AVOIDABLE DEATHS IN DEVELOPING COUNTRIES: A STUDY OF FACTORS CONTRIBUTING TO DEATH IN PATIENTS ADMITTED TO THE MEDICAL WARDS OF MUHIMBILI MEDICAL CENTRE, DAR ES SALAAM

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AVOIDABLE DEATHS IN DEVELOPING COUNTRIES: A STUDY OF FACTORS CONTRIBUTING TO DEATH IN PATIENTS ADMITTED TO THE MEDICAL WARDS OF MUHIMBILI MEDICAL CENTRE, DAR ES SALAAM.

BY

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I HAVE READ THE DISSERTATION AND APPROVE IT FOR THE EXAMINATION.

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ABSTRACT

Objective: To determine what proportion of deaths in the medical wards of Muhimbili Medical Centre could be regarded as "avoidable" and to identify possible contributing factors.

Design: Prospective study of patients admitted to the medical wards of Muhimbili Medical Centre,Dar es Salaam over a 6- months period with information on each patients' history prior to admission being obtained from accompanying relatives.

Setting: Muhimbili Medical Centre, Dar es Salaam.

Subjects: 835 patients: 508 males and 327 females admitted to two medical wards between 1 July and 31 December, 1993.

Results: There were 132 (15.8%) deaths. 80 (64.8%) deaths could have been considered "avoidable". 42 (32.1%) deaths were "unavoidable" but suffering could possibly have been alleviated and life prolonged. Only 4 deaths were considered completely "unavoidable". Of the 80 deaths which could have been considered "avoidable" 17 (21.25%) were due to all forms of tuberculosis (excluding those associated with HIV infection), 10 (12.5%) were due to diabetes mellitus; 9 (11.25%) were due to cerebral malaria, 8 (10%) were due to meningitis, 7 (8.75%) due to all forms of stroke; 6 (7.5%) to cardiomyopathy, 4 (5.0%) due to hypertension,

4(5.0%) due to tetanus, 3 (3.75%) due to clinical malaria, 2 (2.5%) due to acute alcohol intoxication, 2 (2.5%) due to acute viral Hepatitis. 7 deaths grouped as others included acute gastroenteritis, renal failure, adult malnutrition, pneumonia, cellulitis, drug poisoning,and urinary outflow obstruction.

Of the 42 deaths in which life could have been possibly prolonged 23 (54.8%) were due to tuberculosis associated with HIV infection 15 (37.7%) were due to AIDS, 3 (7.1%) due to chronic liver disease and only 1 due to cancer.

The 4 completely "unavoidable" deaths were due to hepatoma 2, rabies 1, noxious substance 1. The following factors related to care seeking behaviour were found to be significantly associated with death: Age ($p<0.0001$), male sex ($p = 0.012$), alcohol ($p = 0.0132$), Glasgow coma score ($p = <0.012$), Karnofsky Performance Scale ($p = <0.0001$), duration of illness ($p = 0.0001$) Duration of days in the hospital ($p = 0.016$), marital status for females when not married ($p = 0.04$), traditional healing ($p = 0.0179$) belief in witchcraft ($p = 0.00029$), delay in care seeking ($p = 0.000992$).

For those who were ever referred to any care unit before admission they were significantly associated with death ($p = 0.0062$). Use of the following services was not significantly associated with death: government ($p = 0.0982$), private ($p = 0.9852$), pharmacy or shops ($p = 0.6668$), past medical history ($p = 0.14$) current medication ($p = 0.7$). Neither was failure to pay for medical services significantly associated with death ($p = 0.63$).

Relatives' account of patients' account of care seeking behaviour matched that of the patients significantly. For services sought agreement was 92.4% for" No service" or assistance by family members, 95% for government services, 97.7% for private services, 76.6% for traditional healing and 99.5% for other services. For reasons for delay agreement was 94.7% for health service to be far, 93.0% when patient could not afford, 85.3% for belief in witchcraft and 93% when patient was unwilling to seek care early. For outcome agreement was 96.4% for discharge on request/absconded, 84.6% for referral before admission and 70% for referral after admission. Distribution for age, sex and education by respondents was similar to those by patients.

Conclusion:

64.8% of deaths are "avoidable" and in 32.1% deaths life could be prolonged and suffering alleviated.

Care seeking behaviour accounted significantly for most of these deaths. Efforts to motivate our people towards a "good" seeking behaviour is warranted. Health units should be equipped and health workers motivated.

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DECLARATION

I declare that the whole of this work has not been submitted for a degree in any other University.

Date: 15.11.1995

Signature: .....

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INTRODUCTION.

Background: The problem of "avoidable" or premature death in sub-Saharan Africa

About 50 million people in the world die each year and many of them prematurely[1]. It is estimated that 40% of these deaths could be prevented by vaccination, access to clean water, use of cheap medicines or changes in unhealthy behaviour[2]. The World Health Organization (WHO) statistics branch in Geneva estimated that about 20 million people now dying before age 65 could live to that age by making lifestyle changes, for example, stopping smoking, by immunisation and by fully implementing low - tech - hygienic and therapeutic measures. Because of the high mortality of young children in sub-Saharan Africa major efforts have been directed towards reducing under 5 mortality. Adult mortality has generally received less attention although premature adult mortality especially since the advent of HIV disease, is now increasingly recognised as a major problem. At current levels of mortality the proportion of Africans age 15 who can expect to die before the age of 60 ranges from around 20% to over 50%[3].

Premature death must be avoidable whenever possible. A premature death is a tragedy at any age. A premature death may be the death of a potential prime minister. Premature death may affect engineers or doctors or other professionals in whose training the country and families have invested heavily. Premature death may involve a household head. His death may mean that those who remain will

suffer economically. The premature death of a mother will result in much suffering of those she leaves behind. Last but not least, it may be a teenager who dies prematurely, someone who could be a future administrator or a prominent farmer and the like. Had the President of South Africa, Mr. Nelson Mandela died prematurely the new South Africa may have not yet been "born".

If we accept current mortality rates in the United Kingdom as a potential "gold standard" it has been shown in the preliminary report of the Policy Implications of Adult Morbidity and Mortality project that 64% of deaths in males and 75% of deaths in females in Dar es Salaam lie outside the United Kingdom distribution of age at death. Certainly there are factors in Dar es Salaam that contribute to the difference from the "gold standard[1]". Possible factors that could influence the occurrence of these premature deaths include:

(i) age of patients

(ii) sex of patients

(iii) late seeking of medical care

(iv) lack of national policies on possible preventable problems eg. those associated with tobacco and alcohol influence.

(v) severity of illness

(vi) local taboos, religious and traditional beliefs including witchcraft.

vii) nature and causes of illness

viii) lack of emphasis on health education on the major preventable diseases.

(ix) failure of access to proper care with correct diagnosis and treatment.

(x) lack of funds and therefore inability to pay treatment bills.

This study was therefore undertaken to investigate, what proportion, if any, of all deaths occurring in the medical wards of Muhimbili Medical Centre could be regarded as "avoidable", what factors could have contributed to these deaths, and what steps can be taken in the future to avoid them.

The study also investigated how closely relatives' accounts of patients' care seeking behaviour prior to admission, compared with the patients' account. If the relatives' histories are similar to those of the patients this will provide evidence to support the validity of information obtained from relatives on factors associated with "avoidable" deaths.

LITERATURE REVIEW

Trends patterns and levels of mortality in children and adults in sub-Saharan Africa.

Reducing childhood mortality and premature mortality in adults will increase life expectancy. A country, with improved mortality rates and reduced premature deaths is one that shows evidence of development. Sub-Saharan Africa rank last in the world on mortality, life expectancy and income[4]. Life expectancy at birth is 51 years and at 10 years is 55 years. The crude death rate on average is about 18.7 per thousand. 20% of children die before they reach the age of 5[4]. Rapid reduction in mortality rates in sub-Saharan Africa were experienced during the post war period. Many surveys were conducted in francophone Africa between the mid - 1950s and mid - 1960s. Results varied with some countries having very high mortality rates. Life expectancy for Guinea in 1954-55 and Chad in 1963-64 at age 15 was around 30 years. In Togo in the 1960s it was about 40 years. In Ivory Coast the life expectancy at age 15 years had risen to nearly 49 years from an estimated 38 years in 1961-62. Most countries that lowered their adult mortality had strong economies by African standards. For Eastern and Southern African countries, except for Swaziland, which had life expectancies at age 15 between 45 and 50 years the levels of mortality were comparatively low[3].

"Childhood mortality has been much severer in Western than in Eastern Africa with a rough gradient crossing the continent from northwest to southeast". In the Southern African countries heavy adult mortality is combined with low levels of childhood mortality. A different picture is seen in Sudan or Mauritania as they have experienced rapid declines in adult mortality in recent years but with little reduction in infant and under 5 mortality[3] On gender issues adult females died more than males in Malawi. This was different in the Southern African countries of Lesotho and Swaziland where adult male mortality is exceptionally high. This is almost certainly related to labour migration to South Africa in the mining industry. Tuberculosis, for example is very common in the mining industry[3].

Causes of death in sub-Saharan Africa

Nearly all premature deaths are due to specific causes or a combination of causes. These causes have different determinants and distributions. Their prevention and treatment requires both personal and community or government approaches.
No comprehensive cause-specific mortality data in sub-Saharan Africa is, however, available.

High childhood mortality rates in sub-Saharan Africa are caused largely by infectious diseases eg. diarrhoeal diseases, malaria, acute respiratory infections (ARI) and measles. These diseases tend to be more severe and fatal when there is coexisting malnutrition. Before their fifth birthday a child has a 5% risk of death

from diarrhoeal diseases, 1.5 - 6% from ARI, 13% from vaccine preventable diseases (measles 8%, pertussis 4%, tetanus 1%). There is also a substantial lifetime risk of death from tuberculosis especially since the advent of AIDS[4].

Malaria control programmes have collapsed in many countries and its transmission has reached higher levels than anywhere in the world[5]

AIDS was noted first in the region in 1980. Its transmission and disease is very threatening. The proportion of Human Immunodeficiency Virus (HIV) infected individuals who ultimately develop AIDS is not known. However, studies in the United States of HIV infected homosexuals and haemophiliacs has demonstrated that 15-20% develop AIDS in 5 years and 50% develop AIDS in 10 years[6].

Rheumatic heart disease, hypertension and cardiomyopathies are also major causes of death in the region. Coronary heart disease is rare in Africa. Hepatocellular carcinoma and bladder cancer are also common. Hepatocellular carcinoma has a high incidence in Southern Africa[7].

Use of "avoidable" deaths as indicators of health care effectiveness.

Definition of terms

"Avoidable" deaths refer to untimely deaths from certain causes which could have been prevented or treated given appropriate and timely medical intervention.

Quality of care refers to the extent to which the results obtained i.e the outcome, are in accordance with the objectives and targets for reducing the dimensions of the problem.

Efficiency of care refers to the extent to which activities are implemented as well as possible in relation to resources devoted to them (in terms of financial and other resources, health processes, technology and time), for example, whether activities are implemented with expected timeliness, quality and at optimal costs.

"Avoidable" mortality is an appropriate outcome that may be used to assess and monitor health services. Maternal and infant mortality rates are accepted, for example as monitors of obstetric and infant care as has been exemplified by Child Survival and Development (CSD) programmes in all regions of Tanzania. Monitoring, therefore, of other disease events eg. premature/"avoidable" death may yield information about a broader range of health care services. An example which has been long and repeatedly quoted is a pilot maternal and child health and family planning services project in urban and rural areas of Lahore, Pakistan, where, after 4 years, of implementation,evaluation showed a decline in birth rates from 41.0 to 19.0 per thousand, an infant mortality rate decline from 119 to 70.2 per thousand and a decline in maternal mortality from 560 to 200/100,000 live births[8]. It is clear that maternal mortality and infant mortality are negative indices of care and have been

very fruitful in saving many deaths. The use of these indices is limited because they apply only to mothers and babies.

