%. This is a very low rate when compared with university-affiliated American hospitals. The 1973 necropsy rate, for example, at Duke University Medical Centre is 57%, at University of Texas Affiliated Hospitals is 63%, and at Seattle University Hospital, Washington, 79%. In Singapore, the objection against autopsy, in particular among the Muslims, but also among a large section of the Chinese population, is difficult to overcome. The high necropsy rates achieved in many American hospitals is also due to the fact that it is accepted practice in most university affiliated hospitals in U.S.A. to obtain consent for autopsy examination as part of the admission policy of the hospitals.

Underlying causes of death (Table V)

The six major causes of death out of the total number of 973 deaths are: (1) Hypertensive disease—184, (2) Ischaemic heart disease—131, (3) Malignant neoplasms—110, (4) Cerebro-vascular disease—87, (5) Bronchitis, emphysema, and asthma—82, and (6) "symptoms and ill-defined conditions" (which includes uraemia)—62. Of the 184 deaths with underlying hypertension, 119 terminate with strokes, 30 with chronic renal failure and 8 with ischaemic heart disease. The cancer deaths are probably under-estimated in this unit survey when compared with Singapore figures, as many of the cancer patients die at home. This pattern of major causes of death is little different from that obtained in the West, reflecting the comparable living standards and standards of medical care in Singapore.

The minor causes of death include (1) pneumonia—60, (2) specific infections (list no. B1 to B18)—43, and (3) "poisonings" (list no. B49 and B50)—26. Many of the deaths due to pneumonia are bronchopneumonias complicating strokes in the old. Among the specific infections there are 11 due to pulmonary tuberculosis. This, however, does not give the true picture of the problem in Singapore as practically all patients with pulmonary tuberculosis are referred to Tan Tock Seng Hospital for treatment. An interesting feature emerging is the fact that there are no Malaria deaths in these 2 years. This undoubtedly is due to constant vigilance of the doctors despite the low endemicity in Singapore. There are 26 deaths due to "poisonings". These include accidental as well as intentional over-dosages of drugs. The low mortality resulting from "poisonings", as compared with Western figures, measures only the tip of the ice-berg of "poisonings" in Singapore. To put the problem in its true perspective, morbidity figures are required.

Young Adult Deaths (Table V)

A young adult death is defined as any death above the age of 10 years and below the age of 40

years. Altogether, there are 128 deaths, or 13.2% of the total deaths. The major underlying causes are: (1) Malignant neoplasms—21, (2) Cardiovascular disease (list no. B26 to B29)—24, (3) Symptoms and ill-defined conditions (including uraemia)—22, (4) infections (list No. B1 to B18 plus B32)—15, (5) "poisonings"—12, and (6) "nephritis" and "nephrosis"—9.

Of the deaths from specific infections below the age of 40 years, there are 3 from leptospirosis, 3 from viral encephalitis, 2 from dengue haemorrhagic fever, 1 from fulminant viral hepatitis, and 1 from pulmonary tuberculosis.

"Poisonings" is an important cause of mortality in the young. 50% of the total deaths from

TABLE V
CAUSES OF DEATH FOR 973 DEATHS REVIEWED
AT DEATH ROUNDS TABULATED ACCORDING
TO LIST OF 50 CAUSES (8TH REVISION, 1965,
INTERNATIONAL LIST OF DISEASES AND
CAUSES OF DEATHS, W.H.O.)

List No.	Cause Group	Young Deaths (age below 40)	All Deaths
B 1	Cholera	0	0
B 2	Typhoid fever	0	0
B 3	Bacillary dysentery and amoebiasis	0	1
B 4	Enteritis and other diar- rheal diseases	0	3
B 5	Tuberculosis of respiratory system	0	11
B 6	Other tuberculosis, includ- ing late effects	1	2
B 7	Plague	0	0
B 8	Diphtheria	0	0
B 9	Whooping cough	0	0
B10	Streptococcal sore throat and scarlet fever	0	0
B11	Meningococcal infection	0	0
B12	Acute poliomyelitis	0	0
B13	Smallpox	0	0
B14	Measles	0	0
B15	Typhus and other ricket- tsioses	0	0
B16	Malaria	0	0
B17	Syphilis and its sequelae	0	1
B18	All other infective and parasitic diseases	10	25
B19	Malignant neoplasms, in- cluding neoplasms of lym- phatic and haemopoietic tissues	21	110
B20	Benign neoplasms and neo- plasms of unspecified na- ture	0	0
B21	Diabetes mellitus	1	20
B22	Avitaminosis and other nut- ritional deficiencies	1	7
B23	Anaemias	2	4
B24	Meningitis	0	3
B25	Active rheumatic fever	0	0
Sub-Total		36	187

