THE NOVA SCOTIA MEDICAL BULLETIN

Wanted: A Cure for Ambulances

Of all the aspects of the total health care delivery system, one of the most essential and certainly the most neglected is that which deals with the transport of sick and injured patients to the health care facility. In a country like ours, with vast areas which are only sparsely populated, and with relatively few metropolitan centres, there are obvious problems in making an efficient ambulance service available to all. Some provinces, notably Ontario and British Columbia, have made substantial efforts towards the development of an integrated province-wide system. Other provinces, including our own Province of Nova Scotia have made little effort to sort out the appalling muddle and inefficient state of their ambulances, so that it can scarcely be called a service, let alone a system.

In Nova Scotia, ambulances are not a benefit under M.S.I. as they are in Ontario, there is no provincial regulation through licensing or inspection of ambulances or the equipment they carry, and there are no standards of training for drivers and attendants.

Under these circumstances, the type of vehicle, driver and equipment are entirely dependant on the goodwill and public spirit of the individual owner. That the owners are concerned is shown by their formation of an association, which, last year, forced by the sheer economics of maintaining expensive vehicles and drivers on 24-hour stand-by, brought pressure to bear upon the Provincial Government.

Unwilling to become involved in the take-over of such a potentially expensive system, the Provincial Government compromised by subsidizing the cost of each ambulance call, and providing mileage payments. This latter provision has made the long-distance transportation of patients a highly profitable business for the ambulance owner, and has undoubtedly led to the unnecessary use of this method of transportation in many cases where standard methods would have been quicker, safer and less expensive. Such a subsidy tends to entrench and perpetuate the existing deficiencies in services, more especially since the subsidy is only available to members of the association, and some owners have been denied membership in that association.

How have other provinces managed to integrate privately-owned, municipally- or hospital-owned ambulances with those operated by voluntary organizations and government institutions? While government at all levels has been involved eventually, the major stimulus has come from the interest of individuals in their community, and the reports and briefs submitted by many voluntary organizations. Physicians and the provincial medical associations have made an outstanding and continuing contribution in the steps leading up to the enactment of an Ambulance Act.

To fulfill the standards laid down by law for drivers and attendants in Ontario, a number of training courses have been set up. Commenting on this in a recent article, McNally states:

> "The success of our program depends on recognition by the medical profession and hospitals of a need for inclusion in the health team or hospital complement of this very special class of employee.
>
> In terms of cost to the public, it would be much more economical to provide satellite clinics or emergency stations with personnel, vehicles and equipment of an ambulance service than to build small hospitals unable to render the type or scope of care which, of necessity, must be concentrated in the regional centres."[1]

The lesson is clear, that if we are to have an improvement in ambulance services in this province, it is up to every individual physician to become concerned in the quality of the service offered in his area. Through public meetings, through talks to groups and by active cooperation with voluntary organizations such as the St. John Ambulance Society and the Red Cross, physicians must ensure that everyone becomes more knowledgable on the requirements for an effective ambulance service.

We must insist on a recognition that ambulance service cannot be provided on a part-time basis with a converted hearse, but must be provided by vehicles especially designed and equipped for the purpose with crews adequately trained to care for the safety and comfort of their patients. Legislation must be enacted to ensure these standards and to provide the mechanism of dispatch-control at provincial, regional and local levels. Such legislation will only come if we as physicians play our part in shaping it and pressing for its enactment.

We can no longer be content with the present situation, as vividly described in a report on ambulance services by a committee headed by Dr. R. F. Scharf.

> "At present, inadequate vehicles, inadequately equipped, with insufficiently trained attendants in inadequate numbers are dashing about Nova Scotia at times without proper regard for safety, on errands for which they lack proper direction and training."[2]

As physicians, we see the problem: we must learn the remedy and apply it vigorously to restore the ambulance services of this province to health. □

I.E.P.

References

1. **McNally, N. H.**: The Ontario Ambulance Service Program, Part II. *Ontario Medical Review*, June 1970, p. 273.
2. **Scharf, R. F.**: Committee on Ambulance Services. *Victoria General Hospital Medical Staff Reports*, Sept. 1970.

DON'T FORGET:

JUNE 7-11, 1971

CMA ANNUAL MEETING,

HALIFAX, N.S.

WATCH FOR

Special issue of the Bulletin mid-May. Bulletin is combining with Newfoundland Newsletter, and will replace June issue. Designed to interest all doctors attending CMA meeting.

Commentary

Impasse: The Need for Better Hospital - Government Relations

R. K. McGeorge, B.Sc., D.H.A.*

Halifax, N.S.

From time to time it is necessary for one to sit back and reflect on the conglomerate hospital and health care delivery system. What are the problems and how can they be resolved?