The concept of "avoidable" death emanates from a proposed method of studying the quality of medical care for preventable and manageable diseases chaired by Rutstein in 1976[9]. They defined quality and efficiency of care. They listed about 80 disease conditions (appendix I) which were divided and graded into "unnecessary disease", "unnecessary death" and "unnecessary disability". They pointed out that the occurrence of unnecessary disease, disability or untimely death justifies a carefully controlled scientific search for remediable underlying causes. They further pointed out that "just as the investigation of an airplane accident goes beyond the immediate reasons for the crash to the design, method of manufacture, and operation of the plane so should the study of unnecessary undesirable health events yield crucial information on the scientific, medical, social and personal factors that could lead to better health. Moreover, the evidence collected will not be limited to the factors that yield only to medical measures of control. If there is clear-cut documented evidence that identifiable social, environmental, "lifestyle", economic or genetic factor are responsible for special varieties of disease, disability or untimely death, these factors should be identified and eliminated wherever possible. The chain of responsibility to prevent the occurrence of any unnecessary disease, disability, or untimely death may be long and complex. The failure of any single link may precipitate an unnecessary undesirable health event. Thus, the unnecessary case of diphtheria, measles, or poliomyelitis may be the responsibility of the state legislature that neglected to appropriate the needed funds, the health

officer who did not implement the programme, society that opposed community clinics, the physician who did not immunise his patient, the religious views of the family, or the mother who didn't bother to take her baby for immunisation. Death from cancer of the lung may be due to the patient's unwillingness or inability to give up cigarettes, the absence of an effective health information programme in the public schools and the community or more rarely from an error in diagnosis or from poor surgical care."[9]

"Thus it is clear that the physician cannot be solely responsible for many of the errors of omission and commission that result in avoidable death. Nevertheless he has initial and some continuing responsibility. He is ideally the one competent to provide the leadership and professional guidance to the politician, the administrator, industry, the public and the patient himself. They may not of course take the physician's advice but that does not relieve him of the responsibility for the input of the scientific facts and the professional knowledge that are directly relevant to the improvement of human health and the prevention of community decisions that may result in untimely death"[9].

Review of studies on "avoidable" deaths

Following Rutstein's[9] work several workers began to take a great interest in "avoidable" deaths. Charlton et al[10] studied geographical variation in mortality from conditions amenable to medical intervention in England and Wales. They

examined data on deaths from 14 diseases from Rutstein's list[9] in 98 area health authorities (AHA). The diseases were those for which a substantial proportion of deaths were thought to be avoidable with appropriate medical intervention. They included: (1) hypertensive disease (2) cancer of cervix uteri (3) pneumonia and bronchitis (4) tuberculosis (5) asthma (6) chronic rheumatic heart disease (7) acute respiratory disease (8) bacterial infections (9) Hodgkin's disease (10) abdominal hernias (11) acute and chronic cholecystitis (12) appendicitis (13) causes leading to maternal deaths (14) deficiency anaemia.

Mortality from these diseases was correlated with the following social indicators (i) the proportion of employed persons who were unskilled (ii) the proportion of households renting their accommodation (iii) the proportion of households without cars. Over crowding was rejected as an indicator because it was rare in the UK and therefore could not be reliably estimated. Unemployment rates were rejected since they varied considerably over the time period of the study. They found that there was considerable variation in standardised mortality rates (SMR) in nearly all of these disease groups and about a threefold variation for each of the social factors selected. However, after adjustment they were able to control the social indicators as confounding factors. The selected avoidable causes varied greatly in the extent to which they were associated with social indicators. They concluded that factors other than purely social and economic ones, for example, health care inputs were associated with mortality from preventable causes studied.

Charlton and Velez[11] compared time trends in mortality from 10 diseases considered to be avoidable in six countries where from 1950-80. Diseases studied

include (i) causes of infant mortality (ii) tuberculosis (iii) cervical cancer (iv) Hodgkin's disease (v) chronic rheumatic heart disease (vi) hypertensive disease (vii) stroke (viii) appendicitis (ix) cholelithiasis and cholecystitis (x) causes of maternal deaths. Percentage (%) falls during the period 1956 - 1978 in all causes when summed together as "amenable causes" were as follows: England and Wales 51%, USA 55%, France 64%, Japan 72%, Sweden 62%. Each disease entity taken alone also fell though at a different rate. Equally correlating with these declines in mortality were increases in:

(a) percentage of gross national product spent on health.

(b) number of physicians per 10,000 population.

(c) number of qualified nurses per 10,000 population.

(d) growth in gross national product per head of population.

It is quite evident from such facts that when differences in population and disease incidence are standardised "avoidable" death is a useful indicator of health service performance.

Boys et al[12] analysed national trends in mortality from conditions amenable to timely, appropriate medical care and those considered not amenable to such care as given in the Rutstein[9] list in four Eastern European countries (Hungary, Czechoslovakia, Poland, German Democratic Republic), two Western European countries (The Federal Republic of Germany and England and Wales) and two North American nations (United States and Canada). They found that in the age group 0-64 percentage changes in mortality from amenable causes between 1970-4 and 1985-7 were as follows:Hungary - 14.7%, Czechoslovakia - 28.2%, Poland -

22.6%, GDR - 26.5%, FRG - 61.6%, England + Wales - 49.7%, Canada - 60.1%, US - 51.2%. For non amenable causes including ischaemic heart disease percentage changes during the same period were: Hungary + 26.1%, Czechoslovakia + 2.2%, Poland + 9.5%, GDR + 0.5%, FRG - 20.1%, England + Wales - 15.7%, Canada - 15.2%, US - 10.5%.

For ischaemic heart disease alone (age group 25-64 years) the percentage changes between 1970-4 and 1985-7 were: Hungary + 41.8%, Czechoslovakia + 13.4%, Poland + 71.4%, GDR + 22.0%, FRG - 12.9% England + Wales - 14.9%, Canada - 42.7%, US - 49.3%. They emphasised the use of mortality data as a negative yet a measurable and useful index of health.

It was shown that, for Eastern European countries the major increases in mortality were deaths from non-amenable mortality. The increase was particularly marked in Poland and Hungary. Over this same period of 15 years, mortality from non-amenable conditions in Western countries fell by at least 15%. These improvements in the Western democracies were achieved in appreciably different systems of health care. The modest improvements in mortality from amenable causes achieved by the Eastern European health system, based mainly on the Soviet Model, are not likely to be explained by lack of availability of doctors or hospital beds as these supply indicators have not been inferior to those in the West.[13]

There has been an element of lack of efficiency in Eastern European health services compared with their Western counterparts[12] and a lack of open critical debate about the quality and organization of health services. Moreover, not only have Eastern European countries had a low gross domestic product per head but

recent data from the World Bank indicate that the percentage of gross domestic product spent on health care has been consistently less than in countries of the Organization of Economic Corporation and Development (OECD).

There has been neglect in implementing the effective monitoring of industrial and household emissions and effluent in the East, whereas in the West there was a shift of emphasis through technological change from heavy to lighter industries. With respect to personal health-related behaviour, smoking is particularly high in Hungary and Poland[12] and alcohol consumption is high in Hungary and Germany. Access to fresh fruits and vegetables is less in the east because of the type of economic system and lack of wealth.

Westerling[14] reporting on trends in "avoidable" mortality in Sweden in the period 1974-1985, as an index of quality of care found that total mortality declined during the 12-year period studied. Avoidable causes of death were grouped into preventable and treatable causes according to Rutstein's classification.[9] In men treatable diseases declined more than total mortality. When lung cancer was excluded, preventable diseases declined for both sexes. The death rate increased for some avoidable causes of death such as pneumonia other than viral. In women death rates increased for chronic bronchitis and emphysema as well as for malignant neoplasm of trachea, bronchus and lung, while for boys aged 1-14 years bronchitis, unspecified disease, and asthma showed an increase in death rates. He suggested an emphasis on preventable and treatable causes and advised further study of these.

Poikolainen and Eskola[15] writing on the effect of health services on mortality in Finland between 1969 - 1981 found that mortality from causes amenable to intervention by health services declined among both males and females more rapidly than mortality from causes not amenable to medical intervention. Deaths from amenable causes fell by 63% among males and 68% among females and death from non-amenable causes by 24% for males and 29% for females. Deaths from all causes fell by 24% for males and 34% for females. Regression coefficients indicated that mortality from amenable causes fell significantly faster than that from non-amenable or all causes among both females and males ($p < 0.001$ in all cases). Within the amenable causes of death rapid linear decreases in death rates were observed for tuberculosis among males, for hypertensive diseases, cholelithiasis and cholecystitis, bronchitis, and asthma among females and for causes of perinatal mortality among both sexes. BCG vaccination in the newborn and general population and screening by Xray brought about a rapid fall in the number of chronic cases of tuberculosis. Rifampicin introduction was more effective and shortened the hospital stay and shifted follow up to an outpatient basis. The shorter treatment course also increased compliance. The decline in mortality from chronic obstructive lung diseases especially asthma is probably related to new selective drugs, improvement in respiratory therapy, rehabilitation practices and the wider use of physiotherapy.

The proportion of patients with hypertension treated will antihypertensives rose from a third to a half. Crude estimates suggest that drug treatment for hypertension prevented approximately 500-850 deaths per year in the mid aged

population in the 1970s. In addition treatment for cholelithiasis became more active and fluid and antibiotic therapy for acute cholecystitis improved, with early surgery being common. There was also consolidated and improved antenatal and perinatal care. Regression estimates suggested that health services accounted for 50% of the total decline in mortality from amenable causes for both sexes. McKee and Rajaratnum[16] made similar observations in England and Wales to the Finnish study though the rate of decline was slower.

Problems associated with "avoidable" deaths as indicators of health care

While it is true that deaths are theoretically avoidable a major problem in developing countries is limitation of resources. There is little money, hospitals are few and most of them ill-equipped and with few staff. Rutstein and other workers have pointed out that there are many influences outside medical care that have a major impact on the outcome of illness. A critique by Carr - Hill et al[17] have claimed that the proposal that effectiveness of medical care can be "measured by mortality from specified diseases for which death is apparently avoidable given appropriate medical interventions" has no theoretical or practical basis. Carr Hill et al[17] had three major criticisms of the findings of Charlton et al[10]

i. Coding of cause of death: There is variability in diagnostic habits, precision of diagnosis and reliability of medical records. That is most work on avoidable deaths and mortality trends was based on the use of medical records. Variations in the medical records could have influenced the results.

ii. Choice of social indicator : Charlton et al[10] used only three apparently

arbitrary social indicators and they termed them as confounding factors, having no effect on the outcome of health care. Carr - Hill et al[17] were not convinced as to why unemployment and overcrowding were excluded. They then analysed other categories of social indicators which included (a) unemployment (b) average domestic rateable value and (C) number of cars per person. They found that through crude multiple regression analysis these three social factors accounted for at least 40% of the variance of the total mortality rate. They concluded that "avoidable" mortality appears more dependent on social factors than total mortality, and that these social factors accounted for a substantial proportion of the variation in avoidable mortality between area health authorities.

iii. Statistical analysis: Carr - Hill[17] point out that Charlton and colleagues[10] used correlation coefficients while they should have used more appropriate statistical tests eg multivariate analysis. Carr Hill et al[17] argued that "any model for investigating the relation between avoidable mortality and health care must distinguish cause and effect. The model should allow for the possibility that differences in avoidable mortality may lead to differences in health care resources (eg. through changes in social policy) and vice versa". This is an issue of particular importance in developing countries where resources are severely limited. People are dying from many diseases which are avoidable but are the resources available reaching them?[1].

A review of literature by Gittelsohn[18] on the reliability of statements on causes of

death suggested that major problems exit. These are related to the current state of medical knowledge, to incomplete information available at the time of death and variable practice of physician in completing the medical certification on the death record. The matter is also made difficult where only a single underlying cause of death is recorded. While often two diseases exist one of which is complications of the other. An example is pneumonia in an immuno-compromised patient. Such factors may be used in studying trends in mortality and thus lead to wrong conclusions. For this reason a new approach is warranted. This may for example be a study of care seeking behaviour of patients before admission. Such a study would be prospective and would not need a search of medical records. No does it require revision of classification of disease. It has no uncertainty as one deals with facts at hand;histories are taken from relatives and the patient is examined and investigated to arrive at a possible diagnosis. This would alleviate the problem of relying on our mortality data which are incomplete. Murray[19] in a critical review of mortality data for the needs of development economists, health specialists and others who require up-to-date information on overall mortality found t hat only 40 countries in the developing world had complete vital registration coverage.
This again provides evidence for looking to the need to look for an alternative way of dealing with mortality and one way may be study of the influence of health care seeking behaviour on subsequent death.

Holland[20] criticised the work of Rutstein[9] and later Charlton[10] by emphasizing that

variation in mortality are not only influenced by health care but also by differences in

(a) incidence of diseases which can be influenced by socioeconomic factors and environment

(b) case fatality rates, which can be influenced by uptake of services, costs, disease severity, availability of resources, appropriateness of resource use, quality of care (delays, skills)

(c) variations in diagnosis

(d) recording cause of death.

