MOST progress in science depends on the exploitation of observations made in a ‘test-tube’ situation. These situations depend in turn on advances in technology. One of the reasons why general practice is a rudimentary science is because it is difficult to produce a satisfactory ‘test-tube’ situation. Recent development in computer science means that the necessary technology is now available; although not yet within easy reach of the general-practitioner research-worker.

Most workers in general practice use whole practices but it is impossible to make sufficiently detailed observations on patients and diseases in whole practices without unlimited use of the full resources of a computing unit. This means that a whole practice is too big to serve as a ‘test-tube’ situation. The obvious solution is to use a sample population. When I was faced with this problem I found that I could not observe the patients adequately in a random sample of my practice, and so I used a biased sample of 500 patients plus their children who were selected at surgery attendances. I called this the ‘artificial practice’.

The patients in this unit were divided into two main groups—a supramean group in which the patients received ten or more personal items of service in the observation year, and a perimean group in which the patients received less than ten items of service (Jacob 1966 a and b). These two groups were subdivided into an A group in which the patients experienced one or two distinct episodes of illness and a multiple group in which the patients experienced three or more distinct episodes of illness. This gave four patient categories in all.

The next stage of the investigation was a morbidity study. Each disease episode and the overall morbidity pattern in relation to the patient groups were studied.

Each disease was classified according to the classification of the Royal College of General Practitioners. This is an aetiological classification and a diagnosis of quality. The results of this part of
the investigation were reported in an earlier article (Jacob 1967). The second part of the morbidity study was to consider the diseases in relation to their severity. This really means a quantitative approach to the diagnosis.

In theory it is possible to construct a numerical scale against which a disease could be graded for this quantitative classification. At the lower end of the scale would be those conditions which hardly affect the patient or simply cause inconvenience (for example wax in the ear and mild refractive errors) and as the scale increases it would move through conditions which cause definite, although self-limiting, incapacity (such as influenza) to those which involve permanent serious ill health and finally death.

While such a scale would be attractive the best that can be offered at present is a classification in which the relevant disease episode is placed in one or other of predetermined, arbitrary categories based on definitions of degrees of severity. This type of scale maintains the implication of quantitative assessment and hence I call this type of diagnosis 'quantitative'. It was obvious from the outset that a serious attempt to measure the overall quantitative aspect of the morbidity in the artificial practice would be required since this is an essential part of a morbidity investigation. The following scale was constructed for use in this part of the field work.

Construction of the scale

I was unable to find a classification of disease according to grades of severity which could be used without modification. In other scales the criteria are either insufficiently defined or not wholly satisfactory for application in practice. Two are explicit enough to allow combination and modification for use in this study and the resulting hybrid was easy to apply. It should be remembered that the conditions found in this type of work are common and easy to describe and define.

The first scale was devised by Backett (Backett, Shaw and Evans 1953) who divides disease into two categories; serious and not serious. The division is made according to whether the disease fits one or other of the criteria for 'seriousness', but inadequate provision is made for variable diseases like bronchial asthma.

Logan constructed the second classification (Logan and Cushion 1958). This scale provides four categories of severity; serious, moderate, mild and minor. The defect of this scale is its reliance on the period of incapacity for work as an indicator of severity. Both scales provide illustrative lists of diseases. Logan's scale implies the Backett scale but the two major disease groups are further
subdivided into two lesser groups.

I used this subdivision as the basis for my own scale, but also kept Backett’s original scheme of two main groups; allowing division into more and less serious disease.

At this stage it is necessary to introduce a new terminology. This is because expressions such as ‘minor’ and ‘trivial’ have become loaded words which imply that the patient is being criticized. Because of this I call the more serious conditions Rank 1 conditions and the less serious Rank 2. The two Ranks are subdivided into a and b groups giving a four grade scale approximating to Logan’s.

The details of the classification are as follows:

Rank 1a. Illness which threatens life and requires rapid operative or intensive causal drug therapy. Prolonged illness with constant danger of relapse. Illness with no hope of final cure.

Rank 1b. As for Rank 1a but with expectation of cure or complete adjustment to residual disability in less than a year. Epilepsy with frequent fits.

Rank 2a. Illness which is not life threatening but requires a period of bed rest and possible convalescence, whether the illness be self limiting or limited by therapy. Primary coxal skin infections of areas which are larger than half an inch in diameter. Abrasions and contusions larger than those classified as Rank 2b. Epilepsy with infrequent fits. The exanthemata of childhood.

Rank 2b. Afebrile infections of the upper respiratory tract. Primary coxal skin infections less than half an inch in diameter. Skin blemishes of same size. Linear scratches. Bruises less than two inches in diameter. Abrasions smaller than one square inch.