Many problems exist and one would be extremely naive not to recognize them. The recent Task Force Reports on the Cost of Health Services revealed more than 100 substantial "systemic" problems. Accreditation surveys (initiated by the medical profession in 1918) also point to hospital problems on an individual hospital basis.

It is a more subtle problem with which this writing deals.

We are told by governments – by the Nova Scotia Hospital Insurance Commission in this province – to hold the line on expenditures; to control, yea, even to reduce costs; and to control utilization. Everyone knows that the bill to a large extent is ultimately met by the taxpayer and of us would like to see taxes reduced, or at least contained. But the problem is not quite as simple as governments make it appear. Administrators receive directives which intimate that by some simple form of action, costs will be contained. But what these directives seem to disregard is that the progressive administrator is growth-oriented. He seeks to obtain as much money for his institution as his shrewdness allows him. He is institutionally-oriented to a large extent, and it is not philosophically possible to be primarily health system-oriented, for no incentives exist which make system-orientation desirable. Furthermore, the administrator in 1971 is faced with demands for a wider variety of services, many of these *new* services. The administrator must consider:

i. Is the new service necessary?

ii. Is projected volume sufficient to establish a formalized program?

iii. If finances were obtainable, could the necessary facilities and staff be provided?

If a positive answer is indicated, the administrator must then obtain funds from one source or another. In such a quest, no progressive administrator would turn down the development of a necessary service if finances can be obtained. We tend to be positive in approach: not to be empire builders, but to provide comprehensive community services effectively.

Governments, on the other hand, often seem typically inflexible and bound to regulations, seldom bowing to subjective judgement.

The impasse is encountered, then, when one thinks in terms of philosophy.

Are health and allied services to be developed in order to achieve levels of effectiveness? Or are we to provide to our citizens a smattering of unrelated, incongrous services in which continuity of care and responsibility is conspicuous by absence? Because costs were low in 1959, do we use that as the benchmark for measuring cost increases? It should be noted that the basic reasons costs were so low in 1959 were:

i. Health profession salaries were immorally low, and

ii. Health care needs were not being met.

Health service costs have risen 5-fold in 12 years. However, anyone who purports to compare 1959 levels of inefficiency with 1970 levels of relative efficiency would need to reflect either deity or satanic powers: no rational thinking man could do so.

Patients now demand a wide variety of investigation, and services which are obviously in their best interest. Hospitals are pressured by patients to provide these expensive services, and the public demand is justified because the legislation promises them hospital service. Furthermore the public concept of hospital service is much broader than it was when the legislation was introduced. Hospitals feel a moral obligation to meet the demands on these services. Hospitals have substantial reason to question governments' knowledge of the basic requirements of providing good patient care in 1971.

To resolve the difficulties created by the Impasse, positive action is required along the following lines:

i. Complete and total honesty in communicating health care economics to the public in order to alter patterns of demand.

ii. Re-structuring of the groups and/or agencies which advise governments on health care matters.

iii. Closer liaison between the paying agencies with
  a) Hospitals
  b) The public (i.e. consumers).

Unless the impasse is soon resolved the health care system is doomed for utter chaos and total ineffectiveness. Hospitals have attempted to bridge the gap; let us hope that positive action will assume a bilateral posture: all in the best interests of the patients we serve. □

*Acting Administrator, Izaak Walton Killam Hospital for Children, Halifax, N.S., and Chairman, Halifax Regional Group, Nova Scotia Hospital Association.

The St. John Ambulance

J. H. Haldane, M.D., F.R.C.P.(C)*

Halifax, N.S.

Pro fide. Pro utilitate hominum.

Many people are familiar with the uniform of the St. John Ambulance Brigade and can recognise its members on First Aid duty at public gatherings, but few are aware of the centuries of history and the great tradition of service that lie behind this organization, founded by the Order of St. John in 1887.

The history of the Order of St. John can be traced back to A.D. 600 when Abbot Probus was asked by Pope Gregory the Great to set up a hostel for pilgrims in the Holy City of Jerusalem. The work was carried on until the hostel was destroyed in 1000 A.D. Some years later, the merchants of Amalfi, a small republic on the Italian coast south of Naples, bought the site of the hostel and built a church and a hospital for Christian pilgrims. The Benedictine monks who worked in the hospital adopted the eight-pointed white cross, the badge of the Republic of Amalfi, and founded the Order of Hospitallers. They acquired the ancient monastery of St. John the Baptist and in consequence, St. John became the patron saint of the Order. Fortresses were built in the main cities of Palestine, and for two hundred years the Knights of the Order of St. John continued to fight for the Christian faith and to care for the sick and the poor. They were driven out of Palestine about the end of the 13th century, but continued their work briefly in Cyprus, for 200 years in Rhodes and for 300 years in Malta, where they finally surrendered to Napoleon in 1798.