Mackenbach et al[21] in a review of aggregate data studies on "avoidable" mortality and health services emphasised the tempting use of geographical variations in mortality from these diseases to point areas where health service effectiveness may be unsatisfactory: regions or countries with excessive numbers of such "avoidable" deaths could be suspected as having less effective care. Mackenbach et al[21] say that when relating mortality to health care variables it is necessary to control for confounding factors. Most authors use sociodemographic variables for this purpose eg unskilled workers, household renting, car ownership, unemployment, income etc. Some use urbanisation. Only Poikolaenen and Eskola[15] used more direct measures related to mortality, namely smoking and alcohol consumption. Mackenbach and colleagues[21] suggested that further research should abandon the realm of aggregate data studies and should investigate individual deaths from amenable conditions in an attempt to see whether they can be linked to deficiencies in the organization, quality or accessibility of health care services.

Relationship between care seeking behaviour and "avoidable" deaths

Wolfe[22] reviewed deaths from stroke in young people. Death from hypertensive disease and stroke is considered to be avoidable because hypertension can be both readily detected and effectively treated. Compliance with therapy, dietary measures, exercise, weight reduction, unavailability of drugs, costs of drugs, ignorance and traditional or religious beliefs may affect the outcome of treatment in hypertension. Wolfe[22] found that only 27% of deaths were associated with avoidable factors but not surprisingly in only half the deaths was hypertension a definite culprit. Had avoidability extended to smoking, atrial fibrillation, alcohol consumption, and other factors more deficiencies in the provision of health care might have been highlighted.

Payne and colleagues[23] in a local confidential inquiry into avoidable factors in deaths from stroke and hypertensive disease found that 29%,(95% CI 21%-37%) of all cases and 44%, (95 CI 34%-55%) of those with definite hypertension had avoidable factors that could have contributed to death. Common were failure to attend follow up clinics and continuing smoking.

Alberts et al[24] in a analysis of time of presentation after stroke pointed out that stroke is a leading cause of death in the United States killing over 150,000 people annually and disabling several hundred thousand. Numerous treatment modalities have been investigated in an attempt to decrease mortality and morbidity. Many of these show some efficacy when they are administered either before or within a few hours of stroke but are of no benefit when the same medications are given many

hours or days after stroke. Albert and colleagues[24] found that only 42% of patient who had a stroke had sought medical care within 24 hours while 25% presented within 48 hours and 33% after 48 hours. Because of this delay the majority of patients may not be candidates for some therapies of acute stroke.

Reasons for delay included:

1. ignorance of features of stroke.
2. ignorance that these symptoms would resolve spontaneously or with time.
3. delay in deciding to seek medical attention.
4. delays because of transportation problems from home to hospital.
5. paramedical personnel may not recognise early symptoms and signs of stroke.
6. elderly or demented patients may have poor motivation to seek medical care.

This study lacked data on short term and long term mortality in order to have the number of deaths and survivals in each category of time seeking care. Erickson and colleagues[25] in a similar study in Scandinavian countries found that the average delay for presentation to hospital was only 4.8 hours; this was thought to be due to higher levels of public education about medical problems in Scandinavia. Cullen and colleagues[26] writing on survival, hospitalisation charges and follow-up results in critically ill patients pointed out that critically ill patients need and receive enormous resources to maintain viability and progress towards a successful recovery. Personnel, time, physical and emotional efforts, vast sums of money, space, highly sophisticated equipment, blood and blood products are all used to

provide optimal care. Resources may be diverted from many moderately sick patients to a few very sick patients. These most critically ill patients may be those who delay in seeking care.

Cullen and colleagues[26] followed 226 consecutive critically ill patients for one year observing their clinical course outcome (survival or death), quality of life, hospitalisation charges and use of blood and blood products. By one month 123 patients (54%) had died, 70 were still hospitalised and 31 were at home; only 1 of the 103 survivors had fully recovered. By 12 months 164 patients (73%) had died, 10 were hospitalised and 51 were at home. Twenty seven per cent of 62 survivors had fully recovered. Their hospitalisation charges were enormous. Despite the fact that this study lacked controls it clearly showed that resources were "wasted". This present study on care seeking behaviour factors associated with mortality may have overcome this problem by including all patients as they came in and analyse with death as an outcome and survival as a control. All patients were studied and not only the critically ill.

Gonnella and colleagues[27] reporting on the problem of late hospitalisation in relation to quality and cost pointed out that emphasis on controlling health care costs has led to many activities aimed at avoiding medically unnecessary hospitalisations. They designed a study to determine whether significant opportunities exist to reduce patient morbidity and health care costs by utilising health care services before diseases progress to an advanced stage. Late hospitalisation can result from patient related problems, eg. failure to seek care or failure to comply or follow prescribed treatment or lack of access to health care

and many others. Gonnella and colleagues[27] staged 14 diseases into "early" care seeking (eg chronic cholecystitis) "timely" care seeking (eg acute cholecystitis) and "late" care seeking (eg acute cholecystitis with gangrene of gall bladder). Two hospitals were studied; a university based hospital, 1549 cases and a community based hospital, 1164 cases.

Late hospitalisation for all patients with any one of the 14 diseases totalled 322 (21%) in the university hospital and 232(19%) in the community hospital. For timely hospitalisations the mean length of stay in both hospitals was the same, 7.1 days but for late hospitalisation it was 18.2 days in the university hospital and 14.6 days in the community hospital. Combining all 14 conditions the mean length of stay for late hospitalisation was 18.2 days, significantly exceeding the mean length of stay for timely hospitalisation which was 7.1 days ($P < 0.01$).

Less than 25% of timely hospitalisations exceeded 10 days, with very few (< 10%) staying 20 days or longer. The length of stay pattern for late hospitalisation was more highly skewed toward longer duration. Over 50% stayed more than 10 days and over 20% stayed 20 days or longer.

Mean charges which were only available at the university hospital were $6821 for timely admission and $20,728 for late hospitalisation ($p < 0.05$).

Based on population data the in-hospital mortality for all patients with a principal diagnosis of bacterial pneumonia showed an expected rise in mortality in patients hospitalised in the late stages of disease. At the university hospital 5 (3.8%) of 132 patients hospitalised on a timely basis died, while 16 (39.0%) of 41 patients in the late category died. Similar proportions were observed in the community

hospital; 3 (2.1%) of 144 in the "timely" category died and 11 (28.9%) of 38 in the "late" category. (For both hospitals $P < 0.001$).

In so far as late treatment is costly and leads to increased morbidity and mortality, it is important that factors related to delayed treatment be identified so that changes may be implemented. Possible factors were investigated in this study.

Data elsewhere have indicated, from analysis of over 30000 Medicare discharges,that hospitalisation of an advanced - stage diabetic patient costs 50% more than that for a patient in the early stages of disease.[28]

While this study investigated the outcome of hospital admissions with reference to health care seeking behaviour it is clear that other factors may influence outcome, and a therefore confounding factors. Among these are the functional status and severity of illness on admission. Pompeii et al[29] when relating patient characteristics at the time of admission to outcomes of hospitalisation pointed out that in clinical practice, physicians informally address patient characteristics such as illness severity, comorbidity, functional status and stability when considering prognosis and diagnostic or therapeutic interventions. Pompeii and colleagues[29] studied a cohort of 604 patients to determine whether physician estimates of illness severity, functional status and stability were predictive of morbidity, mortality, length of stay and average daily ancillary charges. Illness severity was a significant predictor of in-hospital morbidity and mortality, length of stay and charges ($P < 0.001$).

In this study functional status was scored using the Karnofsky performance scale (appendix II) and illness severity using the Glasgow coma score (appendix III).

Health services situation in Tanzania, its utilisation and financing

The United Republic of Tanzania has a population of 23,127,000. Women account for 51% of the adult population while men account for 49%. Population density is 26 persons per square kilometre. The total fertility rate is 6.5 births per woman. The population annual growth rate is 2.8%, the under 5 mortality rate 192 per 1000 live births, infant mortality rate 115 per 1000 live births and life expectancy at birth 49 years. The GNP growth rate is 4.4% per annum and the minimum wage 3500 Tshs.[30] In Tanzania there are about 155 hospitals (4 of which are referral hospitals), 274 health centres and 2851 dispensaries.[31] Most health centres and dispensaries are located in rural areas where over 80% of the population live. About 93% of Tanzanians live within 10 kilometres of a health facility. There is one hospital bed per 510 people. There are 36,747 health workers in Tanzania of which medical officers account for only 2.7%. The admission rate in the general population in 1989 was 9% and the average number of days per hospitalisation was 8.3(unpublished). In Tanzania the health system is financed mainly from central government and its parastatals. Other sources include voluntary agencies, private organisations and individuals. The aggregate central budget on health has been declining in real terms. This has had a significant effect on the quality of care which is delivered by government facilities. The percentage of total government expenditure approved for the health sector has been fluctuating between 5.8% - 11.1%. The per capita health allocation and expenditure has been declining. In 1980 it was US $ 7 and 1989/90 US $ 2. The amount of money allocated for

drugs is only 3% of the total health budget. A good number of peasants resort to traditional healers who charge moderately and who can be payed in kind or over a period of time. The key interest of many patients and their families in the therapeutic process is not merely to cure the illness but to obtain a broad understanding of who is responsible for such illness and why. Traditional healers are very much aware of such expectations and do their best to provide such information. The large doctor: patient ratio of 1:26000 makes it most difficult for doctors to spend sufficient time with each patient to address all their burning concerns.

This shortcoming when coupled with other inconveniences experienced by patients such as long walks from their home to the clinic, the long queues they have to go through before they see a physician, and not getting the prescribed drugs from a health unit make decisions to attend future clinics unlikely. "In contrast, the relaxed atmosphere and personal interest traditional healers create in the patient's total lifestyle, his relationship with others, his gender as well as his moral and spiritual convictions enhance the patient's pride and feeling of self worth". These measures though ineffective in many disease, have earned traditional healers a lot of respect.[32]

Tanzania is a subscriber to the Alma -Ata declaration of Health For All by the Year 2000[33] and is committed to provide her people with basic and appropriate health care. However, with so many economic constraints as detailed above, very limited financial resources are available for health care. If these are to be utilised meaningfully information regarding the outcome of our medical inputs is therefore

required. Medical outcome studies including analysis of "avoidable" deaths are a pre-requisite. This has been very rarely done in a developing country and there have been no previous hospital-based studies in Tanzania.

STUDY RATIONALE AND OBJECTIVES

Rationale

Effective use of declining health resource in Tanzania is essential. Evaluation of the effectiveness of health care is therefore necessary. "Avoidable" death is a sentinel event which can be used to assess the quality of health care i.e. when it happens definitely something has been wrong and must be tackled. Health care seeking behaviour and other factors as contributors to avoidable death have been rarely investigated in developing countries and particularly in a hospital setting.

Broad objectives

1. To identify factors associated with "avoidable" deaths in Medical Wards of Muhimbili Medical Centre.
2. To propose ways in which "avoidable" deaths could be prevented or reduced.

Specific objectives

1. To determine outcome ie. discharge or death in patients admitted to two medical wards in Muhimbili Medical Centre during a specified period of time.
2. To identify how many deaths were due to "avoidable" and "non avoidable" causes.

3. To define the causes of "avoidable" and "non avoidable" deaths.
4. To describe how factors such as patient's age,sex,previous history, diagnosis, severity of illness etc relate to outcome.
5. By a careful analysis of each "avoidable" death to identify factors which may have resulted in death.
6. To propose ways in which deaths from avoidable causes could be reduced.

Supplementary specific objective:

To compare wherever possible how well the relative's description of patient's illness before admission compared with the patient's own account. Substantial agreement between the two accounts would contribute to the reliability of information obtained from relatives and therefore to the validity of information on factors associated with "avoidable" deaths.

METHODOLOGY

Dar es Salaam is the country's largest city with a population of 1.5 million. Muhimbili Medical Centre is a national referral hospital with 1250 beds of which 270 are medical beds. Despite it being a referral hospital it functions effectively as a district hospital mainly because the three district hospitals have lacked, until recently, essential drugs and equipment. Thus many clinics in Dar es Salaam directly refer patients to Muhimbili Medical Centre and all are screened at the casualty department before being sent to appropriate wards. Medical admissions for subjects 7 years and above are covered by 3 medical firms I, III and V. Government services have been free, though cost-sharing is currently being introduced. A minority of affluent persons and employees whose costs are met by employers can afford admission to the city's few private hospitals.

