

DISPLAY BY SPECTRUM

J. F. BURDON, M.B., B.S., D.A.

Paignton

The incidence of disease in each sex and age group is a constant source of interest. Observations on this aspect of disease have frequently pointed the way to understanding the etiology of disease processes. This paper describes a simple method of sequential recording which quickly demonstrates any tendency a disease may have to attack patients of a particular age or sex.

A suitable base-line is prepared, so that the distance along it represents the numbers of patients at risk in each age group, and disease episodes are inserted as vertical lines appropriately placed. As examples accumulate any clustering of the lines becomes apparent, and it is not difficult to estimate the chances of such arrangements occurring accidentally.

The advantage of the method is that it is particularly suited to the collection of data while the observer is engaged in general practice; it shares this virtue with other sequential methods, and it lends excitement to what might otherwise be a dull task, for the picture of disease distribution soon unfolds, and every added case represents confirmation or a challenge to the observer's theories.

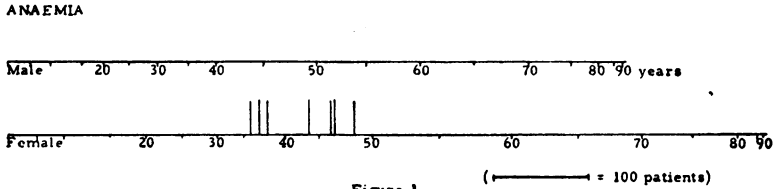
The Base-line

To prepare a suitable base-line, the numbers of patients at risk in each age-sex group must be known; that is, an age-sex register of the practice must be prepared. This is conveniently done by entering each patient's name onto a small filing card, and arranging these cards under the years of birth, separately grouped for sexes. Insertions and extractions are easily done at the same time as new patients are accepted or old ones lost to the practice. At any time the number of cards filed under any year, or group of years, can be counted with ease.

Having prepared such an age-sex register, a line of suitable length can be drawn, say one inch to one hundred patients, and the different groups are marked along it in proportion to their numbers. Matters of interest immediately appear. Certain age groups are poorly represented, and others predominate. In the author's

practice, half the patients are over 50 years old, and a quarter are over 65 years old—twice the national average. This was to be expected in a seaside retirement area.

When seven consecutive cases of anaemia were charted, the following age-sex “spectrum” was obtained: (Figure 1).



All were female and between the ages of 35 and 50 years. Clearly this age-sex group commonly suffers from anaemia, and this should always be remembered when examining them. It might be well to send for them in turn for routine haemoglobin estimations. Some doctors might prefer to give them all iron supplements, but the numbers involved—about a hundred, or about seven per cent in the author’s practice—would represent a substantial load of work and expense if tackled in this way.

Statistical Significance

The lines in figure 1 fall into a cluster occupying about one tenth of the total range. For this to occur in any one instance is one chance in ten (if chance is the only determinant). For seven consecutive patients to array themselves thus, *all in the same one-tenth space*, is one chance in 10,000,000 times. Clearly, chance played no part in this spectrum, and the determinant was obviously menstrual loss.

Not every spectrum is quite so simple to estimate, but if a length of the base-line is chosen, say one-seventh, then each line falling in that particular seventh multiplies the significance by seven, and each line falling elsewhere reduces the chances by the same ratio. Students of statistics will spend many happy hours on these diagrams.

If lines are marked on a spectral display at random, a result like figure 2 is obtained. This example was derived by recording every tenth patient in the alphabetical list of the author’s practice, until 40 had been recorded. No particular pattern emerged, though

there is a grouping here and there by chance. (Figure 2).

RANDOM DISTRIBUTION

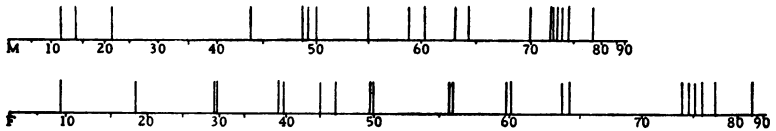


Figure 2

An interesting result followed the charting of patients in which depression or anxiety was present. No attempt was made to divide endogenous from reactive depression, nor acute from chronic anxiety. The depressed patients proved to be all over 40 years of age, and the anxious patients were predominantly female. (Figures 3 and 4).