The Order of St. John, which had been international in membership, was revived in England in 1831 and from that time on was an independent national body, free to develop its own policy. The work of Florence Nightingale for the sick and wounded in the Crimean War stimulated interest in First Aid, and soon its importance in peace time was recognised. To meet this need, the Order of St. John established three Foundations: the St. John Ambulance Association in 1877, the Ophthalmic Hospital in Jerusalem in 1882 and the St. John Ambulance Brigade in 1887.

The St. John Ambulance Association is the public training division of the Order. Thousands of doctors and registered nurses are on its rolls as well as thousands of lay instructors. Any person can receive training e.g. industrial employees, civil servants at all levels of government, school children or Youth organizations. Certificates and awards are issued to candidates who complete their training course successfully. In 1969, the Association trained 140,000 people in First Aid, Home Nursing and Child Care, and a further 200,000 in the application of artificial respiration. Courses in three levels of First Aid are available: an Emergency First Aid course of eight hours, a Standard course of sixteen hours covering the essentials to deal with most First Aid situations, and Advanced courses which teach the use of special equipment and techniques. This last is designed especially for persons with a supervisory responsibility in Industrial First Aid and includes instruction in external cardiac massage and oxygen therapy. Ski patrols and snowmobilers have specialized instructors.

The St. John Ambulance Brigade is the uniformed branch of the Order, with Divisions in many parts of the world, including Canada, Australia, New Zealand, India and Africa. The men, women and children who form the Ambulance, Nursing and Cadet Divisions, provide a properly trained body of volunteers to render First Aid to the sick and injured at public gatherings ranging from cinemas and theatres, team games and sports meetings, to great national events such as Expo 67. Members work voluntarily in hospitals and old people's homes, provide and staff roadside and beach First Aid posts, accompany sick and injured to hospital, and in some communities maintain the local ambulance service. Every year the nursing cadets supply hundreds of recruits to the nursing profession.

The Ophthalmic Hospital was built in Jerusalem to carry on the traditional role of the Order of service to mankind in the Holy City, and to care for the thousands who suffer from trachoma, an eye disease which causes severe incapacity and sometimes complete blindness. It has continued its work in spite of many difficulties imposed by the Arab-Israeli war, and in 1969 treated 183,000 out-patients, as well as the in-patient load.

The humanitarian effects of the services of St. John Ambulance are apparent to all who have encountered accidents or illness, but the economic significance of these services is seldom recognized. The Industrial Accident Prevention Association estimated in 1969 that the cost to Canada of industrial accidents alone approximated $850,000,000 a year, and is rapidly rising. Surveys in the construction industry indicated that a 20% reduction in the accident rate would double net profits. There are 14-15,000 hospital beds in Canada occupied by accident victims in every 24 hours of every day of the year, with an average bed maintenance cost of $60 per day.

Research by Workmen's Compensation Boards and Safety Organizations shows increasingly that people trained in First Aid are more conscious of accident causes and therefore less accident prone. Recent evidence indicates that accident rates are being cut by 40-50% in factories manned by a high proportion of workers trained in First Aid. The St. John Ambulance, assisted by the Workmen's

(continued on page 38)

*Provincial Commissioner, St. John Ambulance Brigade.

Your Ambulance Service in Nova Scotia

R. F. Scharf, M.D., C.M., F.R.C.S.(C),*

Halifax, N.S.

As physicians, we should be proud of the great advances in treatment of the sick and injured. While we were rightly occupied with treatment, other dedicated individuals and organizations established ambulance services to utilize available medical and paramedical facilities. Perhaps it is now time for those of us in the medical profession to assume part of the direction and supervision of this effort.

For ambulance services in many areas of North America, the physical requirements and attendant training are agreed to be seriously defective. Summoning the vehicles to the place of need for example, is sometimes difficult, legislation dealing with the use of ambulances and traffic by-laws is sometimes deficient, and financial support is often insufficient, at times being biased by the attitude of those who supply it.