During the period 1 July - 31 December 835 patients admitted in Firm I were enroled in the study. On admission, a questionnaire (appendix IV) was completed during interview with each close relative of the patient. The following particulars were obtained: name, age, sex, occupation, education, marital status, tribe, address, previous admissions, smoking (number of sticks per day), alcohol (amount and how regularly), current medications, chronic illnesses and their duration in months, relationship to the patient, relative's education, sex, and whether or not she/he has being caring for the patient. Both the relatives and the patients (excluding those admitted in coma and who never recovered) were asked about the services sought by the patient since the beginning of the illness in chronological order.

Information included duration of illness (hours, days, weeks, months, years), time before admission, services sought (no service, self medication, health unit, traditional healing etc), reason for choosing the service (referred, near, cheap etc), reasons not satisfied or reasons for the patient moving to another service (referred, medicines not available, bribes, could not afford etc), outcome (attended at OPD and returned home, referred before or after admission, absconded or discharged on request etc, reasons for not going to a higher service (facility closed at that time, far, no transport, could not afford, belief in witchcraft etc.) (appendix IV). Interview from patients was started from September to 31 December and it included 408 patients. This was for the purpose of the supplementary objective. All patients underwent a thorough clinical examination and all necessary investigations whenever possible to reach a correct diagnosis. All patients were assessed on admission using the Karnofsky performance scale (appendix II) and the Glasgow coma score (appendix III). Diagnosis, and outcome (dates of discharge and death) were recorded for every patient. Precoding was done for some variables (eg marital status, education, alcohol, cigarettes, relationship to patient) for entry into a computer. Diagnoses for diseases were also coded using a classification system based on the WHO International Classification of Diseases (ICD-10) (appendix V). Following Rutstein's list (appendix I) causes of death were classified into-"avoidable" ie. timely and appropriate medical intervention would have prevented the occurrence of that death.

- "unavoidable" but suffering could be alleviated and life been prolonged meaning

that death would have occurred but pain or complications could have been timely managed and life prolonged.

- completely "unavoidable" that is regardless level of intervention once the disease has occurred death is imminent and will soon occur.

STATISTICAL ANALYSIS

Data entry was done through EPI INFO programme. Variables were recorded and converted into dBASE III for further analysis. The Norton Commander then went into Foxpro where variables were analysed against outcome giving X^2 and p values. The "commander" then went into SPSS and ran logistic regression analysis creating mathematical models based on the variables which show contribution of each of the variables to the individual's risk of death.

RESULTS

835 patients were enroled in this study. There were 508(60.2%) males and 327 (39.2%) females with male to female ratio of 1.6:1. The mean age of the patients was 32.7 years (median 31.5 years, and ranges 8 to 94 years).

Causes of admission

Causes of admission are shown in Table I. The commonest causes of admission included 106(12.7%) due to pulmonary tuberculosis, 77(9.2%) due to pulmonary tuberculosis associated with HIV infection, 79 (9.5%) due to clinical malaria; 72(8.6%) due to Acquired Immunodeficiency Syndrome (AIDS) 47 (5.6%) due to acute gastroenteritis, 36(4.3%) due to cardiomyopathies, 32(3.8%) due to diabetes mellitus, 33(4.0%) due to cerebral malaria, 25(3.0%) due to bacterial meningitis, 27(3.2%) due to pneumonia, 18(2.2%) due to drug poisoning, 22(2.6%) due to hypertensive diseases, 18(2.2%) due to stroke, 11(1.3%) due to chronic liver disease, 18(2.2%) due to acute febrile illness and no cause identified, 16(1.9%) conditions were uncertain. Other less common causes of admission are shown on Table 1.

Causes of death

132(15.8%) patients died of whom 38(28.8%) were females and 94(71.2%) were males. 13.3% of all females died compared to 22.7% of all males. (Table 2).

Causes of death and case fatality rates are shown on Table 1. 23(17.4%) were due to pulmonary tuberculosis with HIV disease, 17(12.9%) were due to all forms of tuberculosis not associated with HIV disease, 15(11.4%) were due to AIDS 10 (7.6%) were due to diabetes mellitus, 9(6.8%) were due to cerebral malaria, 8(6.1%) were due to meningitis, 7(5.3%) were due to stroke, 4(3,0%)were due to tetanus, 4(3.0%) were due to hypertension, 3(2.3%) were due to clinical malaria, 2(1.5%) were due to hepatitis, 2(1.5%) were due to acute alcoholic intoxication. Other causes of deaths included renal failure, acute gastroenteritis, drug poisoning, adult malnutrition, cellulitis, pneumonia, noxious substance, cancer and cellulitis. The cause of death in 5 patients could not be classified.

Classification of causes of deaths i.e. "avoidable", "unavoidable" but suffering could have been alleviated and life prolonged and completely "unavoidable"

80(64.8%) of all deaths could have been considered potentially "avoidable". 17(21.3%) were due to all forms of tuberculosis (11 pulmonary tuberculosis and 6 extrapulmonary tuberculosis); 10(12.5%) were due to diabetes mellitus, 9(11.3%) were due to cerebral malaria, 8(10%) were due to meningitis, 7(8.8%) were due to cardiomyopathy, 6(7.5%) due to all forms of stroke, 4(5.0%) were due to tetanus, 4(5%) due to hypertension, 3(3.75%) due to clinical malaria, 2(2.5%) were due to acute alcohol intoxication and 2(2.5%) due to acute viral hepatitis.

7 deaths from "other" causes included death from renal failure, drug poisoning, acute gastroenteritis, pneumonia, adult malnutrition and cellulitis. (Table 3A).

42 (32.1%) deaths were considered "unavoidable", but suffering could be alleviated and life prolonged. 23(54.8%) were due to HIV disease associated with tuberculosis, 15(37.7%) were due to AIDS, 3(7.1%) were due to chronic liver disease and only one due to cancer (Table 3B)

Only 4(3%) of total deaths were considered completely "unavoidable". They included hepatoma 2, rabies 1, and noxious substance 1 - (Table 3C).

Factors associated with death

Age:

Most of the deaths occurred at age 20-50 years. These accounted for 76.5% of all deaths (Table 4) (figure I) Age group 30 - 34 years had most deaths 23 (17.4%). Increasing age was positively associated with increasing risk of death up to age group 60 -64 years. Age was significantly associated with deaths (p= 0.002, logistic regression).

Sex:

94(22.7%) of males died compared to 38(13.3%) of females. Males therefore had a greater probability of death than females. (P = 0.012 (x^2 = 6.72) (Table 2).

Marital status:

404(48.7%) were single, 343(41.3%) married, 45(5.4%) widows or widowers, and 38(4.5%) were divorced (Table 5a). 59(13.4%) of those who were married died compared to 70(18.3%) of those who were not married. Marital status was not significantly related to death (P = 0.0634 (logistic regression) (Table 5b).
When females were considered alone 14(8.1%) of married females died compared with 24(15.6%) who were not married. The unmarried females had a significantly greater risk of death (P = 0.04 (X^2 = 4.37) (Table 5b).

When males were considered alone 45(16.9%) of married males died compared with 46(20.2%) not married. Thus marital status was not significantly related to death P = 0.34 (X^2= 0.9) (Table 5b).

Education:

34(26.2%) of those who died had no education compared to 169(24.1%) of those discharged alive. 80(61.5%) of those who died had a primary education compared to 423(60.3%) of those discharged alive. 2(1.5%) of deaths had a university education compared to 19(2.7%) of those discharged alive. One death had an adult education compared with 3 who were discharged alive. Four patients who died had Quaran education compared with 6 who were discharged alive. Patient education was therefore not significantly related to outcome (Table 6).

Severity of illness:

Those who had a severe form of illness had a greater probability of death. Those who scored <60 on the Karnofsky performance scale had a greater probability of death than those who scored >60 (P = 0.0001 (logistic regression) (Table 11). Those who had a Glasgow coma score <5 had a greater probability of death compared to those who scored >5

(P = 0.0147 (X^2 = 5.65) (Table 7 and 8).

Smoking:

137 (16.4%) of all admitted patients were smokers and of these 28(20.4%) died. Among the 658 non smokers there were 104 15.8%) deaths. Smoking therefore was not significantly associated with death (P = 0.4786) logistic regression (Table 9).

Alcohol:

223 (26.6%) of all patients drank alcohol compared to 612 (73.3%) who did not. 85 (13.9%) patients who did not drink alcohol died compared to 19 (16.8%) of those who sometimes drank alcohol and 27 (25%) who drank regularly. Regular drinking was associated with a significantly increased risk of death compared to non-drinking and "sometimes" drinking (P=0.0132) (logistic regression) (Table 10).

Traditional healing:

192(24.4%) of all patients had sought traditional healing prior to admission. 45(23.4%) of those who sought traditional healing died compared to 84(13.4%) of those who had not sought traditional healing. Prior attendance at a traditional healer was significantly associated with death (P = 0.0179) (Logistic regression) (Table 11).

Belief in witchcraft:

129(15.7%) of all patients had a belief in witchcraft. 34(26.4%) of those who died had a belief in witchcraft compared to 95(13.7%) of those who were discharged alive. Belief in witchcraft was significantly associated with death (P = 0.00029) (X^2 = 13.09) (Table 11).

Delay in seeking care:

424(51.6%) of all patients delayed to seek care. 74(17.5%) of those who delayed to seek medical care died compared with 55(13.9%) who did not delay in seeking care. Those who delayed to seek care had an increased probability of death (P = 0.000992) (X^2 = 37.39) (Table 11 and 12).

Referral of patients:

581(70.8%) patients were referred from different levels of health care before admission. 100(17.2%) of those who were ever referred died compared to 29(12.1%) who were not. Those patients who were ever referred had a greater

probability of death than those who were not referred (P = 0.0062) (logistic regression) (Table 11).

Patients who were assisted by family members and those who did not take medication before admission:

362(44.1%) were patients included in this group. 51(14.1%) of these died as compared to 78(17.0%) who did not take medication or assisted by family members. Being assisted by family member or not taking medication was not significantly associated with death (P = 0.3750) (logistic regression) (Table 11).

Use of government services:

605(73.7%) patients had used government services. 93(15.4%) died compared to 36(16.7%) who had not used government services. Use of government services was not therefore significantly associated with death (P = 0.09852) (logistic regression) (Table 11).

Use of private services:

361(44.0%) had sought private services prior to admission. 62(17.2%) of those who had sought private services died compared to 67(14.6%) who had not used private services (Table 11).Use of private services was not therefore significantly associated with death (P = 0.9852) (logistic regression).

Use of pharmacy or shops:

Only 15(15.3%) patients had used pharmacies or shops for medical care prior to admission. 3(20%) of those who had used pharmacies died compared with 126(15.6%) who had not sought care from pharmacies or shops for medical care. Seeking prior help from pharmacies or shops was not significantly associated with death (P = 0.6668) (logistic regression) (Table 11).

History of chronic illness and current medication

168(20.5%) patients had a history of a chronic illness. 32(19.0%) of those died compared with 89(14.5%) who had no history of chronic illness. 252(30.7%) patients were on current medication at time of admission. 32(12.7%) of those who were on current medication died compared to 98(17.8%) who were not on current medication. The presence of chronic illness or been on current medication were not significantly associated with death.(P= 0.14 and 0.7 respectively) (Table 11).

Duration of days in hospital:

382(47.72%) patients stayed in hospital for less than 3 days, 235(28.1%) patients for 3 to 7 days, 138(16.5%) for 8 to 14 days, and 70(8.4%) for more than 14 days.

70(18.3%) patients who stayed less than 3 days in hospital died, 24(10.2%) who stayed 3 to 7 days, 21(15.2%) who stayed 8 to 14 days and 17(24.2%) who stayed more than 14 days. Mortality was greatest in those who stayed less than 3 days and those who stayed over 14 days (Table 13).

Services sought and where drugs were obtained

There were 2777 episodes of care seeking in all patients. Those who were discharge alive had 2332 episodes while those who died had 445 episodes. 816 episodes included more than one visit to one particular health "unit". There were 572 government hospital visit. (There were also 2777 episodes where drugs were obtained). 2332 service visits had been made by those who were discharged alive and 445 episodes by those who died (501 episodes were from a previous unit sought by the patient). The number of episodes for services and for where drugs were obtained are given in Table 14 and Table 15.

