

### THE COST OF DISEASE\*

W. M. CASTLE, M.B., B.S. (LOND.), A.I.S., F.S.S., *Lecturer in Medical Statistics in the Department of Social Medicine, University College of Rhodesia*

An old English proverb stated: 'Diseases are the tax on pleasure'. It is interesting to reflect on the cost of disease—the medical taxes paid by patients.

#### METHOD

Table I shows the annual morbidity prevalence rates already known for 3,500 European patients in one Salisbury general practice. No apologies are made for basing this part of the survey on a single practice, as a solitary reliable evaluation is statistically better than pooling the returns of many busy non-motivated doctors, especially as morbidity prevalence rates are notoriously unreliable. The diseases in Table I are grouped as this morbidity pattern has been used previously for comparison with another two practices.<sup>1</sup> The 24 disease entities constituted 93.5% of the total.

TABLE I. ANNUAL MORBIDITY PREVALENCE RATES (IN PERSONS)

Rank	Disease entity	No. of cases
1	Upper respiratory tract infection and laryngo-tracheitis	1,409
2	Skin disorders	388
3	Emotional disorders	346
4	Musculoskeletal disorders	287
5	Minor gynaecological conditions (excluding abortions)	247
6	Common digestive disorders	207
7	Pneumonia and acute bronchitis	177
8	Acute diarrhoeas	145
9	Minor trauma	144
10	Major trauma	127
11	Ear infections	103
12	Eye disorders	99
13	Urinary tract infections and venereal disease	94
14	Exanthemata including whooping cough	91
15	Hypertension	85
16	Cerumen auris	65
17	Viral gastritis	56
18	Venous abnormalities	52
19	Obesity	48
20	Stomal and dental infections	46
21	Asthma	39
22	Peptic ulcer	34
	Anaemia	34
24	Chronic bronchitis	25
	All others (with less than 25 cases each)	325
	Total	4,673

Although it seemed reasonable to derive a prevalence pattern from one practice, it was considered too unreliable to assess costs from this single doctor's approach to disease treatment. Therefore, all but the costs of drugs were assessed from the original accounts of all Salisbury's doctors as submitted by their patients to Rhodesia's largest medical aid scheme. On checking these returns it was very reassuring to find that the prevalence pattern of the single practice seemed similar to the over-all Salisbury pattern.

Using the 1968 figures, at least 25 cases of each of the 24 disease entities were comprehensively priced, 975 cases in all. As a patient was recorded as having one of these

diseases, his returns were checked throughout the year and all relevant charges to that particular illness were totalled. The costs were converted into rand and listed separately under the following headings:

1. General practitioner and specialist consultation costs.
2. Diagnostic investigations.
3. Treatment costs, retaining medical and surgical treatment costs separately.

Charges were allocated to the different categories as fairly as possible. This meant that if a doctor made a routine charge of R2.00 for a consultation and a total of R5.00 for removing a corneal foreign body, R2 of the R5 were allocated for consultation and the balance of R3.00 to surgical treatment.

The estimates of costs for drug therapy could not be derived from the medical aid returns and are less reliable. Yet, without these estimates the tax picture is incomplete, so I include them hesitantly. Six doctors were persuaded to write 'typical' prescriptions for each disease entity. These prescriptions were priced by a local pharmacist and the average cost is reported. Where diseases were grouped, the commonest diagnosis within that group was specified for treatment. For example, acute anxiety was specified and treated for emotional disorders.

#### RESULTS

Table II shows the average cost for each of the most prevalent diseases. The first two columns repeat the findings of Table I, the diseases in brackets in the first column being those used for obtaining sample prescriptions. The next column, the number priced, is the number followed through the medical aid returns. The prices are then given under the chosen headings.

#### DISCUSSION

Besides assessing the medical taxes which accrue to the various diagnostic labels, for example R6.30 for a doctor 'curing a cold', the table can be used to highlight the expensive diseases and the average annual medical tax per patient.

Table III lists the diseases in order of expense. The chronic diseases appear at the top, with the hypertensives paying the heaviest taxes. Hypertension is also the most expensive of these diseases to treat both medically and overall. Peptic ulceration is the second most expensive, but is the most expensive of all to investigate and to treat surgically. The most profitable diagnosis as far as the general practitioner is concerned is chronic bronchitis.

The cost of the average of these 24 diagnostic labels is shown along the bottom line of Table II. In fact, this is an underestimate, as many of the diseases too rare to be specified in these prevalence rates, such as neoplasms, cardiovascular accidents and chronic alcoholism, are expensive. 'Diseases are the tax on pleasure'. Of interest is the fact that the average cost of 30 Salisbury pregnancies was R89.30 whereas the tax on non-pregnancy, 'the pill', was R14.05.