Basic Requirements

However, let us not waste time examining the present system. Let us rather propose that we have a duty to see that all the sick or injured are brought to the best sources of medical aid within our professional, civic, and financial means. Let us consider, too, what we know of our local area, and what we, ourselves, or our local medical organization, should be doing about the following requirements:

i. Each normal ambulance should be capable of carrying a minimum of two patients.

ii. In each there should be sufficient room so that one or more persons can stand and aid the sick or injured during transit.

iii. The length of the passenger component should be adequate, allowing person up to 76" height with a Thomas splint or continuous neck traction to fit inside.

iv. The patient areas should allow variable elevation of the head and chest, for asthmatic and cardiac cases.

v. Lights that give light, heaters that work, and adequate oxygen supplies are taken for granted.

vi. Mechanically, the vehicle should be of standard North American base, so that ordinary maintenance can be done by our available routine automotive outlets.

vii. The ambulance must be capable of observing the local speed limits in ideal road conditions; however, with our roads, it must have considerably more road clearance than our average hearse or stationwagon.

viii. The vehicle must contain reliable radio communication, either to one certain base at all times, or, in transit, to the frequencies of reliable Community Aid Services. We need reliable communications to accelerate transit and to select and organize care at the receiving facility.

Equipment in fact is often lacking. A recent American survey revealed that only seven out of a hundred ambulance services met minimal acceptable standards.[1] One-half of them lacked adequate splints. One-half lacked adequate material with which to stop bleeding. Only one-quarter had oropharyngeal airways, over two-thirds had no airway suction device, while in one-quarter there was no adequate equipment with which to assist or aid respiration or to manage airway obstruction.

Research on specially equipped pediatric and cardiac care vehicles is being done. However, these are expensive and probably we have too much to do in obtaining minimally acceptable standards, to plan immediate utilization of these modifications.

As to **personnel,** drivers should have the defensive driving course, and a brief but comprehensive First Aid course. They should be familiar with radio equipment and with the mechanical routine care of the vehicles.

Each emergency attendant should have an adequate income and pension plan, and his hours should not be excessive. His instruction must be updated with refresher courses and demonstrations of new methods. Progressive American centres picture him being useful to the same degree as medical corpsmen in combat areas, capable of such procedures as tracheostomy, defibrillation, and external cardiac massage, either by independent action or guided by a physician through radio control.

Regarding **logistics,** we need a central summoning service for ambulance control, at least for each county, with a standard, simple phone number, identical in all provinces. Those who dispatch ambulances must have a medical knowledge derived from an instuctional course. Ambulances should have maps, colour-coded by various types of emergency case, indicating just which hospital should receive a specific individual. For example, should an ambulance in New Ross go to Kentville or directly to Halifax, and with just what type of problem?

In areas with hospitals which provide essentially similar services have we a schedule of receiving days for ambulances? Have we a way of indicating that one hospital is too busy to receive at present? Or, have we a clear division of special problems for specific institutions?

A word on ambulances and **traffic.** Our present automobiles have so much noise from engines, heaters, radios, and especially pre-recorded music, that we are often unable to hear sirens. Our city areas have too many built-up corners to permit us to see lights adequately. To ensure the safety of the greatest number, all ambulances should obey all traffic rules, unless special arrangements are made in

*Director of Emergency Department, Victoria General Hospital, Halifax, Nova Scotia.

consultation with traffic authorities for specific traffic problems, like ferries, rotaries and bridges. It is to be noted that even helicopters, in civilian medical use, only average forty miles per hour ground transport distance equivalent, from the moment of call to delivery of patient to treatment facility.

A Need for Questions

One could continue further, but this should suffice. The question, in essence, is this: do we, as doctors, know about our local ambulance service? More specifically, we must ask ourselves:

- Do we know the reliability of the local ambulance, and the equipment it contains?
- Who, from each district hospital or branch Medical Society, is responsible for the supervision of attendant training?
- Is communication adequate?
- If someone medical does not know, when will such a person be appointed by the local branch?
- Finally, if we do not assume responsibility, are we prepared to take our orders on essentially our own task, from some lay organization, which attempts some of our duties by default? □

Reference

1. **Yarbrough, D. R., and Rittenbury, M. S.:** Failure in Phase 1 of the management of the injured. The inadequacy of ambulance services. *J. Trauma* **10:** 1172, 1970.

The St. John Ambulance *(continued from page 36)*

Compensation Board, is carrying out a research project in Orillia, Ontario, to train every adult in the town in First Aid. The future accident rate will be compared with that of previous years. If the theory proves correct that First Aid knowledge decreases accident proneness, increased training will not only reduce industrial accidents, but should be an important step in reducing the accident and fatality rates on the highways.

The St. John Ambulance will continue to teach that accident prevention is the best First Aid practice. As Sir Winston Churchill said, "Eternal vigilance is the price of safety." □

The Demand for Emergency Services: A Study from the Victoria General Hospital

Mary L. Chipman, B.A., M.Sc.*
Halifax, N.S.

In the provision of sophisticated medical care the hospital's Emergency Department plays an essential role. Studies of the patterns of use in emergency services of large referral hospitals in North America have provided valuable information on patterns of medical care and on the medical needs of the population served by the emergency department. Such a study, has recently been carried out in the Emergency Department of the Victoria General Hospital in Halifax.[1] This study is summarized in the present paper.