Characteristic of respondents

Age:

All the relatives were 15 years and above. Their mean age was 34.7 years. (range of the age was 15 to 76 years (Table 16).

Sex:

320(38.3%) respondents were females and 515(61.7%) males with a male to female ratio of 1.6.

The sex distribution was similar to that of the patient (Table 17).

Education:

156(18.8%) respondents had primary education, 495(60%) of respondents had a primary education 135(16.3%) had secondary education and 30(4.46%) had college

or university education. Only 1 had adult education and 10(1.5%) had Quaran education (Table 18).

Relationship of respondents to the patients:

184(22.1%) of the respondents were brothers, 106(12.7%) were sisters, 93(11.2%) were wives, 92(11.1%) were friends, 66(7.9%) were sons, 64(7.7%) were fathers, 59(7.7%) were husbands, 58(6.9%) were mothers. Others included work mates, employers etc (Table 19).

Respondents' responses compared to those of the patients about services sought prior to admission:

There was close agreement between respondents and patients account of services sought prior to admission for example there was 92.4% agreement on the fact that no service or assistance by family members prior to admission. For use of government services 95.% agreement and for prior use of private services 97%. For prior use of traditional healing agreement was rather less,203 respondents saying that the patient had seen a traditional healer compared to 265 patients. Respondents therefore tended to underreport visits to traditional healers.

Reasons for delay in care seeking according to respondents and patients:

Table 21 shows level of agreement between respondents and patients. Level of agreement were over 85% for reasons for delay although for the following reasons

agreement levels were between 50 - 60% : lack of transport, closure of health facility, too sick at no available help.

Patients' account of outcome of services compared to that of respondents: There was general agreement between patient account of outcome of services compared to that of respondents (Table 22). Understandably however 2 patients said that they had previously been discharged to die at home compared to 7 respondents.

TABLE 1: CAUSES OF ADMISSION, NUMBER OF DEATHS AND CASE-FATALITY RATES.

DISEASES	PATIENTS			DEATHS			CASE FATALITY RATE (%)		
	F	M	TOTAL	F	M	TOTAL	F	M	TOTAL
A. Infectious and parasitic	204	334	578	24	60	84	11.8	18.0	14.5
Pulmonary tuberculosis (PTB)	31	75	106	1	10	11	3.2	13.3	10.4
Extra pulmonary tuberculosis	8	31	39	2	4	6	25.0	12.9	13.2
PTB + HIV	38	39	77	10	13	23	26.3	33.3	29.9
HIV/AIDS	36	36	72	6	8	15	19.4	22.2	20.8
Clinical malaria	31	48	79	1	2	3	3.2	4.2	9.7
Cerebral malaria	11	22	33	1	8	9	9.1	36.4	27.3
Meningitis	9	16	25	2	6	8	22.2	37.5	32.0
Acute gastroenteritis	13	34	47	-	1	1	-	2.9	2.1

DISEASES	PATIENTS			DEATHS			CASE FATALITY RATE (%)		
	F	M	TOTAL	F	M	TOTAL	F	M	TOTAL
Chronic gastroenteritis	1	2	3	-	-	-	-	-	-
Viral hepatitis	5	6	11	-	2	2	-	33.3	18.2
Tetanus	1	8	9	-	4	4	-	50	44.4
Acute febrile illness	13	5	18	1	-	1	7.7	-	5.6
Abscess/cellulitis	1	6	7	-	1	1	-	16.7	14.3
Typhoid	-	1	1	-	-	-	-	-	-
Leprosy	1	-	1	-	-	-	-	-	-
Rabies	0	1	1	-	1	1	-	100	100
Herpes zoster	4	1	5	-	-	-	-	-	-
Chronic febrile illness	1	1	2	-	-	-	-	-	-
Amoebic liver abscess	0	2	2	-	-	-	-	-	-
Encephalitis	1	0	1	-	-	-	-	-	-
B. Respiratory diseases	11	23	34	-	1	1	-	4.3	2.9

DISEASES	PATIENTS			DEATHS			CASE FATALITY RATE (%)		
	F	M	TOTAL	F	M	TOTAL	F	M	TOTAL
Pneumonia/ARI	9	20	29	-	1	1	-	5.0	3.4
Chronic lower respiratory	0	2	2	-	-	-	-	-	-
Asthma	2	1	3	-	-	-	-	-	-
C. Gastrointestinal disease	7	17	24	1	4	5	14.3	23.5	20.8
Peptic ulcer disease	2	2	4	-	-	-	-	-	-
Intestinal obstruction	1	3	4	0	-	-	-	-	-
Chronic liver disease	2	9	11	1	2	3	50.0	22.2	27.3
Severe abdominal pain	0	2	2	0	1	1	-	50.0	50.0
D. Endocrine/Metabolic	9	25	34	4	6	10	44.4	24	29.4
Diabetis mellitus	8	24	32	4	6	10	50.0	25.0	31.3
Thyrotoxicosis	1	0	1	-	-	-	-	-	-

DISEASES	PATIENTS			DEATHS			CASE FATALITY RATE (%)		
	F	M	TOTAL	F	M	TOTAL	F	M	TOTAL
Malnutrition	0	1	1	-	1	1	-	100	100
E. Haematological disease	15	14	29	-	1	1	-	7.1	3.4
Anaemia	13	11	24	-	1	1	-	9.1	4.2
Sickle cell disease	1	3	4	-	-	-	-	-	-
Others	1	0	1	-	-	-	-	-	-
F. Cardiovascular disease	31	31	62	3	7	10	9.7	22.6	16.1
Cardiomyopathy	21	15	36	1	5	6	4.8	33.3	16.7
Hypertensive disease	9	13	22	2	2	4	22.2	15.4	18.2
Rheumatic heart disease	1	3	4	-	-	-	-	-	-
G. Genitor urinary disease	0	8	8	-	2	2	-	25.0	25.0
Renal failure	0	1	1	-	1	1	-	100	100
Nephrotic syndrome	0	3	3	-	-	-	-	-	-

DISEASES	PATIENTS			DEATHS			CASE FATALITY RATE (%)		
	F	M	TOTAL	F	M	TOTAL	F	M	TOTAL
Benign prostatic hypertrophy	0	2	2	0	1	1	-	50.0	50.0
Urinary tract infection	0	2	2	-	-	-	-	-	-
H. Central Nervous system	18	19	27	1	6	7	5.6	31.6	26.0
Epilepsy	0	2	2	-	-	-	-	-	-
Paraplegia/polyneuropathy	3	2	5	-	-	-	-	-	-
psychoses	5	7	12	-	-	-	-	-	-
Strokes	10	8	18	1	6	7	10.0	75.0	38.9
G. Neoplasms	2	10	12	2	2	4	100	20	33.3
Hepatoma	0	7	7	0	2	2	-	28.6	28.6
Gastric cancer	0	1	1	-	-	-	-	-	-
Lymphoma	1	1	2	1	-	1	100.0	-	50.0
Uncertain cancer	1	1	2	1	0	1	100.0	-	50.0

DISEASES	PATIENTS			DEATHS			CASE FATALITY RATE (%)		
	F	M	TOTAL	F	M	TOTAL	F	M	TOTAL
H. Skin disease	0	3	3	-	-	-	-	-	-
I. Joint diseases	2	3	5	-	-	-	-	-	-
J. Intentional self harm	10	8	18	1	1	2	10.0	12.5	11.1
K. Acute alcoholic intoxication	3	4	7	0	2	2	-	50.0	28.6
L. Other injuries	4	2	6	-	-	-	-	-	-
M. Uncertain diseases	9	7	16	1	2	3	11.1	28.6	18.8
Total	327	508	835	38	94	132			

TABLE 2: SEX DISTRIBUTION OF PATIENT WHO SURVIVED AND THOSE WHO DIED

SEX	ALIVE	DIED	TOTAL
F	289	38	327
M	414	94	508
TOTAL	703	132	835

TABLE 3A: DISTRIBUTION OF DEATHS WHICH WERE CONSIDERED " AVOIDABLE".

"Avoidable" Deaths	No	%
Pulmonary Tuberculosis	11	13.8
Extra Pulmonary TB	6	7.5
Tetanus	4	5.0
Hepatitis	2	2.5
Clinical malaria	3	3.8
Cerebral malaria	9	11.3
Anaemia in CCF	1	1.3
Diabetes	10	12.5
Meningitis	8	10
Hypertension	4	5.0
Stroke	7	8.8
Cardiomyopathy	6	7.5
Alcohol	2	2.5
Others	7	8.8
Total	80	100

3B: DISTRIBUTION OF DEATHS WHICH WERE PROBABLY "UNAVOIDABLE" BUT SUFFERING COULD POSSIBLY HAVE BEEN ALLEVIATED AND LIFE PROLONGED.

HIV, PTB	23 (54.8%)
Cancer	1 (2.4%)
HIV	15 (37.7%)
Chronic liver disease	3 (7.1%)
Total	42(100%)

3C: UNAVOIDABLE DEATHS

Hepatoma	2
Rabies	1
Noxious substance	1
Total	4

TABLE 4: RELATIONSHIP BETWEEN AGE OF PATIENTS AND OUTCOME

AGE	ALIVE			DIED			TOTAL	
	Number	%	Cum.freq.(%)	Number	%	Cum.freq.	Number	%
5-9	13	1.85	1.85	0	0	0	9	1.48
10-14	29	4.13	5.98	0	0	0	29	3.47
15-19	65	9.25	15.23	3	2.27	2.27	68	8.14
20-24	108	15.36	30.59	15	11.36	13.63	123	14.73
25-29	108	15.36	45.95	15	11.36	24.99	123	14.23
30-34	98	13.94	59.89	23	17.42	42.41	121	14.49
35-39	79	11.24	71.13	14	10.61	53.02	93	11.14
40-44	55	7.82	78.95	12	9.09	62.11	67	8.02
45-49	38	5.41	84.36	10	7.58	69.69	48	5.75
50-54	41	5.83	90.19	12	9.09	78.78	53	6.35
55-59	14	1.99	92.18	6	4.55	83.33	20	2.40
60-64	31	4.41	66.59	12	9.09	92.42	43	5.15
65-69	9	1.28	97.87	2	1.52	93.94	11	1.32
70-74	7	1.00	98.87	6	4.55	98.49	13	1.56
75-79	5	0.71	99.58	2	1.52	100.00	7	0.84
80-90	2	0.28	99.86	0	0	100.00	2	0.24
>90	1	0.14	100.00	0	0	100.00	1	0.12
Total	703	100.00		132	100.00		835	100.00

TABLE 5 (A): RELATIONSHIP BETWEEN MARITAL STATUS AND OUTCOME

MARITAL STATUS	ALIVE		DIED		TOTAL	
	No.	%	No.	%	No.	%
Single	351	50.29	53	40.15	404	48.67
Married	276	39.54	67	50.76	343	41.33
Divorced	33	5.72	5	3.79	38	4.58
Widow	38	5.44	7	5.30	45	5.42
Total	698	100.0	132	100.00	830	100.00

TABLE 5(B): DISTRIBUTION OF MARITAL STATUS BY SEX STRATIFICATION.

		DEAD (%)	ALIVE %	TOTAL
MARRIED	Y	59 (13.4)	380 (86.6)	439
(BOTH SEXES)	N	70 (18.3)	312 (81.7)	382
TOTAL		129	692	821

(P = 0.0634)

		DEAD (%)	ALIVE %	TOTAL
MARRIED	Y	14 (8.1)	158 (91.9)	172
FEMALES	N	24 (15.6)	130 (84.4)	154
TOTAL		38	288	326

(P = 0.04 (X^2 = 4.37)

		DEAD (%)	ALIVE %	TOTAL
MARRIED	Y	45 (16.9)	222 (83.1)	267
MALES	N	46 (20.2)	182 (79.2)	228
TOTAL		91	404	495

(P = 0.34 (X^2 = 0.9)

TABLE 6: RELATIONSHIP OF EDUCATIONAL STATUS TO OUTCOME

EDUCATION	ALIVE		DIED		TOTAL	
	No.	%	No.	%	No.	%
Nil	169	24.07	34	26.15	203	24.40
Primary	423	60.26	80	61.54	503	60.46
Secondary	82	11.68	9	6.92	91	10.94
University	19	2.71	2	1.54	21	2.52
Adult education	3	0.43	1	0.77	4	0.48
Quaran	6	0.85	4	3.08	10	1.20
Total	702	100.00	130	100.00	832	100.00

TABLE 7: RELATIONSHIP OF KARNOFSKY PERFORMANCE SCALE TO OUTCOME.

