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LOGICAL-FLOW DIAGRAMS

IN THE TRAINING OF HEALTH WORKERS

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There are too few doctors and nurses to serve even marginally the pressing needs of the world's population. The shortage is worst felt in the countries that have most illness; but in any case the cost of producing new physicians and nurses is prohibitive. Hope is thus pinned on the training of auxiliary health workers. Besides supplementing and complementing fuller trained health workers it is hoped that auxiliaries will come directly from the people they serve and thus be more responsive to their needs and effective in promoting their health. Training auxiliaries, however, is a difficult matter. Who should be taught? How much? How well? How long? By whom? Where? With what materials? With what supervision? With what follow-up? And, do they do any good? The subject has been reviewed extensively.[1, 2, 3] Perhaps these puzzles cannot be solved in isolation but only as part of extensive societal self-examination and change. We raise them, however, to put into proper perspective our presentation of logical-flow diagrams which may simplify training, codify standards of care, permit ready supervision of auxiliaries' work, and facilitate retrieval of epidemiologic data.

Clinicians the world over appreciate five axioms about disease: first, that only a few diseases comprise the bulk of human illness; second, that most illnesses are self-limiting; third, that most illnesses are manifested by readily recognized signs and symptoms; fourth, that most illnesses may be easily succored or cured by simple medicines and remedies, not all in the Western pharmacopeia; and fifth, that steps to prevent many serious diseases are specific, easy and often inexpensive. Given these axioms it would seem possible that a few simple instructions to deal with a few common situations could permit even lightly trained auxiliaries to provide good ameliorative, curative, and preventive care

for the majority of illnesses. King writes, however, that, "Whenever possible things must be made foolproof for (auxiliaries)...One of the difficulties of working with auxiliaries...is the problem of communicating instructions to them."[1]

Similar difficulties were discovered in communicating instructions to high speed computers. Each instruction had to be specific, unambiguous and broken down into simple, sequential steps. "Logical-flow diagrams," or "decision-trees," or "branched-logic charts," or "protocols" were devised to clarify and organize the thinking of the instructor and to direct the computer as well.

Logical-flow diagrams in clinical medicine explicitly direct a health worker to collect data about a patient and to take actions based on the data obtained. Flow diagrams currently in use take a "binary logic" form, that is answers to questions about the patient are "yes-no," "present-absent," or "more than-less than," and so on. The diagrams should be internally consistent, completely unambiguous, should clearly delineate emergency or urgent conditions, and should cover the majority of important possibilities within the particular problem covered. An example of a flow chart is seen as Figure 1.

Flow diagrams have been used successfully by auxiliaries in the diagnosis and management of upper respiratory disease,[4] stable diabetes and hypertension,[5] vaginitis and urinary tract infection,[6] and in the reading of roentgenograms.[7]

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* The word "algorithm" is also used; it derives from ~~this~~ "algorism" which in turn is from the name of a 9th century Arab mathematician Al-Khowarazmi; originally algorithm meant the act of computing with numerals -- now the term covers "any particular procedure for solving a certain type of problem."

In the developing world one auxiliary training program has used a modified logical-flow procedure.[8]

The putative advantages of logical-flow diagrams over customary teaching methods and standing orders are several:

1. They more efficiently teach medical material, especially to new health workers, and support a degree of uniformity of care.
2. The course of action in a logical-flow chart has a definite beginning, direction and end, making the charts fun to learn and use. A sense of achievement is gained immediately as the health worker moves through the flow.
3. The method of learning about one illness is generalized to others.
4. The flows may be easily simplified or made more sophisticated to suit the level of training of the class of health workers using them.
5. Methods of data retrieval for supervisory, management, and epidemiologic purposes can be readily designed from the forms themselves, with a minimum of paperwork.

The flow-diagrams, of course, do not provide training in the clinical skills called for; some explanatory material (doses, definitions, rationale for each step) may need to be listed separately as well.

A number of questions must be asked, and rigorously, lest the novelty of the method lead to uncritical acceptance. Do these diagrams speed auxiliaries' learning time, enhance retention of material, and improve performance compared to traditional training? Do patients receive better care? Even before these questions can be considered the actual form of

the diagrams must be designed. Will auxiliaries in different cultures understand a logical-flow? Would colors or pictures instead of symbols facilitate learning? Will the design need to vary from one locale to another? Is the content relevant and acceptable? Will the diagrams continue to be used well after they have been learned? What will be the costs of training as compared to traditional methods?

We have composed a series of logical-flow charts for maternal and child health care as might be carried on in a typical basic health center.[9] (The section on diarrhea will appear in detail in Tropical Doctor.) These and their variations must be tested to answer the questions posed above. Thus we are interested in sharing, and assisting with these materials with medical workers and educators who are in a position to carry out this research.

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