The major objective of this study was to examine the need for and use of emergency medical care in Halifax and the surrounding area, by examining the characteristics of patients using the service, the areas from which they came, and the influence of medical services insurance on the demand for emergency medical care. It was hoped that the findings of such a study would aid in the planning of health services in this area of Nova Scotia.

A sample of records from the Emergency Department register, for two six-month periods from April 1 to October 1 of 1968 and 1969, respectively, was abstracted so that information on a total of 1304 patient visits was available for analysis.

General Patient Characteristics

More than half the visits were by persons under 35 years of age, and two-thirds were by males. The 17 main diagnostic categories of the International Classification of Diseases were used to characterize the preliminary diagnosis associated with each visit; over 60% of visits were in the single category "Accidents, poisonings, and violence". 10% of all visits were referrals by private doctors, 11% of visits involved the use of an ambulance, and 80% were treated in the emergency department and discharged. These facts provide strong evidence of the use of this service as a source of primary medical care, regardless of any immediate or urgent need for medical attention.

Characteristics of Specific Groups

A comparison between referred and non-referred visits to the Emergency Department revealed that females were more likely to be referred, that referral patients were older than non-referrals, and that referral patients included a higher proportion of people with "defined complaints". Not surprisingly, a much higher proportion of the non-referred patients had experienced an accident, poisoning or violence. Referred patients were much more likely to be admitted, although differences in ambulance use between referred and non-referred patients were equivocal. Additional findings resulted from a comparison of those using an ambulance with those not using an ambulance. The former were older, more likely to have a defined complaint, and more likely to be admitted.

These three characteristics, referral, ambulance use, and admission to hospital, are closely related to one another, and reflect the traditional purpose of emergency facilities in the hospital: to provide care for the severely ill and those requiring immediate attention.

Regional Characteristics

The pattern of utilization in different areas of Halifax and Dartmouth and the surrounding region was studied by taking the home address, recorded for each patient visiting the Emergency Department. The socio-economic status of each area, derived from census data, and the family physician-population ratio were correlated with the utilization rates. In general, these rates were inversely related to travel time and distance from the hospital, with the poorer areas along the harbour front contributing as many as 21 visits for every 100 people during a 6-month period. When distance was taken into account there was a general trend for the higher utilization rates to occur in areas of low socio-economic status.

The utilization pattern of the Halifax West and suburban region provides a notable exception; here there were positive associations between the utilization rates and both socio-economic status and family physician rates. Furthermore, one area, Rockingham, although some distance from the hospital, had one of the highest of all utilization rates. A possible explanation for this is that in such a rapidly expanding area, with its new and mobile population, relatively few family physicians, and the lack of any nearby emergency facility, no alternative source of health care is readily available to residents.

*Lecturer, Department of Preventive Medicine, Dalhousie University, Halifax, N.S.

1. This study is reported in full as a book, "Use of the Emergency Department, Victoria General Hospital, Halifax, N.S.". by Stewart, M., Robertson, W. B. C., Chipman, M. L., and Gordon, P. C., January 1971. Copies are available upon request to the Department of Preventive Medicine, Dalhousie University, Halifax, N.S.

Dartmouth, like Rockingham, is also growing rapidly and is relatively distant from the hospital. In contrast with Rockingham, it has low utilization rates; patients from Dartmouth are less likely to use the Emergency Department as a source of primary medical care, as evidenced by a high proportion of referrals, ambulance users, and hospital admissions among the visits recorded. One possible explanation of this difference between Dartmouth and Rockingham is that Dartmouth has a small emergency facility, which may result in a more appropriate use of the more extensive services available at the Victoria General Hospital.

Conclusions

It is believed that these findings provide information essential for the planning of optimal health services in the Halifax-Dartmouth metropolitan area. Six factors are considered to be of particular relevance:

i. the extensive demand for *primary medical care,* especially in the lower socio-economic group;

ii. the high utilization of services by Rockingham, despite its remoteness from the hospital;

iii. the trend to high utilization in areas close to the hospital and lower utilization in more remote areas;

iv. the trend to high utilization in areas of low socio-economic status when distance from the hospital is taken into account;

v. the lack of association between utilization and the availability of family-physicians in most areas;

vi. the lack of change in patterns of use shortly before and immediately after the introduction of comprehensive medical insurance; in fact, there was a significant increase in use by patients from Halifax North.