KARNOFSKY	ALIVE			DIED			TOTAL		
PERFORMANCE SCALE	No.	%	Cum. freq.%	No.	%	Cum. freq.%	No.	%	Cum. freq.%
10	2	0.30	0.30	1	0.78	0.78	1	0.12	0.37
20	14	2.08	2.38	15	11.63	12.41	29	3.62	3.99
30	34	5.06	7.44	22	17.05	2	56	6.99	10.98
31	1	0.15	7.59	0	0	9.46	1	0.12	11.10
40	107	15.92	23.51	34	26.36	29.46	141	17.60	28.70
50	251	37.35	50.86	42	32.56	55.82	293	36.58	62.28
60	176	26.19	87.05	13	10.08	88.38	189	23.60	88.88
70	62	9.22	98.27	2	1.55	98.46	64	7.99	96.87
80	12	1.79	98.06	0	0	100.00	12	1.50	98.37
90	9	1.34	99.4	0	0	100.00	9	1.12	99.49
100	4	0.60	100.00	0	0	100.00	4	0.50	100.00
TOTAL	672	100.00		129	100.00	100.00	801	100.00	

TABLE 8: RELATIONSHIP OF GLASGOW COMA SCORE WITH OUTCOME.

GLAS GOW	ALIVE			DIED			TOTAL		
coma score	No.	%	Cum. freq.%	No.	%	Cum. freq.%	No.	%	Cum. freq.%
3	2	0.30	0.30	2	1.55	1.55	4	0.50	0.50
4	3	0.45	0.75	7	5.43	6.98	10	1.25	1.75
5	4	0.50	1.25	3	2.33	9.31	7	0.87	2.62
6	1	0.15	1.40	4	3.10	12.41	5	0.63	3.25
7	2	0.30	1.70	3	2.33	14.74	5	0.63	3.88
8	6	0.90	2.60	5	3.88	18.62	11	1.38	5.26
9	4	0.60	3.20	2	1.55	20.17	6	0.75	6.01
1	12	1.79	4.99	3	2.33	22.50	15	1.88	7.89
11	2	0.30	5.29	2	1.55	24.05	4	0.50	8.39
12	25	3.73	9.02	6	4.65	28.70	31	3.88	12.27
13	14	2.09	11.11	4	3.10	31.80	18	2.25	14.52
14	26	3.88	14.99	9	6.98	38.78	35	4.38	18.90
15	569	84.99	100.00	79	61.24	100.00	648	81.10	100.00
Total	670	100.00		129	100.00		799	100.00	

TABLE 9: RELATIONSHIP OF SMOKING AGAINST OUTCOME

SMOKE	ALIVE			DIED			TOTAL		
No of cigarettes	No.	%	Cum. freq.%	No.	%	Cum. freq. %	No.	%	Cum. freq.%
0	554	83.18	83.18	104	78.79	78.79	658	82.46	82.46
1	3	0.45	83.63	1	0.76	79.55	4	0.50	82.96
2	7	1.05	84.68	1	0.76	80.31	8	1.00	83.96
3	12	1.80	86.48	2	1.52	81.83	14	1.75	85.71
4	12	1.80	88.28	3	2.27	84.10	15	1.88	87.59
5	15	2.25	90.53	4	3.03	87.13	19	2.38	89.97
6	12	1.80	92.33	5	3.79	90.92	17	2.13	92.10
7	0	0	92.33	1	0.76	91.68	1	0.13	92.23
8	8	1.20	93.53	1	0.76	92.44	0	1.13	93.36
10	26	3.90	97.43	6	4.55	96.99	32	4.01	97.37
12	2	0.30	97.73	2	1.52	98.51	4	0.50	97.87
15	1	0.15	97.88	1	0.76	99.27	2	0.25	98.12
20	10	1.50	99.38	0	0	99.27	10	1.25	99.37
30	1	0.15	99.53	1	0.76	100.00	2	0.25	99.62
99	3	1.95	100.00	0	0	100.00	3	0.38	100.00
Total	666	100.00		132	100.0		798	100.00	

TABLE 10: RELATIONSHIP OF ALCOHOL INTAKE TO OUTCOME

ALCOHOL	ALIVE		DIED		TOTAL	
	No.	%	No.	%	No.	%
No	527	74.96	85	64.39	612	73.29
Sometimes	94	13.37	19	14.39	113	13.53
Regularly	81	11.52	27	20.45	108	12.93
Not known	1	0.14	1	0.76	2	0.24
Total	703	100.00	132	100.00	835	100.00

TABLE 11: RELATIONSHIP OF VARIABLES OF OUTCOME

VARIABLE		OUTCOME DEAD	ALIVE	TOTAL	PVALUE AND REMAKES
SEX	F	38	288	326	P=0.012 (X^2 = 6.72)
	M	91	404	495	males die more than females
Smoking	Y	28	107	135	P = 0.08 (X^2 = 3.01)
	N	101	582	683	Smoking not significantly associated with death
Alcohol	Y	45	172	217	P = 0.0132 (Logistics regression)
	N	83	519	607	alcohol significantly associated to death.
No medication/family	Y	51	311	362	P = 0.3750 (Logistic regression) No
member assistance	N	78	381	459	significance.
Traditional healing	Y	45	147	192	P = 0.0179 (Logistic regression)
	N	84	545	629	Statistically significant association.
Government	Y	93	512	605	P = 0.0982 (Logistic regression) No
	N	36	180	216	significance.
Private	Y	62	299	361	P = 0.9852 (Logistic regression) No
	N	67	393	460	significance.
Pharmacy and shops	Y	3	12	15	P = 0.6668 (Logistic regression) No
	N	126	680	806	significance.
Referred	Y	100	481	581	P = 0.0062 (Logistic regression)
	N	29	211	240	Statistically significant.
Delay	Y	74	350	424	P=0.000992 (X^2 = 37.39)
	N	55	342	397	Statistically significant.
Belief in witchcraft	Y	34	55	129	P = 0.00029 (X^2 = 13.09) Statistically
	N	95	597	692	significant.
Able to afford	Y	70	360	430	P = 0.63 (X^2 = 0.22) No significance.
	N	59	332	371	
Glasgow coma Score	>5	10	9		P = 0.017 (X^2 = 5.65) Statistically
	<5	130	661		significant.
Karnofsky	>60	3	87	90	P = 0.0001 (Logistic regression)
Performance scale	<60	587	127	714	Statistically significant.
Past medical	Y	32	136	168	P = 0.14
History and	N	89	524	613	No significance
Current	Y	32	220	252	P = 0.7
Medication	N	98	454	252	No significance
	Y =	YES			
	N =	NO			

TABLE 12: DISTRIBUTION OF REASONS FOR DELAY AGAINST OUTCOME.

Reason	Alive	Dead	Total
No reason	1690	299	1989
Facility closed at time of illness	8	0	8
Far	16	4	20
Could not afford	51	5	56
No transport available	23	1	24
Relatives unwilling	20	5	25
Patient unwilling	104	14	118
To sick to move/no help	7	3	10
Satisfied with service	257	56	313
Terminally ill	1	0	1
Belief in witchcraft	136	56	192
Other	19	2	21
Total	2332	445	2777

TABLE 13: RELATIONSHIP BETWEEN DAYS IN HOSPITAL AND OUTCOME.

DAYS	ALIVE (%)	DEAD	TOTAL
≤ 3	312 (81.6)	70 (18.3)	382
3 - 7	211 (89.8)	24 (10.2)	235
8 - 14	117 (84.8)	21 (15.2)	138
> 14	53 (75.7)	17 (24.2)	70
Total	703	132	835

TABLE 14: DISTRIBUTION OF SERVICES SOUGHT BY PATIENTS

SERVICE (Appendix IV)	ALIVE	DEAD	TOTAL
No service	199	33	232
Self medication using modern drugs	133	30	163
Family members and friends	34	0	34
Traditional healing	155	49	204
Village health worker	1	0	1
Government dispensary	102	16	118
Government health centre	136	20	156
Government hospital	479	93	572
Voluntary dispensary	49	10	59
Voluntary health centre	23	6	29
Voluntary hospital	14	5	19
Health worker at his/her residence	8	3	11
Private dispensary	176	3	213
Private health centre	57	9	66
Private hospital	62	16	78
Pharmacy, shops	4	0	4
Used above services more than once.	699	117	816
Could not afford	1	1	2
TOTAL	2332	445	2777

TABLE 15: TABLE OF WHERE DRUGS WERE OBTAINED BY PATIENTS

DRUGS FROM (APPENDIX IV)	ALIVE	DEATH	TOTAL
No drugs	389	80	469
Self medication using modern drugs	44	16	60
Family members and friends	10	2	12
Traditional medicines	117	36	153
Village health worker	1	0	1
Government dispensary	81	11	92
Government health centre	109	10	119
Government hospital	407	75	482
Voluntary dispensary	44	9	53
Voluntary health centre	19	5	24
Voluntary hospital	11	5	16
Health worker at his/her residence	10	2	12
Private dispensary	163	39	202
Private health centre	46	9	55
Private hospital	66	17	83
Pharmacy, shops	354	44	398
Used above services more than once.	423	78	501
could not afford.	38	7	45
Total	2332	445	2777

TABLE 16: DISTRIBUTION OF AGE OF RESPONDENTS

Age	No	%	Cum.freq.
15-19	21	2.51	2.51
20-24	154	18.44	20.95
25-29	125	14.97	35.92
30-34	165	19.76	55.68
35-39	115	13.77	69.45
40-44	100	11.98	81.43
45-49	72	8.62	90.05
50-54	45	5.39	98.44
55-59	13	1.56	97.00
60-64	11	1.32	98.32
65-69	3	0.36	98.68
70-74	2	0.24	98.92
75-79	2	0.24	99.16
>80	7	0.84	100.00
Total	835	100.00	

TABLE 17: SEX DISTRIBUTION OF RESPONDENTS.

Sex	Freq.	%
Female	320	38.3
Male	515	61.7
Total	835	100

TABLE 18: EDUCATION OF RESPONDENTS

		%
Nil	156	18.8
Primary	495	60.0
Secondary	135	16.3
College	30	3.6
Adult	1	0.1
Quaran	10	1.2
Total	672	100.00

TABLE 19: RELATIONSHIP OF RESPONDENTS TO PATIENTS

RELATION	TOTAL	
		%
Brother	184	22.12
Daughter	31	3.73
Father	64	7.69
Husband	59	7.09
Mother	58	6.97
Friends	92	11.06
Others	79	9.50
Sister	106	12.74
Son	66	7.93
Wife	93	11.18
Total	832	100.0

TABLE 20: RESPONSE OF RESPONDENTS COMPARED WITH THOSE OF PATIENTS ABOUT SERVICES SOUGHT PRIOR TO ADMISSION

	No service + family members	Traditional healing	Government services	Private services	Other + Previous services
Patient	375	265	804	499	856
Respondent	406	203	846	484	860
Agreement (%)	92.4	76.6	95.0	97.0	99.5

TABLE 21: REASONS FOR DELAY IN CARE SEEKING AS GIVEN BY RESPONDENT COMPARED WITH PATIENTS ACCOUNT.