The annual medical tax paid by this group of people in

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TABLE II. AVERAGE COST TO PATIENT PER DISEASE ENTITY IN SALISBURY, RHODESIA

Disease entity	Annual prevalence	Number priced	Consultations			Investigations	Treatment			Total costs
			GP	Consultant	Total		Surgical	Medical	Total	
Upper respiratory tract infections	1409	108	R4.62	—	R4.62	R0.21	—	R1.47	R1.47	R6.30
Skin diseases (eczema)	388	66	R4.77	R0.79	R5.56	R0.09	R1.36	R2.78	R4.14	R9.79
Emotional diseases (acute anxiety)	346	55	R6.40	R3.06	R9.46	R0.05	—	R2.44	R2.44	R11.95
General musculoskeletal conditions (acute back)	287	68	R5.03	R1.10	R6.13	R2.48	R12.89	R1.53	R14.42	R23.03
All gynae. (vaginitis)	247	75	R4.40	R1.85	R6.25	R0.96	R9.14	R2.40	R11.54	R18.75
Non-specific gut conditions ('indigestion')	207	31	R5.78	R0.34	R6.12	R0.76	—	R1.57	R1.57	R8.45
Ac. bronchitis/pneumonia	177	40	R7.46	—	R7.46	R0.66	—	R3.66	R3.66	R11.78
Diarrhoea	145	37	R5.29	—	R5.29	R0.25	—	R4.04	R4.04	R9.58
Minor trauma	144	29	R3.49	—	R3.49	R0.15	R0.10	—	R0.10	R3.74
Major trauma (sepsis)	127	27	R7.70	R0.23	R7.93	R0.80	R7.78	R2.55	R10.33	R19.06
Ear conditions (otitis media)	103	35	R5.52	—	R5.52	R0.18	—	R2.50	R2.50	R8.20
Eye conditions (conjunctivitis)	99	25	R3.61	R2.52	R6.13	—	—	R0.72	R0.72	R6.85
UGS conditions (acute cystitis)	94	38	R6.44	—	R6.44	R1.57	R0.91	R3.59	R4.50	R12.51
Exanthemata (measles)	91	33	R3.98	—	R3.98	—	—	R0.63	R0.63	R4.61
Hypertension	85	26	R9.28	R2.82	R12.10	R2.91	—	R30.96	R30.96	R45.97
Cerumen auris	65	65	R2.10	—	R2.10	—	—	—	—	R2.10
Viral gastritis	56	30	R4.90	—	R4.90	—	—	R1.92	R1.92	R6.82
Venous abnormalities (haemorrhoids)	52	29	R2.97	R0.22	R3.19	—	R8.95	R1.98	R10.93	R14.12
Obesity	48	26	R4.36	R0.40	R4.76	—	—	R2.42	R2.42	R7.18
Stomal and dental conditions (aphthous ulcers)	46	29	R4.40	—	R4.40	—	—	R1.45	R1.45	R5.85
Asthma	39	26	R11.85	R0.40	R12.25	R2.77	—	R9.30	R9.30	R24.32
Peptic ulcer	34	25	R9.57	R0.25	R9.82	R6.10	R13.74	R15.11	R28.85	R44.77
Iron-defic. anaemia	34	27	R8.43	—	R8.43	R1.23	—	R5.26	R5.26	R14.92
Chronic bronchitis	25	25	R20.10	—	R20.10	R3.91	—	R11.58	R11.58	R35.59
Average over-all	325	—	R6.35	R0.58	R6.93	R1.05	R2.29	R4.58	R6.86	R14.84

Salisbury in 1968 was estimated, and the totals are shown in Table IV. The total bill for 3,500 people is very nearly R49,000, averaging almost R14.00 per person. Of this, 47.2% is spent on general practitioner consultations, 5.7% on consultant consultations and 5.3% on investigations. Of these investigations 10% is for pathological services, 70% for radiology and the balance for such diagnostic procedures as electrocardiography and sigmoidoscopy. Less than half the total bill, 41.8%, is for treating the disease, 17.3% over-all for surgical treatment and 24.5% for medical care. In all, the general practitioners collect 49% of the gross taxes, as they collect extra over and above that for consultations for undertaking procedures. All specialists, including pathologists and radiologists, collect 22%, and the 29% balance is paid directly to the chemists, physiotherapists and hospital authorities.

#### Disease Price Index for Rhodesia

So far, the costs have related specifically to Rhodesia. In order to compare equivalent medical costs in different centres, the Laspeyres method for calculating consumer price indices was copied.<sup>2</sup>

Economic statisticians, in calculating a Laspeyres consumer price index, make an initial survey of foodstuffs commonly consumed and their quantities, ignoring luxury items. This provides an average shopping list of commodities, which is priced initially and repriced from time to time for comparison. Laspeyres called the initial costs 100 units.