These conclusions imply an increasing demand for diagnostic and treatment services that do not require in-hospital care. The study presented a choice of alternatives to meet this demand: *either* to provide diagnostic and treatment facilities for ambulatory patients in the areas of greatest need (Rockingham and Halifax North, say) *or* to provide a second major emergency department in an expanded hospital complex, such as that considered for Camp Hill Hospital. Whichever option is chosen, the resulting facilities must be coordinated with other elements in a health care delivery system for this area of Nova Scotia and by extension for the rest of the province. □

Everyman's Guide to Blood Component Therapy

M. Gorelick, M.D.*

Halifax, N.S.

With the ever increasing requirements for blood and blood components, the resources of the Red Cross Blood Donor Panels are strained to near breaking point. The practising physicians of Nova Scotia bear the responsibility for the most economical and appropriate utilization of the variety of blood components made available by the Canadian Red Cross Blood Transfusion Service. Transfusion should be undertaken only after careful assessment of the patient's clinical condition to determine the *need* for transfusion and the *nature* and *quantity* of the blood components to be transfused. For ready reference, a schedule of these products and the indications for their use has been prepared.

BLOOD COMPONENT THERAPY

Whole Blood is primarily indicated to replace simultaneous loss of both red blood cells and plasma. It should be given to patients who are suffering from acute loss of whole blood or conditions associated with intractable bleeding. Whole blood is less suitable than plasma for the treatment of shock which is not associated with hemorrhage. Whole blood is considered less suitable than the administration of concentrated red-cell suspensions for the management of anemia associated with a normal plasma volume. In such cases, whole blood may cause an overload of the circulation, especially in infants, debilitated patients and those with cardio-renal disease. In the management of shock that accompanies severe burns, early replacement of fluids, electrolytes and plasma should take precedence over the use of whole blood during the first 48 hours to avoid hemoconcentration.

Stored Whole Blood collected in Acid-Citrate-Dextrose and stored at 4° C. for up to 21 days is satisfactory for most cases requiring whole blood. When blood stored under such conditions is transfused, 70% to 80% of the red cells remain viable for at least five days in the circulation of the recipient.

Fresh Whole Blood used within 24 to 48 hours of collection provides certain labile coagulation factors absent in stored blood and is indicated in selected cases. Massive transfusion of stored blood (more than 8 units of blood in less than 12 hours) may cause depletion of various coagulation factors. In these cases, and in patients with proven coagulation disorders, fresh blood may be required.

Concentrated Red-Cell Suspensions minimize the chance of circulatory overload, and the possibility that plasma proteins and isoagglutinins may have metabolic effects on the recipient; the risk of hepatitis may also be reduced. The main indication for concentrated red cells is in the treatment of anemia, in the presence of, or following the restoration of, normal plasma volume. Any patient in whom erythropoiesis is impaired, and all debilitated patients, should receive blood less than five days old so that red cell survival may be maximal. In all other cases, the cells may be up to 21 days old. The use of packed cells rather than whole blood releases more plasma for preparation of fresh frozen plasma and plasma fractions. It has been suggested that the proportion of packed red blood cell transfusions used could well serve as an index for estimating the quality of medical practice.

Platelet Transfusions: The essential aim in transfusing platelets is to tide the patient over a crisis, either by controlling or preventing serious hemorrhage. Frequent transfusions are needed because the half-life of platelets in thrombocytopenic patients is no more than 24 to 48 hours. Therapy may take the form of **platelet-rich blood, platelet-rich plasma (PRP)** or **platelet concentrates (PC)** administered three times weekly. The effectiveness of platelet transfusions is determined to a very large extent by the interval of time elapsing between the drawing of the blood from the donor and its administration to the recipient. Techniques for platelet storage are presently being conducted but are not as yet available for general use. The size of an effective dose of platelet concentrate will depend upon the underlying cause of the thrombocytopenia; in an adult it may be in the region of five units. The effectiveness of platelet transfusion is diminished *i)* during acute hemorrhage; *ii)* when there are transfusion reactions; *iii)* in the presence of marked splenomegaly; *iv)* in idiopathic thrombocytopenic purpura, and *v)* when platelet antibodies are formed after multiple platelet transfusions.

Buffy Coat-Poor Cells: Non-hemolytic febrile reactions occur in 1% to 2% of recipients of blood transfusions. In many of these cases, leukocyte agglutinins are responsible for the reaction; in other cases, platelet or plasma protein incompatibilities may be the cause. Buffy-Coat-Poor blood contains markedly reduced numbers of leukocytes and platelets as well as little plasma. Transfusions of such blood to patients who have consistently shown a severe and typical febrile response to whole blood transfusions usually results in a marked reduction or complete absence of such symptoms.