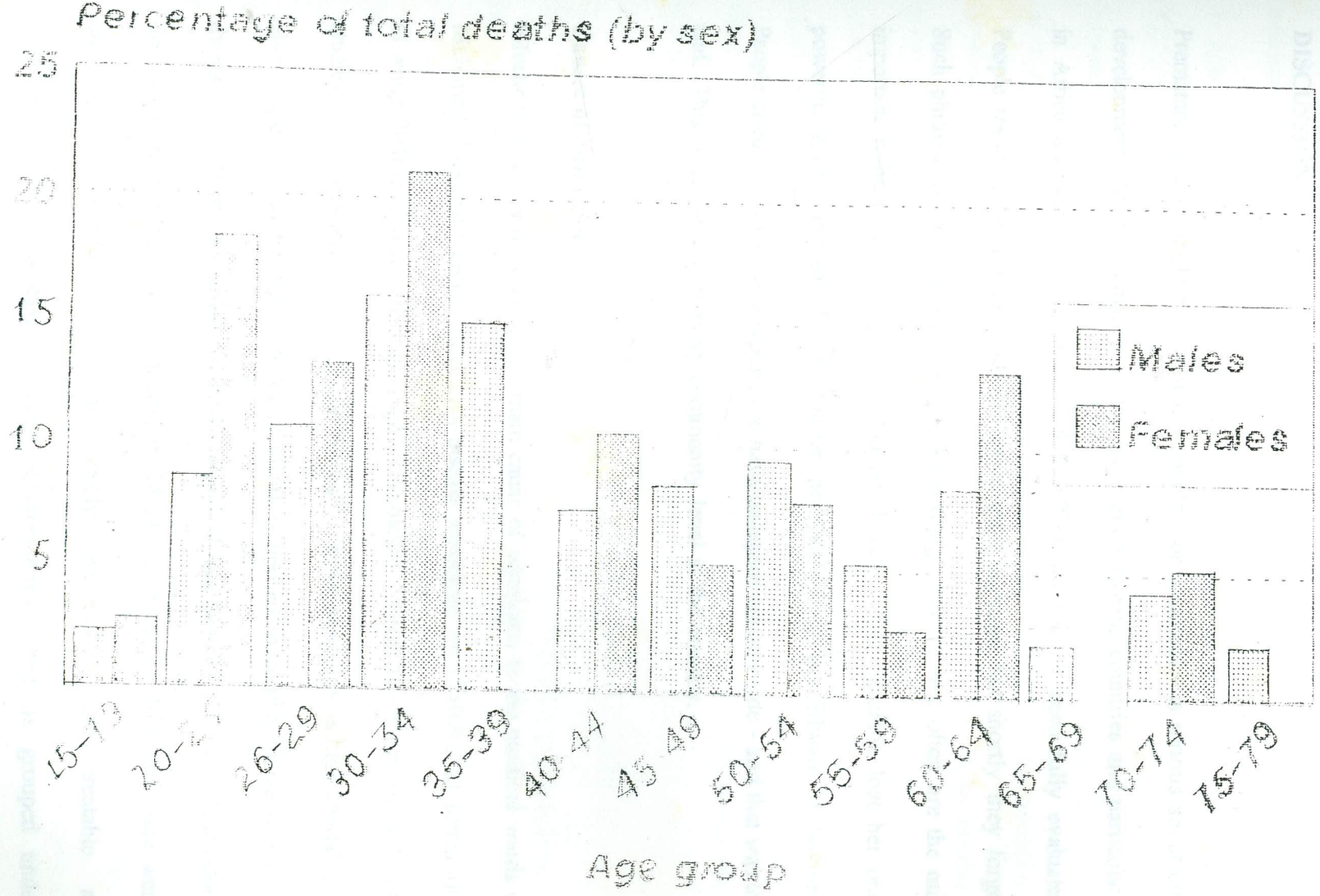
Response	Respo ndent	Pati ent	Agreement (%)
No delay	1970	1832	93.0
Facility closed	8	16	50.0
Could not afford	57	61	93.4
Far	18	19	94.7
No transport	26	15	57.7
Relatives unwilling	25	42	60.0
Patient unwilling	116	125	93.0
Too sick/no help	11	6	54.5
Satisfied with services	307	393	77.1
Belief in witchcraft	186	218	85.3
Others	21	20	95.2

TABLE 22: OUTCOME OF SERVICES USED BY PATIENT AS GIVEN BY RESPONDENTS COMPARED TO THAT GIVEN BY PATIENTS

Response	Respo ndent	Pati- ent	Agreement (%)
No response	520	558	93.2
Attended OPD and returned home	1286	1458	88.2
Referred before admission	469	397	84.6
Referred after admission	195	136	70.0
Discharged after improvement	43	38	88.4
Discharged to die at home	7	2	29.0
Discharged on request/absconded	189	196	96.4

FIGURE I

Age distribution of deaths



DISCUSSION

Premature deaths should not occur if a country or community is serious about their development. Many premature deaths occur in developing countries and particularly in Africa and yet the magnitude of their effect has not yet been fully evaluated. People resort to mourning and sometimes great expenses but shortly they forget. Such phrases as "he was very good, hardworking" and the like often are the only important remarks that are made. On April 12th 1984, Tanzania lost her once powerful, strong, and able Prime Minister, prematurely, the late Edward M. Sokoine. People cried and some were reported to have collapsed countrywide - and that was the end. This is happening at every community level in the country.

Causes of admission:

Infectious diseases featured as the main cause of admission to the medical wards of Muhimbili Medical Centre. Infectious disease accounted for 578(69.2%) admissions of which 204(35.3%) females and 334(57.7%) males. This picture compares well with studies done elsewhere in sub-Saharan Africa[1,3]. When morbidity is high mortality is also expected to be high. A lot of effort is needed to combat these infectious diseases which are a burden to the countries of sub-Saharan Africa. Respiratory diseases were the cause of admission in 34 (4.1%) patients. Most of these were pneumonias 29(85%) which are easily preventable and treatable as well.Gastrointestinal diseases(excluding gastroenteritis which is grouped under infectious diseases)were only 24(2.9%) and are all treatable disease hence less likely

to have a high mortality when timely and accurately managed. There were 34 (4.1%) admissions with endocrine disease. Diabetes was the cause in 32(94.1%) . Diabetes is now an important problem in Africa[34]. Cardiovascular diseases accounted for 62(7.4%) admissions. Most were cardiomyopathies 36(58.0%) and 22 (35.4%) had hypertension-related problems. There were only 4 (6.5%) patients with rheumatic heart disease. The number of patients with rheumatic heart disease is low probably because soon after diagnosis patients are seen on an outpatient basis in the cardiac clinic. These 4 cases included new cases and those with severe decompensated haemodynamics. Diseases of central nervous system caused 27(3.2%) admission. 18(66.7%) of these were due to cerebral vascular disease. Due to difficulties in diagnosis and having no facilities like CT scans it was difficult to delineate specific causes of strokes.

There were 12(1.4%) patients with neoplasms of which 7(58.3%) had hepatoma. Hepatoma is a common cancer in the southern part of Africa[7]

Outcome

This study showed the number of deaths that could potentially have been "avoidable". 132(15.8%) patients died after admission and 80(64.8%) of deaths could have been potentially "avoidable". In 42(32.0%) patients deaths were "unavoidable" but suffering could have been alleviated and life prolonged. Only 4(3.1%) deaths were completely "unavoidable".

"Avoidable" deaths:

All forms of tuberculosis accounted for 17(21.25%) of "avoidable" deaths, diabetes for 10(12.5%), cerebral malaria for 9(10.8%), meningitis for 8(9.6%),stroke for 7(8.8%),cardiomyopathy for 6(7.5%),hypertension for 4(5.0%),tetanus for 4(5%) and clinical malaria for 3(3.8%). Others are due to acute alcoholic intoxications, anaemia, renal failure, drug poisoning and gastroenteritis. These are classified as "avoidable" according to Rutstein classification (appendix I). Factors that could have lead to the occurrence of these deaths are discussed below.

"Unavoidable" deaths but life could be prolonged:

HIV/AIDS in association with tuberculosis accounted for 23(54.8%) of these deaths. HIV/AIDS alone accounted for 15(37.7%) of these deaths. It is known that HIV infection alone is asymptomatic in the majority of patients[35]. Coexistence of opportunistic infections e.g. tuberculosis leads to most of deaths. Data from the USA suggest that the annual risk of reactivation of tuberculin positive in HIV-infected individual is 7.9%[36]. When tuberculosis is prevented by isoniazid prophylaxis in asymptomatic HIV infected patients then life can be prolonged[37]. Delay in care seeking and improper diagnosis and treatment at lower levels of health care could also have contributed to the occurrence of these deaths.

Likewise the deaths from HIV/AIDS could have been due to coexisting opportunistic infections e.g. diarrhoeal diseases due to Salmonella spp, Shigella spp, Cryptosporidium spp or Pneumocystis carinii[39]. Study of these opportunistic infection was not undertaken in this study.

Chronic liver diseases accounted for 3(7.1%) of those deaths where life could have been prolonged. Avoiding alcohol and treating other coexisting conditions may prolong life in these patients. Cirrhosis of the liver may deteriorate quickly and often to liver failure by continued alcohol consumption, inter-current infections or gastrointestinal haemorrhage[38].

"Unavoidable" deaths

Only 4 deaths were considered to be completely "unavoidable". They include 2 cases of hepatoma one patient with rabies and one from a noxious substance. Hepatoma was included here because even in advanced centres survival does not exceed 6 months and where liver transplants are performed the 3-year survival rate is only 15%[40]. Rabies is known to have 100% mortality. For the death from a noxious substance this occurred after 2 days of admission. 4 members other of the same household died but were not included here as they were admitted on different dates and different wards as symptoms did not start concurrently. No results are as yet, available from the Government chemist as to the nature of the poison.

Factors related to outcome

Age:

Age was statistically significant related to death $p<0.001$ (logistic regression). 76.5% of deaths were between age 20 - 50 years. These are premature and most of them avoidable. With this era of HIV more premature deaths are likely to occur and

therefore emphasis towards prophylaxis against opportunistic infections and preventive measures towards avoiding HIV infection.

Sex:

327 females and 508 males were admitted during the study period of whom 15.3% and 22.7% females and males respectively died. Males contributed to 71.2% of the deaths and females 28.8%. For many diseases men are affected more than females e.g.in diabetes for example in studies done in rural Tanzania males were affected more than females in a ratio of 1.6:1[41].

Education:

Most of the patients had a received formal education 503 (60.5%). 102 (12.3%) had secondary or college education. Education alone was not a significant contributor to death. This shows that some people may have gone to school but still, they delay to seek care, and resort to traditional healing. Many also believe in witchcraft as detailed below.

Marital status:

The risk of death was significantly greater for unmarried females ($P<0.04$ ($X^2 = 4.37$) but not for males ($P = 0.34$ ($X^2 = 0.9$). The inference from this is that this era of HIV disease, keeping to marriage with faith would be ideal in preventing the disease. It may look that married women are more faithful than married males. In this study however those taken as "not married" included the widowed females or widower males whom their husbands or wives could have died of AIDS and therefore at more risk

of dying from the same disease.

Past medical history:

Having a history of chronic disease was not significantly associated with an increased risk of death (P= 0.14

(X^2 = 2.21) (The same applied for those who were on current medication (P = 0.7 (X^2 = 3.26). Those who had a past medical history were those who had their diagnoses made before and came on admission for exercebation of symptoms or complications. Since they are aware then they will easily seek medical care. Again, it could be that somebody who has been sick and cured before has faith in the hospital even if he or she contracts another disease. People should be encouraged to seek medical care regardless of previous illness.

Smoking:

Risk of death was not significantly associated with smoking

(P = 0.4786 (logistic regression). Smoking is known to be associated with coronary heart disease [42]. Coronary heart disease is however rare in Tanzania. In this study there was only one case of coronary heart disease in a 45 - years old diabetic patient, who, in-fact, had never smoked. Due to lifestyle changes in the country there is a likelihood that coronary heart disease will increase and this will lead to an increase in the number of deaths. Smoking should be prohibited and people educated on its bad effects. The risk of lung cancer in smoker is over 30%[43]. Lung cancer was not detected in the study. It is possible that it was missed and mislabelled as tuberculosis.

Again smoking is known to be associated with diabetic foot [44].

Other diseases associated with smoking include urinary tract tumors[45] but they are generally admitted to surgical wards. Bueger's disease was not diagnosed in this study.

Alcohol:

Regular alcohol consumption was found to be significantly, associated with death (P = 0.0132) (logistic regression).

2 patients died of acute alcohol intoxication. These are avoidable deaths. Alcohol is also related to chronic liver diseases,hypertension and malnutrition. Regular alcohol intake may influence compliance with therapy eg. anti tuberculosis therapy. People should be discouraged from excessive alcohol indulgence.However it is important for future studies the type of alcohol,amount,and duration of taking it are taken into account so as to arrive at a strong conclusion.

Severity of illness:

Patients who had scored <5 on the Glasgow Coma Score (appendix III) had a greater likelihood of death (P = 0.0147

(X^2 = 5.65).21 patients scored ≤ 5 on the Glasgow Coma Score.12(57.1) of these died and 9 (42.9%) survived.Common causes of coma included cerebral malaria and malaria.The same applied to the score on the Karnofsky Performance Scale. Those who scored <60 had a greater risk death than those who scored >60. (P < 0.001 (logistic regression). Most of patients with these severe illnesses were either late to seek medical care or else there had been improper care prior to admission. Emphasis

on timely seeking of care should be advocated. Personnel in the "lower" health care units should motivated and these units should be furnished with essential drugs and equipment. To assist motivation health workers will need continuous education, seminars on new developments and achievements in medicine and an increase in salary.