Instead of relating, as Laspeyres did, the costs at different times to the initial year, in this disease price index costs at different places were related to the initial place, Salisbury, Rhodesia. Instead of an initial survey of commodities

TABLE III. LIST OF DISEASES ACCORDING TO OVER-ALL COSTS

No. in sequence	Disease
1	Hypertension
2	Peptic ulcer
3	Chronic bronchitis
4	Asthma
5	Acute back
6	Major trauma
7	All gynae.
8	Iron-deficiency anaemia
9	Venous abnormalities
10	UGS conditions
11	Emotional diseases
12	Acute bronchitis
13	Skin diseases
14	Diarrhoea
15	Non-specific gut conditions
16	Ears
17	Obesity
18	Eyes
19	Viral gastritis
20	URTI
21	Stomal and dental conditions
22	Exanthemata
23	Minor trauma
24	Cerumen auris

TABLE IV. ESTIMATE OF ANNUAL EXPENDITURE FOR 3,500 PEOPLE IN SALISBURY, RHODESIA\*

GP consultations	R23,105.50	
Consultant consultations	2,781.44	
Total consultations		R25,886.94
Investigations		2,599.05
Surgical treatment	R8,505.25	
Medical treatment	12,001.77	
Total treatment		20,507.02
Grand total		R48,993.01

\*Rhodesian currency converted to rand.

and their quantities, the disease prevalence survey was used. A shopping list of medical care used to treat the 3,500 patients was calculated and priced initially in Salisbury. The list was then sent to various countries to obtain their equivalent costs. In each centre costs relate to patients without any special benefit schemes. Laspeyres called his baseline 100. The Rhodesian baseline is also 100, after two modifications in order to make it more directly comparable with that of the other countries.

First of all, the Salisbury results were updated to April 1969, at which time the other results were obtained. Secondly, the Rhodesian results were modified by substituting the most commonly charged Salisbury rates where these differed from those actually charged and used for the actual costs of diseases. These usual Salisbury prices were then compared with the commonest charges in other countries. In fact, these modifications together amounted to a correction of less than 1%. In each country the different currencies were adjusted to the rand.

Although no references were found in the medical literature to adapting price indices to medical costs, all price indices have some inherent unreliabilities and it can be imagined how this disease price index incorporates and exaggerates them all. Nevertheless, they are interesting pointers. The results are shown in Tables V - VII.

TABLE V. TOTAL DISEASE PRICE INDEX FOR DIFFERENT CENTRES (APRIL 1969)

Country	Index
America (South Dakota)	173
Italy (Rome)	156
South Africa (modified Standard Tariff)	153
Australia (Melbourne)	120
South Africa (Johannesburg—medical aid)	117
Australia (Sydney)	110
South Africa (Cape Town—medical aid)	109
Beirut (Lebanon)	104
Bulawayo (Rhodesia)	100
Salisbury (Rhodesia)	100
Ireland (Dublin)	76
Hong Kong	59

100 = R49,137.41

TABLE VIA. GP CONSULTATIONS INDEX

Centre	Index
South Africa (Standard Tariff)	172
Rome	156
South Dakota	152
Melbourne	137
Johannesburg (medical aid)	119
Sydney	110
Beirut	105
Cape Town (medical aid)	101
Salisbury	100
Bulawayo	99
Dublin	59
Hong Kong	57

100 = R23,075.78

TABLE VIB. CONSULTANT CONSULTATIONS INDEX

Centre	Index
Rome	227
South Dakota	156
South Africa (Standard Tariff)	144
Johannesburg (medical aid)	119
Cape Town (medical aid)	119
Sydney	109
Dublin	109
Melbourne	103
Salisbury	100
Bulawayo	95
Hong Kong	66
Beirut	62

100 = R2,741.97

TABLE VIC. INVESTIGATIONS PRICE INDEX

Centre	Index
Rome	188
South Dakota	159
South Africa (Standard Tariff)	156
Cape Town (medical aid)	135
Johannesburg (medical aid)	127
Sydney	124
Melbourne	117
Beirut	109
Bulawayo	106
Dublin	102
Salisbury	100
Hong Kong	48

100 = R2,698.33

TABLE VID. SURGICAL TREATMENT PRICE INDEX

Centre	Index
South Dakota	284
Rome	175
South Africa (Standard Tariff)	162
Beirut	134
Sydney	122
Cape Town (medical aid)	119
Johannesburg (medical aid)	119
Melbourne	111
Bulawayo	105
Salisbury	100
Dublin	95
Hong Kong	58