DEPRESSION

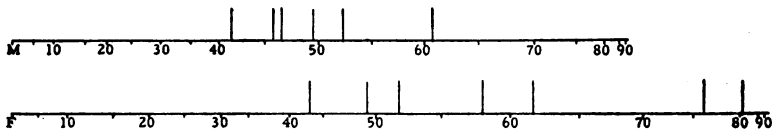


Figure 3

ANXIETY STATE

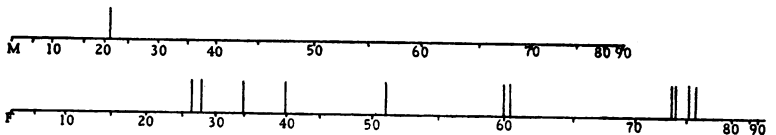


Figure 4

Wax in the ears was a trouble mainly afflicting adult males. The interesting question is, Why? (Figure 5).

WAX IN EARS

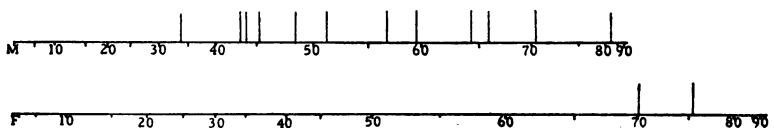


Figure 5

Myocardial infarct struck down five men, four over 70 years old and one of 63; but obesity showed a female preponderance. How does this bear on the theory that fatness and coronary disease are related? (Figures 6 and 7).

MYOCARDIAL INFARCTION

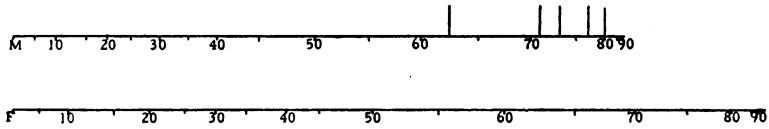


Figure 6

OBESITY

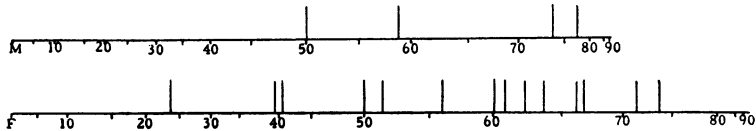


Figure 7

Another application of analysis by spectrum is to chart all patients visited during a period. Figure 8 shows the author's experience

PATIENTS VISITED, MARCH 1960

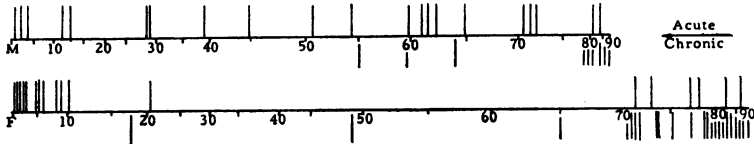


Figure 8

during March 1960, the fresh calls to patients with acute illness being marked above the lines, and the routine visits to patients with chronic disease below. There is a remarkable absence of visits to housewives.

Patients attending the surgery showed a different pattern, as was expected. Figure 9 shows the total for one week. Further interest

PATIENTS ATTENDING SURGERY, WEEK ENDING 27th FEBRUARY 1960

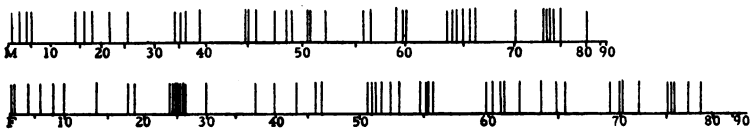


Figure 9

can be derived from such records by showing days of the week, or different surgery hours, separately.

The above examples are not intended to provide serious proof of anything except that this method of display is a source of much interest and instruction in return for little effort. Recording is easy to keep up, even during patches of overwork. It may be that some diseases will be found by this method to have an unexpected relationship to age, sex, or some other feature that may be investigated, e.g., occupation, area of town, or any other selective criterion for which a spectrum can be constructed. In practice, the unfolding pattern is by turns interesting, exciting, disappointing, instructive, annoying, or gratifying. Applications of the method are limited by the investigator's ingenuity only.

NOTICE

Student Prizes

Public Welfare Foundation Prizes

This competition is open to senior medical students in the United Kingdom and Eire, to encourage those who have taken advantage of opportunities to discuss the diagnosis and management of patients in the setting of general practice. The student should have been introduced to the patient by the family doctor; he should have seen the patient on at least three occasions in the doctor's consulting room or in the patient's home, and he must have discussed with the doctor the relevant clinical and social factors involved.

There will be six prizes of £40 each. Details and application forms may be obtained from the dean of the student's medical school or from the Secretary of the College of General Practitioners, 41 Cadogan Gardens, London, S.W.3.

1961 will be the fifth year in which the competition has been held; this year there were 43 entries representing 14 medical schools.

The closing date for the competition is 1st May 1961, but entries received after that date will be passed to the adjudicators for the following year's competition.