Fresh Frozen Plasma (FFP) is prepared by removing plasma from fresh blood and freezing it at – 20° C. to preserve labile coagulation factors. FFP is used in treatment of hemophilia B (Christmas disease) and, rarely, other patients with bleeding due to proven coagulation defects. It is also used in the treatment of burns. FFP must be transfused as quickly as possible after thawing and cannot be refrozen.

*Medical Director, Canadian Red Cross Blood Transfusion Service, Halifax Depot.

Cryoprecipitated Factor VIII is the treatment of choice for Factor VIII deficiency. Random donations contain a variable quantity of Factor VIII owing to the wide range of normal values; the treatment dose cannot, therefore, be entirely accurately estimated and reliance must be placed on frequent *in vivo* assays. It should be infused immediately after thawing.

Plasma Protein Fractions (prepared by Connaught Medical Research Laboratories): Pools of plasma are sent to the Connaught Laboratories for fractionation. From three litres of plasma, obtained from about 16 blood donations, the following products can be prepared: 12 vials of Human Normal Immunoglobulin, 2 vials of Human Albumin and 3 vials of Human Fibrinogen.

Human Normal Immunoglobulin: This is the term adopted by the World Health Organization for the product previously known as gamma globulin. It is supplied in 5 ml. vials as a 160 mg. per ml. solution, with a shelf life of 5 years at 4° C. It consists almost entirely of IgG; only variable, small quantities of IgA and IgN are present. This concentrated solution of antibody globulins is principally used in the prevention or modification of many viral diseases and of severe bacterial infections; it is also used for the prevention of serum hepatitis following transfusion in high risk cases. Immunoglobulins are also used in the treatment of antibody deficiency syndromes and as supportive therapy following severe burns.

Human Immunoglobulin Anti-Rh is used in the prevention of Rh sensitization of Rh-negative women.

Human Albumin is supplied in 50 and 100 ml. vials as a 25% solution, each vial containing the osmotic equivalent of 250 or 500 ml. of plasma. The biological half-life is 11 to 26 days, the shelf life 5 years at 4° C. The main uses are in the treatment of shock as replacement therapy after severe burns and in exchange transfusions to newborn infants to assist in binding unconjugated birirubin. As supplies are very limited, it is impossible to supply albumin on a long-term basis for patients with chronic hypoalbuminemia.

Human Fibrinogen is supplied in a freeze-dried form to be reconstituted with 100 ml. of sterile distilled water. The shelf life is 5 years at 4° C. It is administered intravenously for hypofibrinogenemia and in the treatment of the Defibrination syndrome. This product must be considered icterogenic, but no more than 1% of recipients develop hepatitis.

Selection of Blood Donors:
(on following page for easier removal)

SELECTION OF BLOOD DONORS

Physicians also play a key role in advising patients as to their suitability as blood donors. The careful selection of blood donors is important for two reasons: 1) the actual donation must not be detrimental to the donor's health, 2) the donor must be free from any disease transmissible by the transfusion of blood or blood products. For the guidance of physicians, the Red Cross Requirements for Blood Donors are published below;

GENERAL REQUIREMENTS

Age: Between 18 and 65. Between the ages of 17 and 18, male donors may be accepted if they can produce written authorization from their parents. 18 year-old females should not donate blood more than once before their 19th birthday.

Interval Between Donations: Donations should not be given more frequently than once in every three months.

Haemoglobin: A haemoglobin level of at least 12.5 g per 100 ml. for both sexes.

Malaria: Donations for plasma only are acceptable from persons with a history of malaria.

Jaundice: As the causative organism for Homologous Serum Jaundice has not, as yet, been isolated, patients who may have suffered from Infectious Hepatitis cannot be accepted. This is expressly forbidden by regulations under the Food and Drug Act of Canada; household contacts of Infectious Hepatitis should be deferred for a period of six months.