Uncomplicated obesity was ‘ranked’ as 2b. When it was complicated the complication decided the rank.

Uncomplicated pernicious anaemia, diabetes mellitus and thyroid disease were ‘ranked’ as 1b. When these conditions were complicated the complication decided the rank.

The detailed list in Logan’s original classification was used without further alteration.

This classification was easy to use for grading the majority of the conditions observed in the artificial practice. This is because most of the conditions are common and have already received a rule-of-thumb grade which is more or less generally agreed. There is always a small proportion of complaints which are hard to classify in this type of study. In his original work Backett estimated that this would be about five per cent. In my investigation this source of error has been minimized because each episode was observed from start to finish. This allows frequent reassessment. Because of the length of follow up it was not possible for a relapse or alteration in the patient’s condition to occur at a remote date without its being recorded and assessed in the light of the previous history. In this respect the classification is used in the same way as the diagnostic classification of the Royal College of General Practitioners. Al-
though the scale is experimental I found it so easy to use that I feel it may be suitable for general use.

Results

Table I shows the quantitative morbidity of the artificial practice in numbers of episodes of illness.

**TABLE I**

**QUANTITATIVE MORBIDITY OF ARTIFICIAL PRACTICE**

<table>
<thead>
<tr>
<th>Ranks of illness</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Supramean multiple</td>
<td>Supramean A</td>
<td>Perimean multiple</td>
<td>Perimean A</td>
</tr>
<tr>
<td>Rank 1a</td>
<td>21</td>
<td>6</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Rank 1b</td>
<td>105</td>
<td>24</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>Rank 2a</td>
<td>450</td>
<td>24</td>
<td>247</td>
<td>80</td>
</tr>
<tr>
<td>Rank 2b</td>
<td>306</td>
<td>5</td>
<td>160</td>
<td>42</td>
</tr>
</tbody>
</table>

This gives an indication of the work distribution between the different groups of illness but these figures permit only conventional study of morbidity. It has already been shown that this approach is inaccurate because of the 'clusters' of illness experienced by patients in the multiple groups (Jacob 1967).

The study was continued along patient orientated lines but to do this I had to condense the illnesses into two major groups to avoid complications in the handling of the figures. This was done by grouping Ranks 1a and 1b together and Ranks 2a and 2b together. I then began by studying the part played by Rank 1 illness in the formation of a patient's 'cluster'.

Table II shows that half the supramean multiple patients have

**TABLE II**

**PATIENT FREQUENCY OF RANK 1 ILLNESS IN ARTIFICIAL PRACTICE**

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Supramean multiple</th>
<th>Supramean A</th>
<th>Perimean multiple</th>
<th>Perimean A</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. with no Rank 1 illness</td>
<td>79</td>
<td>9</td>
<td>91</td>
<td>80</td>
<td>259</td>
</tr>
<tr>
<td>No. with one or more Rank 1 illness</td>
<td>79</td>
<td>25</td>
<td>17</td>
<td>29</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>34</td>
<td>108</td>
<td>109</td>
<td>409</td>
</tr>
</tbody>
</table>

\[ x^2 = .5705 \]  

degrees of freedom = 3  

P < 0.001
one or more episodes of Rank 1 illness in their ‘clusters’. The majority of supramean A patients have a Rank 1 illness. The incidence of Rank 1 illness is lowest in the perimean multiple group. A sizeable minority of perimean A patients have at least one Rank 1 illness. The frequency of Rank 1 illness per patient is remarkably high.

Figure 1 shows that there are insufficient supramean multiple patients with two or more Rank 1 illnesses to consider the possibility of a ‘sub-cluster’ of Rank 1 illness only.

![Graph showing distribution of Rank 1 episodes in supramean multiple group.](image)

**Figure 1**

Distribution of Rank 1 episodes in suprumean multiple group

There was a possibility that the Rank 1 illness was part of the recurring type of ‘cluster’. Table III contains all the patients who suffer three or more episodes of a specific group of conditions. This number of episodes was chosen arbitrarily but it suggests that these patients may have the type of vulnerability discussed in the report quoted above. The figures in this table are too small for formal analysis but they do not suggest that the Rank 1 illness is connected

**TABLE III**

<table>
<thead>
<tr>
<th>Connection of Rank 1 illness with recurring part of ‘cluster’</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of patients without connected Rank 1 illness</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>No. of patients without unconnected Rank 1 illness</td>
</tr>
<tr>
<td>No. of patients with unconnected Rank 1 illness</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
with the recurring part of a 'cluster' since about half these patients have an unconnected Rank 1 in their 'cluster' while the other half do not have a Rank 1 illness in the 'cluster'.