Delay in care seeking:

Patients who delayed in seeking care had an increased risk of death (P = 0.0000992 (X^2 = 37.39). Delay in care seeking is a problem and leads to many deaths which could have been "avoidable". If delay in care seeking is discouraged people may be motivated to seek medical care earlier. There could be other reasons associated with "delay".

It could be that people have lost faith with our existing health care system and therefore resort to other forms of care eg. traditional healing , and only come to hospital when they do not improve and have no alternative. The number of days that preceded admission had a significant influence on outcome. The longer the duration before admission the greater was the probability of death.

(P = 0.000 (X^2 = 291.78). The longer first care seeking preceded admission the greater was the likelihood of death (P = <0.001 (X^2 = 76.07). This suggests that when the duration of illness is long before admission there had been considerable delay in care seeking.

Traditional healing and belief in witchcraft

23.4% of those who used any form of traditional healing died compared with 13.4% who did not use traditional healing. This was statistically significant at (P = 0.0179 logistic regression). Similarly,those who said that they believed in witchcraft had a greater probability of death (P = 0.00784 (X^2 = 13.09). Seeking traditional healing means delay in seeking proper medical care. When patients come to hospital they come late and most probably after the disease has worsened, and the likelihood of death increased. Our people are to be motivated against belief in witchcraft and traditional healing. Equally important is that those factors which are likely to influence people to seek traditional healing e.g. having no faith in our health care units should be tackled as discussed above.However it is often difficult to obtain from the patient's history without specific inquiry as to whether he/she used traditional healing or witchcraft. Clearly for future studies it will be important to ask that specifically and not only that but also the kind of therapy offered i.e whether spiritual or medicinal.

Government and private services

The previous use of government services was not significantly associated with death: (P value 0.0982 (logistic regression). Nor was there any increased risk following the use of private services. This infers that using of private or government services will reduce mortality. It also supports the idea of cost sharing, i.e if people can pay for private services then why not pay even a little to subsidise government health care costs.

Referral system:

17.2% of patients who died had been referred to a higher services compared with 12.1% who are previously been referred (P = 0.0062) (logistic regression). This infers that there is a need to review our referral system. It may be that those who are more seriously ill are those most likely to be referred and therefore have a greater probability of death.

Self medication or by family members and friends:

Previous self-medication or assistance by friends or relatives was not significantly associated with death (P = 0.3750 (logistic regression). Common drugs used for self medication included simple analgesics like aspirin, paracetamol and chloroquine. There have many advertisements on the use of these drugs but it is not known whether people know or use correct dosages. Of note, was the fact that there were only 3 deaths from 79 cases of clinical malaria but no study has ever been done to assess the use of self-medication by chloroquine. There were 18(2.1%) cases of drug poisoning associated with has been described elsewhere chloroquine tablets are commonly used[46]. Only one death occurred in these 18 cases. It could be that family members acted urgently by doing all manoeuvres to induce emesis. Oral chloroquine is rapidly and completely absorbed. Within 30 minutes of ingestion almost all chloroquine is absorbed and death does occurs in one to three hours after ingestion[47]. This study did not analyse each death individually but since delay to seek medical care is a significantly problem then most of these drug poisoning were likely to have been fatal had it not been assistance by family members.

The use of pharmacies and health workers at patient's residence was not significantly associated with death.

(P value = 0.6668 (logistic regression).

Affording health care:

16.3% of those who could not afford medical care died compared to 15.1% who could afford. Unaffordability was therefore not significantly associated with death (P value = 0.63555 (X^2 = 0.22). One of the factors which could have led to this finding is that patients may not have been able to afford care but by the nature of our society when somebody gets sick it is commonly a responsibility of the community or relatives to support the sick person. So as it was relatives who were interviewed then a bias of guilt was a possible influence. The ideal measure is improvement in the socio economic status of society but in Dar es Salaam this is even difficult to do so. Salaries are very meagre but people have other means to supplement their income. These means are often not reliable and cannot be therefore easily measured.

Duration of days in hospital:

More deaths occurred within 3 days of admission (54.5%) and these are probably the most serious and those who delay in care seeking. A carefulanalysis is in the future required so as to analyse those categorised as delay as for how long they stay in hospital and that will indirectly infer the costs used. The same applies for each disease entity taken alone. However the greater the duration of stay in the hospital the more were the deaths. (P= 0.016 (X^2 = 12.17).

Analysis of avoidable deaths: some case histories

80 (64.8%) deaths were considered "avoidable". For each of the commonest causes of avoidable death - tuberculosis (21.3%), diabetes mellitus (12.5%), cerebral malaria (11.3%), meningitis (10%) and tetanus (5.0%) sample case histories are described below. For each case possible reasons for death are suggested. Should these reasons be tackled then a good number of these "avoidable" deaths could be reduced.

Case Histories

Case report No. 1

A 24-years-old petty businessman recently arrived in Dar es Salaam from Moshi had been sick for two weeks due to fever, headache, joint aches, general malaise and loss of appetite. He sought medication at a nearby dispensary but he did not get relief. Believing in witchcraft and since he never had such an illness before he sought traditional healing. He felt somewhat better for a short period,but felt worse again two days before admission. At this time he sought medication at a private dispensary with a reputation for having "good" medicines. He was later found deeply unconscious in his room and brought to Muhimbili Medical Centre 6 hours later. He was found on admission, deeply unconscious with a Glasgow Coma Score at 4 and score of 20 at the Karnofsky Performance Scale. He was febrile (T=40°C), not jaundiced and had a soft neck with equally reacting pupils. His pulse was 120 and blood pressure 130/80 supine. A blood slide for malaria parasites was taken urgently was positive (++). He was instantly started on intravenous quinine 600mg in 500mls of dextrose 5% infusion every 8 hours. He aspirated on the following day and died on his third day in the hospital.

Problems

1) Improper care at the first care seeking episode.

2) Time delay due to seeking traditional healing.

Case report No. 2

A 31-years-old peasant male from an outskirt village of Dar es Salaam presented with a month long history of progressive undue fatigue and weight loss despite good appetite. He had an associated history suggesting both polyuria and polydipsia. He had no fever, no cough and no diarrhoea. He resorted to traditional healing as it was a mysterious illness in the village and continued this for one month. During this one month symptoms were getting worse and one day before admission he was sent to Mnazi Mmoja Health Centre where a relative works. He was instantly referred to Muhimbili Medical Centre and on admission was found to be semiconscious with a Glasgow Coma Score of 12 and Karnofsky Performance scale score of 40. He was afebrile and had oral ulcers. He was dehydrated and had Kussmaul's breathing. His pulse was 124 and blood pressure or 100/70 (supine). His chest was clear.

Bedside urinalysis showed sugar ++++ and ketones +++ but no protein. An urgent random blood sugar was 47.8 mmol/l. A diagnosis of diabetic ketoacidosis (DKA) was made.

He was started immediately on treatment but died on the next morning.

Problems:

1. Ignorance, of the symptoms and signs of diabetes due to lack of public awareness.
2. Traditional healing caused considerable delay.

Case report No. 3.

A 23-years-old, lady who was well until three days before admission developed a sore throat and painful tonsils. This was associated with high grade fever and frontal throbbing headache. She had a mild unproductive cough with no chest pain nor tightness. She went to a shop and bought 3 tablets of "dakika tatu". This gave her mild relief of symptoms, but later her level of consciousness suddenly changed and a few hours later she was referred to Muhimbili Medical Centre through a nearby private hospital. On admission she was unconscious (T=40°C) she had stiff neck with a positive Kernig's sign. Her pulse was 70 and blood pressure 70/50 (supine). Her chest was clear. Fundoscopy was normal and lumbar puncture was done.

The CSF was turbid and under increased pressure CSF sugar was 1.6 mmol/l (Random Blood Sugar 4:8 mmol/l),CSF protein was 1.2g/l, WBC -20/ml. Gram stain showed gram positive diplococci ZN stain and India ink were negative. Culture of CSF yielded Streptococci pneumonia sensitive to penicillin.

She was started on intravenous crystalline penicillin 5 UM 6 hourly and chloramphenicol 1 gm 6 hourly. She died the next morning.

Comments: Ignorance that not every fever can be treated adequately with "Dakika tatu" - a paracetamol trade name. 3 days delay cost this "avoidable" death.

Case report No. 4

69-years-old peasant male from Morogoro Rural district. He was diagnosed to have pulmonary tuberculosis in 1991 following productive cough and low grade fevers. He had a positive sputum for acid fast bacilli (AFB). He was successfully started on the standard anti tuberculous treatment regime and was well up until - three months ago. He then developed low grade fevers in the evening, night sweats, productive cough, wasting and a gradually distending abdomen. No history of diarrhoea or skin lesions. He resorted to traditional healing thinking that it is not possible to get PTB more than once. After 4 weeks his son, who stays in Dar es Salaam went to pick him up and took him to Muhimbili Medical Centre. On admission he was in a fair condition, afebrile, no lymph nodes palpable and no oral thrush. He had a normal skin. He was dyspnoeic with a respiratory rate of 28 per minute and bronchial breath sounds right upper zone. There were diffuse bilateral coarse crepitations as well. Abdomen was boggy with shifting dullness and no fluid thrill. His pulse was 100 and blood pressure 100/60.

His chest X-ray showed uniform opacities in the right upper lobe and diffuse bilateral patchy opacity. His sputum for AFB was positive and an ascitic tap uninformative. He was restarted on anti TB therapy but died on his fourth day in the hospital.

Problems:

Late care seeking due to resorting to traditional healing, and ignorance that one cannot contract PTB twice.

Case report No 5.

A 32-years-old driver with CCM party. He had an accidental nail prick on his left foot one week before admission. He considered it a trivial thing and did not seek medical care. One day before admission he presented with trismus and lock jaw with body spasms. He reported to Mwananyamala district hospital and was referred to Muhimbili Medical Centre. He had lock jaw with spontaneous tetanic spasms on admission and an uncleaned wound on his left foot on the plantar aspect. He was afebrile with a pulse of 86 and a blood pressure 120/60. A diagnosis of tetanus was entertained and he was put on appropriate therapy with sedation. The wound was debrided. However spasms increased and he was referred to the Intensive Care Unit. His condition deteriorated and he died 12 days later.

Problems:

Ignorance of the need for wound care and the possible association between wounds and tetanus. Adults as well as children, should be vaccinated will tetanus toxoid.

Shortcomings

The study did not look at avoidable factors related to patient management in the ward.

Relatives' account of patients' care seeking behaviour before admission compared to patients' own account.:

Most respondents were adults above 15 years of age and able to provide an account of the patients' history. The sex and education distribution among respondents was similar to that of patients.

Agreement on services sought by the patient between the respondents' accounts and those by patients were over 92%, except for seeking traditional healing. Traditional healing showed agreement of 76.6%. It could be that patient sought traditional healing as a secret event and therefore underreporting by respondents.

On reasons for delay agreement was over 90% for most of responses. Belief in witchcraft had an agreement of 85.5% There were very few responses as facilities being closed at onset of the illness and for no available transport,the level of agreement was therefore relatively low at 50% and 57% respectively.

Agreement on outcome of services used by the patient was generally over 85%. In only 29% was there agreement for the outcome of "discharge to die at home". Responses were few, only 2 by patients and 7 by the respondents. These were AIDS patients. When counselling is not successful or done only to relatives then an underreporting is likely by the patient.

These results show justification of the validity of relatives' responses on patients' care-seeking behaviour when studying "avoidable" deaths. It also indicates that reliance can generally be placed on relatives accounts when verbal autopsies are conducted in the community.

CONCLUSION:

The study provides evidence that most of the deaths in the medical wards of Muhimbili Medical Centre are potentially "avoidable". This is likely to be the same in many of the underdeveloped countries. Health care seeking behaviour contributed significantly to the occurrence of those deaths. It is clear that if our people are motivated to change their care-seeking behaviour then "avoidable" deaths could be reduced. When these deaths are reduced the community will prosper. In addition, a reduction in these deaths could release resources for the care of patients most in need of care.

RECOMMENDATIONS:

1. Our people should be educated about the potential dangers of witchcraft and traditional healing.

2. Our people should be motivated to seek medical care early.

3. Excessive or regular alcohol intake should be discouraged.

4. The government should review our referral system.

5. Health units should be well equipped with facilities for diagnoses and treatment. Equally, health workers should be motivated by better pay and continuing education.

6. Relatives' account of patient factors associated with avoidable deaths is generally valid.

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