showed pictures of two systems currently in use in the U.S.A. and Sweden which nearly reached his idea of 100–300 specimens an hour, with the results in a form suitable for data processing.

Professor J. R. SQUIRE (University of Birmingham) tackled the problem of cost of these new systems. He found that by renting fairly simple equipment for £700 a year he had saved 10% of the technicians' expensive time. The secretaries were able to punch out and print requests at the same time as producing a daily work sheet. The machine grouped the cards functionally and also produced the report. The main problem was to get quality control of the routine methods by ridding the biochemical methods of inaccuracies. He thought that a gradual approach to this expensive discipline was the sensible one.

Encouragement from the Ministry of Health

Sir GEORGE GODBER (Chief Medical Officer, Ministry of Health) said that computers were the technology of the younger man. The interest of the younger generation was essential, not to learn to write programmes but to learn to rationalize and standardize data for computer use.

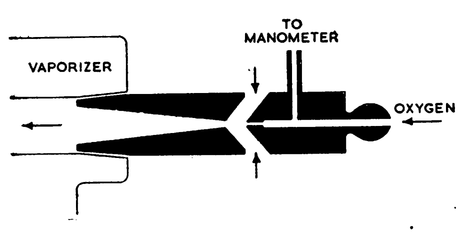
Already seven regional hospital boards had acquired or had ordered computers, and the others would soon follow. By 1967 there should be 100% analysis of hospital activity. Soon regular statistics should be available to any hospital doctor who needed a regular feed-back of information. Then it should be possible to go on to special studies for individual consultants. Small machines should be on hand for special tasks, such as calculating radiation dosage, allocating nurses to the wards, and working out diets. Storage and retrieval of the literature should make it easier to keep up to date and avoid the repetition of research. So far only hospital problems had been considered, but there was a vast volume of records and information outside hospital.

In answer to previous criticisms that many doctors might regard the provision of clinical data for computer analysis as a breach of professional confidence, Sir George emphasized that such information was anonymous and that the profession must programme its work to do the most for the most. This also meant standardization, which implied record sheets of the questionary type, so that the data could be put straight into the computer without further handling.

NEW APPLIANCES

Economical Anaesthesia Overseas: Air-entrainment Device for Use with Draw-over Vaporizers in Children

Dr. J. V. FARMAN, Department of Anaesthetics, Welsh National School of Medicine, Cardiff, writes: Draw-over vaporizers, such as the Oxford vaporizer and the E.M.O. (Epstein and Macintosh, 1956), have proved ideally suited to conditions where supplies of compressed gases are difficult to obtain and where safety and robustness are the principal considerations. They can be used on children above the ages of 3 or 4, but for younger children the resistance and deadspace of the valves are too great. While it is customary to use open drop ether for these patients, there are certain operations, such as repair of cleft lip, for which tracheal intubation is essential. An entrainer (see Diagram) has therefore been developed which blows a stream of gases through the apparatus to vaporize the ether. The resultant mixture is led to a circuit suitable for babies such as Ayre's T-piece. The patient is therefore relieved of the need to draw air through the vaporizer.



The device consists of an injector, driven by compressed air or oxygen, which entrains a flow of air. It delivers a total gas flow of 10 litres a minute against the resistance of an E.M.O. and delivery tubing. Dr. H. G. Epstein, of the Nuffield Department of Anaesthetics, Oxford, has kindly calibrated an E.M.O. vaporizer at various gas flows. He found that with a constant flow of less than 9 litres a minute the ether concentration was rather lower than indicated (in contrast to the intermittent flows for which the vaporizer was designed). The accompanying Table shows that the concentration of ether delivered is still somewhat less than that indicated on the vaporizer dial, but the difference is not great. Since 10 litres a minute is more than double the minute volume of a 4-year-old child this flow will be more than enough to avoid rebreathing when using the usual paediatric breathing circuits.

Concentration (Vol. %) of Ether Delivered by the E.M.O. Vaporizer at 26° C. (Figures Supplied by Dr. H. G. Epstein)

	2%	3%	4%	6%	10%	15%
Constant gas flows:						
7 litres a minute	1·2	1·7	2·3	3·2	6·1	11·9
9 „ „	1·5	2·7	3·5	5·4	9·9	13·8
11 „ „	1·8	3·0	4·2	6·1	9·0	13·7
Intermittent gas flows: 20 breaths a minute, total vol. 9 l./min.	–	–	3·9	5·9	9·9	13·8

Any source of compressed gas (cylinder, pipeline, or compressor) can be used, but a cylinder of oxygen will normally be employed. An ordinary mercury or aneroid manometer is used to measure the driving gas pressure. The flow of gas from the cylinder is adjusted until the manometer reads 100 mm. Hg. At this pressure the entrainer delivers 10 litres a minute. This way of estimating the flow depends on the fact that the rate of flow of a gas through a fixed resistance varies with the driving pressure.

If the flow of gases from the entrainer is occluded the maximum pressure achieved inside it is 15 cm. H_2O. This means that if for any reason gas is prevented from escaping from the breathing circuit the pressure in the apparatus cannot rise higher than 15 cm. H_2O. This pressure is unlikely to cause damage to a patient's air passages.

Artificial ventilation can be carried out by squeezing the reservoir bag of the circuit or by simply occluding the exhaust end of a T-piece. Bag squeezing will cause a reverse flow through the vaporizer and entrainer so that not only will the volume of fresh gases delivered to the patient be reduced but the gases will make more than one passage through the vaporizing chamber, so increasing the ether concentration. For these reasons a non-return valve should be placed between the vaporizer and the breathing circuit. The Oxford inflating bellows can be used for this purpose.

The use of oxygen as the driving gas ensures that the inspired mixture contains an adequate concentration of oxygen. It should be borne in mind that this will render the ether-oxygen mixture detonatable, and full precautions should be taken against explosions. The entrainer has a male taper which fits the air inlet of the vaporizer. When working it makes a low hiss which becomes louder if the outlet is obstructed.

The device has been in use in Cardiff for the past two years and has proved efficient and reliable. Only occasional adjustment of the cylinder valve is needed during anaesthesia. Induction may be carried out by the open drop method or with the entrainer, vaporizer, and a child's breathing circuit with a face-mask. In the case of neonates surface analgesia of the larynx may be used instead. Tracheal intubation is then performed and the apparatus connected and turned on. A vaporizer setting of 5–10% ether is needed for maintenance, but for induction or to deepen anaesthesia this can be increased to 15%.

My thanks are due to Mr. E. K. Hillard, senior technician in this department, and his assistant, Mr. Roy Saunders, for constructing the entrainer, and to Professor W. W. Mushin and Dr. H. G. Epstein for their valuable help and advice.

Further inquiries about the apparatus should be directed to the Longworth Scientific Instrument Co., Radley Road, Abingdon, Berks, the makers of the E.M.O. vaporizer.

REFERENCE

Epstein, H. G., and Macintosh, Sir Robert (1956). *Anaesthesia*, 11, 83.