There was no necessity to do a special study for Rank 2 illness since it follows that if the distribution of Rank 1 illness is seldom more than one episode per patient affected, the remainder of the illnesses must be Rank 2.

Discussion

It is now possible to construct a profile of the morbidity pattern of the artificial practice. The whole population has been divided into a high and low demand group, but these two groups are really an aid to statistical evaluation. It would be more accurate to consider the demand picture of the population as a continuous range with its extremes at low and high demand. One finds people with single and multiple ailments at both ends of this range. Conventional morbidity studies are sufficient to analyse the nature of the single illness pattern but not for the 'cluster' pattern.

The 'clusters' were examined to see if they conformed to a regular pattern and it was found that when the different categories of disease were placed in order of frequency the figures followed the negative binomial distribution. This can be interpreted as indicating that the patients with a 'cluster' in which a group of diseases recurs have a vulnerability to that group of diseases.

It has also been shown that half the patients in the supramean multiple group have at least one Rank 1 illness. The evidence suggests that this episode is not necessarily related to the recurring part of the cluster. The remainder did not have a serious illness during the observation year.

These findings raise some interesting problems. The first arises in connection with the relative importance of vulnerability and chance in producing disease. Although three recurring episodes were used to indicate vulnerability it should be remembered that the 'accident proneness' theory implies a graduation of vulnerability so that an individual with an episode of dermatitis (for example) may be an invulnerable person who is the victim of unfortunate circumstances or may equally well be someone who would not have broken down in this way if their skin had been more resistant to the trauma to which it was exposed. If there is a specific vulnerability can it be detected before breakdown or must we wait until a cluster emerges?

The significance of Rank 1 episodes cannot be decided from this part of the investigation. It could be that vulnerability in a special sense may be associated with an additional general tendency to breakdown—a suggestion which has been mooted by Balint in his
'basic fault' conception (Balint 1956). Alternatively, it may be that the Rank 1 episode should be regarded as the end point of a progressive process based on specific vulnerability. This would imply that people with a recurring group of conditions in their clusters will later develop a major breakdown of the relevant system. It may be that the stress of Rank 1 illness throws too great a strain on the body's resources and reveals other deficiencies which were not previously noticeable. In such circumstances one would expect clustering to stop after resolution of the Rank 1 illness.

Many of these problems would be cleared up by a larger survey with a follow-up period of ten years or even longer. One problem with this type of survey is to obtain sufficient people with obviously recurring patterns in the cluster. If three episodes a year are accepted as the criterion and if the supraneous multiple group are about ten per cent of the population* only two per cent of the whole population would have such a pattern. In order to study 500 people like this it would be necessary to survey a random population of 25,000. This could only be done by a university department of general practice or a unit of general practice working in association with a number of practices. Although such an investigation would yield much information of theoretical and practical value it must await the establishment of these departments.

Summary

It is pointed out that the assessment of the gravity of an illness is a quantitative diagnosis.

The scale which was used to establish quantitative diagnosis in the artificial practice is described.

It was found that half the supraneous multiple patients had at least one Rank 1 illness and one quarter of this group had two Rank 1 illnesses. Most of the supraneous A patients had a Rank 1 illness and more than a third of the perimean A patients had a Rank 1 illness.

The Rank 1 illness in the supraneous multiple group is not necessarily connected with the recurrent part of the cluster.

The implications of the findings are discussed.

Acknowledgements

To Mr J. Pearson, department of public health and social medicine, University of Dundee, for assistance with the planning of the mathematics and statistical considerations in this article; to Professor A. Mair, department of public health and social medicine, University of Dundee, for the use of

*Obtained by calculation from previous work.
equipment in the analysis; and to Riker Laboratories, Loughborough, Leicestershire, for financing the investigation.

REFERENCES


This paper is based on the author’s impressions following a sabbatical tour of Britain. He spent 19 weeks in this country, nine of them doing locums in varying types of practice, and in addition interviewed some 20 individual general practitioners, attended various university departments of general practice and of social medicine, and sat in on meetings of the College Council and Research Committee.

Although his contacts appear to have been mainly with the ‘upper crust’ Dr Bridges-Webb is critical of many aspects of National Health Service general practice—the limited scope, lack of financial incentive to better work, and the generally lower status of the general practitioner in Britain who “often seems to be regarded as a busy minor official, of no special importance, who nevertheless holds the keys to many of the treasures of the Welfare State”.

He points out that despite widespread complaints about excess clerical work and certification this did not seem to differ greatly from what is required in Australia. As regards work load most practitioners he met and worked with appeared to work shorter hours and carry less responsibility than he himself did in Australia, although they did work at very high pressure during working hours. The shortage of general practitioners seemed to be less acute in Britain than in Australia.