MEDICAL ALGORITHMS

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SUMMARY: The use of algorithms, or logical graphs, as a means of simplifying understanding is outlined. Four examples of medical algorithms are illustrated.

An algorithm is an orderly sequence of instructions for solving a problem, and as a generic term is taken to include any sequence of simple statements or questions in such a way that, to arrive at the correct decision, only those statements need to read which are relevant to the particular case. An example of an algorithm is shown in Fig. 1 where the simple stages of making a local telephone call are laid out. Study of Fig. 1 makes immediately obvious the purpose of an algorithm without the need for further explanation. This is the aim of the algorithm, to explain in simple stages the events that lead to a conclusion. This can be done as in Fig. 1 by a flow chart, or logical tree, sometimes referred to as a directed graph, or by a list structure as shown in Fig. 2. Whatever the pattern they are all embraced by the term algorithm.

Algorithms have many applications. Lewis, Horabin and Gane (1967) have devised a flow chart to provide easy understanding of Capital Gains Tax while I have been brushing up my game of bridge by using Goren's (1963) tutor text "The Elements of Bridge", in which by providing the right answer to a simple question the reader is

Fig. 1. Algorithms as applied to a local telephone call.

1. LIFT RECEIVER AND LISTEN
CAN YOU HEAR CONTINUOUS DIALLING TONE?
IF YES GO TO 2.
IF NO SOMETHING HAS GONE WRONG. REPLACE
RECEIVER AND TRY AGAIN, OR TRY DIALLING
FROM ANOTHER BOOTH.
2. DIAL FIRST LETTER OF THE NUMBER YOU WANT
HAS DIALLING TONE STOPPED?
IF YES GO TO 3.
IF NO SOMETHING HAS GONE WRONG. REPLACE
RECEIVER AND TRY AGAIN, OR TRY DIALLING
FROM ANOTHER BOOTH.
3. DIAL REST OF NUMBER AND WAIT FOR A FEW SECONDS.
SECONDS.
CAN YOU HEAR THE RINGING (BURR-BURR) TONE?
IF YES GO TO 4.
IF NO GO TO 5.

Fig. 2. The first part of Fig. 1 in "List structure form".

Fig. 3. Fermentation reaction of neisseria.

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Fig. 5. A plan for the treatment of cardiac arrest.

Fig. 6. Weil-Felix reaction.

Discussion

Depending on what has to be conveyed, and to whom, the algorithm can be quite simple or very complicated. Even the most complex can, however, be broken down into a series of charts or sections, a conclusion in one part leading to another chart, or, as in Goren's book, to another page.

Flow charts, with the refinement of critical path analysis, are well established in industry but their use in other fields is almost unlimited. In every situation where instruction and training is taking place algorithms can be used to simplify this instruction. As well as simple teaching aids, future reference charts such as for identification of tablets or the identification of bacteria could well be set out as an algorithm.

Whatever the future use I have certainly discovered while writing this article that attempting to convert a subject to an algorithm is an excellent way of learning that subject.

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Figs. 1 and 2 are reproduced from CAS Occasional paper No. 2 by kind permission of the Controller of Her Majesty's Stationery Office. I am indebted to Lieutenant-Colonel A. R. P. Grist, R.E.M.E. for introducing me to this fascinating subject.

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Culture and Gimcrack

An unusually fine exhibition of the many facets of our mixed-up national character is presented in the controversy over London's Tate Gallery. All the pseuds, to borrow *Private Eye's* admirable word, are in a fever about this. Among the "advanced" attitudes being struck are anti-Philistinism, anti-militarism, anti-modernism, pro-preservation, anti-Government-parsimony, you name it. All because of a plan to change the sham front of a laughable old wedding-cake building in order to make room to hang more pictures.

The culture lobby finds itself in the happy position of having it both ways: it can shout for better facilities for art, while at the same time denouncing this particular plan for better facilities on the ground of Philistinism. By a lucky coincidence a military hospital happens to occupy the next site, providing a perfect target for diversionary tactics. Clear out the insensitive Army, leave the Tate unscathed and build us a splendid new art gallery next door.

Further entertaining complications include the fact that there's never been a hope in hell that Government money would be forthcoming for a new art gallery (or a new Army hospital elsewhere), which is why the Tate people came up with their re-building scheme in the first place. Then there's the slight difficulty that not even the most ardent preservationist can pretend the rubbishy old Tate has a fragment of architectural merit. Finally comes the point that the crisis has only arisen because the Tate has stuffed itself with the sort of pictures that its founder never intended it for.

And this is where the most ironic touch of all comes in. The Tate has become the centre for modern art, and it wants room to hang modern paintings. You might think, then, that appreciators of modern art would welcome a modern front to their gallery. Instead, they set up a howl for gimcrack Graeco-Victorian columns.

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