List No.	Cause Group	Young Deaths (age below 40)	All Deaths
B26	Chronic rheumatic heart disease	11	23
B27	Hypertensive disease	9	184
B28	Ischaemic heart disease	2	131
B29	Other forms of heart disease	2	23
B30	Cerebrovascular disease	1	87
B31	Influenza	0	0
B32	Pneumonia	3	60
B33	Bronchitis, emphysema and asthma	2	82
B34	Peptic ulcer	0	11
B35	Appendicitis	0	2
B36	Intestinal obstruction and hernia	0	1
B37	Cirrhosis of liver	2	25
B38	Nephritis and nephrosis	9	10
B39	Hyperplasia of prostate	0	0
B40	Abortion	0	0
B41	Other complications of pregnancy, childbirth and puerperium	0	0
B42	Congenital anomalies	1	3
B43	Birth injury, difficult labour and other anoxic and hypoxic conditions	0	0
B44	Other causes of perinatal mortality	0	0
B45	Symptoms and ill-defined conditions	22	62
B46	All other diseases (residual)	13	48
B47	Motor vehicle accidents	0	0
B48	All other accidents	4	8
B49	Suicide and self-inflicted injuries	1	3
B50	All other external causes	11	23
Grand Total		129	973

“poisonings” occurs in patients below 40 years of age.

The potentially salvable groups towards which the attending physician must direct more attention, are those deaths related to “poisonings”, specific infections, cardio-vascular disease (including hypertension), and perhaps glomerulonephritis.

Deaths from acute myocardial infarction (Table VI)

Deaths from acute myocardial infarction totalled 106, approximately 10% of the total deaths. Complication such as shock or “pump” failure are probably under-reported as immediate causes of death in the Death Round records, although more commonly observed by the bedside.

Deaths from chronic renal failure (Table VII)

There were altogether 124 deaths from chronic renal failure. There are 10 with “nephritis” or nephrosis”. Most are end-stage kidney disease where the cause could not be determined. Association with hypertension occurs in one-quarter of the cases (31). Forty-five are below the age of 40 years. This gives

TABLE VI
DEATHS FROM ACUTE MYOCARDIAL INFARCT:
IMMEDIATE CAUSES

Arrhythmias (V. T., A. F., heart block)	34
Congestive cardiac failure	
Shock	22
Both of the above	1
Other immediate complications	8
Unrecorded	41
Total Infarct Deaths	106

TABLE VII
DEATHS FROM CHRONIC RENAL FAILURE:
ASSOCIATION WITH HYPERTENSION

Chronic renal failure with hypertension	31
Chronic renal failure without hypertension	93
Deaths due to Chronic Renal Failure	124

TABLE VIII
CEREBROVASCULAR DEATHS

As underlying cause of death	87
As immediate cause with antecedent disease	135
Total deaths involving cerebrovascular disorder	222

TABLE IX
DIABETIC DEATHS

As underlying cause of death	21
As contributory cause of death	69
Total diabetic deaths	90

an idea of the potential numbers requiring chronic haemodialysis/renal transplantation.

Deaths from cerebro-vascular disease (Table VIII)

Death involving cerebro-vascular accidents is the highest single mortality factor in the study. This appears to be a “fashionable” way of death in people over 60 years. It is the immediate cause in 135 instances, most times with a background of hypertension. In addition, it is the underlying cause in 87. Bronchopneumonia and pressure sores are common complications.

Deaths associated with diabetes mellitus (Table IX)

Diabetes mellitus is the underlying cause in 21 deaths and the contributory cause in 69.

Owing to the limited items of information available in this study, only very general conclusions may be made. The significance of the cases which are not read is difficult to assess. More complete documentation of deaths should be aimed at in future studies. There will obviously be a bias towards a larger proportion of renal and cardiac deaths in this

study as there are special facilities for renal and coronary care in this unit. Strokes are a major problem as seen in this general medical unit and there is a need for provision of rehabilitation and terminal care facilities in planning future medical services. It is the authors' hope that this study will stimulate similar studies among other hospital units.

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REFERENCES

1. Mortality Records, Medical Unit II, Outram Road General Hospital, Singapore, 1972.
2. Mortality Records, Medical Unit II, Outram Road General Hospital, Singapore, 1973.
3. Central Medical Records, Outram Road General Hospital, Singapore, 1972 and 1973.
4. International Lists of Diseases and Causes of Death. World Health Organisation, 8th Revision 1965.
5. Statistics Department, Singapore.
6. Directory of Approved Internships and Residences, Council on Medical Education, 1973-74.