100 = R8,054.58

TABLE VI E. MEDICAL TREATMENT PRICE INDEX

Centre	Index
South Dakota	148
Rome	122
South Africa (Standard Tariff)	113
Cape Town (medical aid)	110
Johannesburg (medical aid)	110
Melbourne	101
Sydney	101
Salisbury	100
Bulawayo	99
Beirut	91
Dublin	83
Hong Kong	65

100 = R12,566.75

TABLE VII. COST OF DRUGS INDEX

Country	Index
America	124
South Africa	107
Italy	103
Rhodesia	100
Australia	90
Southern Ireland	79
Lebanon	76
Hong Kong	69

100 = R11,176.00

Apart from Rhodesian and South African figures, the tables show results from Australia (Sydney and Melbourne); the Far East (Hong Kong); the Middle East (the Lebanon); Europe (Dublin and Rome); and America (South Dakota). Unfortunately, the situation in South Africa seems to be in a state of flux. Information was derived from two South African sources and I view the range between these results as representative of South Africa.

Representing the upper South African extreme is the Standard Fees Tariff as approved by the Federal Council of the Medical Association. The 1967 edition was used incorporating the amendments applicable to general practice as effective from 1 March 1969 and increasing all other 1967 fees by 10%. My information was that these were the lines along which present amendments were being made.

Representing the lower extremes, this year's *Government Gazette* No. 2280 relating to the tariff of fees for medical aid schemes was used. I specifically calculated the indices for Cape Town and Johannesburg from this gazette, as occasionally the prices varied from centre to centre within the Republic.

At this point it must be emphasized that this index relates only to equivalent costs to patients for a specific

pattern of care. It does not refer to the actual costs to the patients in a particular country, because the prevalence rates vary from place to place. Nor does it relate to the earnings of doctors. Andrew Lang accused somebody of 'using statistics as a drunken man uses lamp posts—for support rather than illumination'. These tables are offered more soberly—as illumination rather than to support any particular point of view about doctors' earnings. Although there is an obvious relationship between costs to patients and doctors' earnings, these tables do not incorporate the information necessary to equate the two. For example, different tax structures, different practice expenses and different costs of living in the different countries are in no way taken into account.

Within a country any gross differences may be of interest. For example, in one Rhodesian centre the 'pathological price index' (not shown) is 115 in comparison with the Salisbury figure of 100. This cannot be related to different tax structures or costs of living but may be associated with higher overheads or a lower demand. The recent increases suggested by Salisbury's general practitioners would put the over-all price of disease index up 8 points, which means that the average patient will pay 8% more for the diagnosis and treatment of disease.

Personally, I was surprised to see Rome figure so prominently, but my contact there volunteered the information that the medical costs in Rome were about 30% above those in the rest of Italy. The over-all range is quite large, with America at the top, with over-all charges about 3 times those in Hong Kong, where costs are lowest.

Table VI (A - E) shows the index broken down by consultation costs, investigations and treatment. The effect of this breakdown on Beirut is particularly interesting. This city shows the lowest index for consultant consultation and is in the middle for investigations. For a patient undergoing treatment in the Lebanon it would appear that what is gained on the medical roundabout (index 91) is lost on the surgical swings (index 134).

Voltaire said that 'the art of medicine consists of amusing the patient while nature takes its natural course'. This is particularly true so far as the general practitioners in Table VIA are concerned, and it is only proper that the patients pay for their medical amusement. While the doctors in Hong Kong and Dublin produce cheap entertainment, it would appear that South African doctors who have 'opted out' stage quite a gala performance compared with the more reasonable cabaret turns of Rhodesia's practitioners!

Table VII shows the relative prices of drugs in the different countries. As this estimate is incorporated into a country's cost of living index, the trend is probably indicative of the over-all cost of living. The order is similar to the over-all cost of disease index, but the range (with the American costs now less than twice those of Hong Kong) is not as marked as when professional fees are superimposed.

## SUMMARY

A recent study of a general practice in Salisbury estimated the annual morbidity prevalence rate for 3,500 Europeans. However, the diagnostic label attached to a patient has a financial as well as medical significance.

Disease costs were considered under the following headings: Consultation fees; costs of diagnostic investigations; and the

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costs of surgical and medical treatments. Records of a large medical aid scheme have been studied to estimate the average costs for consultation, investigation and surgical treatments. 'Typical' prescriptions issued by the medical profession for the different diseases were priced in order to estimate the medical treatment costs.

A disease price index for Rhodesia is calculated using the morbidity statistics and disease cost estimates. This is compared with the equivalent figure for other countries.

I wish to thank Mr J. L. Bates particularly and his staff, for their considerable assistance in reviewing the records of the Commercial and Industrial Medical Aid Scheme, Salisbury. The survey would not have been possible without help from many contacts in different parts of the world and I am particularly grateful for their co-operation.

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