OTHER CAUSES FOR EXCLUSION

1) Any chronic illness such as tuberculosis, rheumatic fever or kidney disease; other prolonged or intermittent fever such as undulant fever, within the past two years. Persons who have had infectious mononucleosis may be accepted as soon as they are free from all signs and symptoms of the disease.
2) Confirmed cardiovascular disease; this includes persons suffering from hypertension.
3) Generally, donors should not be accepted if they have been hospitalized or undergone surgery in the past six months or if they have had an illness requiring a physician's care within three months. This is a broad category and discretion is allowed on a physician's advice.
4) During pregnancy and for six months after delivery. However, this period may be shortened if it is for provision of antisera, either by regular donation or by plasmapheresis.
5) Active allergy, such as asthma, hay fever and hives, is a cause for disqualification; inoculations for such conditions are generally a bar to donation for 7 days after the last injection.
6) Immunization procedures for typhoid, typhus, cholera, tetanus, smallpox or yellow fever should be considered a cause for exclusion for one week only, provided the reaction has subsided. The recent administration of oral or parenteral poliomeylitis vaccine does not disbar a donor. None of the foregoing inoculations prohibit plasmapheresis for the purpose of producing specific human antisera.
7) Persons in occupations hazardous to themselves or others should be deferred if they must return to work within 8 hours.
8) Upper respiratory infections and other infections requiring antibiotics should be deferred for at least one week. This applies also to dental extractions.
9) Because of questionable long-term prognosis, donors with polycythemia rubra vera are not acceptable.
10) Donors who have had scheduled drugs prescribed are not normally accepted for a period of three weeks following medication; this applies in particular to anti-hypertensive agents, steroids and agents acting upon the central or autonomic nervous systems.
11) Birth control pills, mild tranquilizers, maintenance doses of thyroid and non-prescription drugs are generally not a bar to donations.
12) Persons using psychedelic drugs should be deferred for a period of 72 hours.
13) Donations for therapeutic reasons are not accepted. □

2. The Computer in Medicine: A Tool for the Future

David Mutch, B.Eng., M.E.,*
Winnipeg, Manitoba,
and
D. A. E. Shephard, M.D., C.R.C.P.(C),**
Halifax, Nova Scotia.

"Computers with all their implications in terms of equipment, procedures and ways of thinking, will play too large a part in the work of doctors in the future to be left entirely to the expert; every doctor should at least learn to understand their basic principles and potentialities."
– Report of Royal Commission on Medical Education, U.K., 1968.[1]

INTRODUCTION

The development of the computer starting in 1946 must be regarded as a major step in the progress of mankind. Few aspects of technology are growing more rapidly, are wider ranging in overall influence, and are more significant for man's evolution than the emergence of the computer. So rapidly has it developed that as recently as 1951 there was only one computer in general use on the entire North American continent: today, the medical school of Dalhousie University alone possesses one for its needs. As to its influence, the computer has been called "the most versatile machine ever invented".[2] And its potential significance lies in the fact that man has thereby advanced one fundamental step beyond developing tools such as the lever, the wheel, and the internal combustion engine, which augment his muscular capability; rather, the computer enhances man's very intelligence, and thus for the first time, his cerebral capacity is augmented. As the new millennium approaches, it will in fact be unintelligent not to use such a remarkable machine.

A cerebral servant to man, the computer has inestimable value for medicine, as for many other fields of human endeavour. Its efficiency as a machine and its mathematical logic and ability to manipulate large amounts of data obviously make it useful, for example, in medical research: indeed, computer science may well be the fastest growing edge of medical research. Clinical practice, medical education and hospital administration are other areas of medicine which are being greatly influenced by the computer. Significant as these aspects are, there is one aspect of the computer which must be emphasized. In Schwartz's words, this is:

> "the possibility that the computer as an intellectual tool can reshape the present system of health care, fundamentally alter the role of the physician, and profoundly change the nature of medical manpower recruitment and medical education – in short, the possibility that the health-care system by the year 2000 will be basically different from what it is today."[3]

The computer essentially offers a promise of change in our approach to health care delivery at a time when the medical profession is adjusting to the explosive growth of medical information on one hand and fundamental problems like an acute shortage of manpower, rising health care costs, and a broadening political commitment to general health care on the other. In the context of medicine for the new millennium, then, the computer is an appropriate subject for discussion.

SOME ASPECTS OF THE COMPUTER AS A CLINICAL TOOL

1. The Digital Computer

The digital computer is a machine capable of manipulating, storing, and retrieving large quantities of information of data. Data are processed logically, rapidly, and accurately. But to say that the computer is intelligent or stupid is to miss the point: a computer does what it is told, as does any other machine. Furthermore, being a machine, the computer can accept data only if these are presented in a highly structured format. This is a characteristic relevant to medicine. For example, when a patient enters a consulting room, the clinician subconsciously senses many qualities and physical quantities; the computer, of course, senses nothing. This is the fundamental difference between the human and the computer as a data processor. The computer can operate effectively only if data are fed to it in an acceptable format, albeit in esoteric language, and if it has been properly programmed. In general, then, a computer is supplied data and a program; when the start button is pressed, the programmed procedure simply begins

*Harco Electronics Ltd., Winnipeg, Man.; formerly Biomedical Engineer, Izaak Walton Killam Hospital for Children, Grace Maternity Hospital, and Halifax Infirmary, Halifax, N.S.
**Departments of Anaesthesia, Izaak Walton Killam Hospital, and Dalhousie University, Halifax, N.S.

to operate on the data, giving rise to an action which is dependent entirely on the data and the procedure. The operation may be termed a *data procedure.*

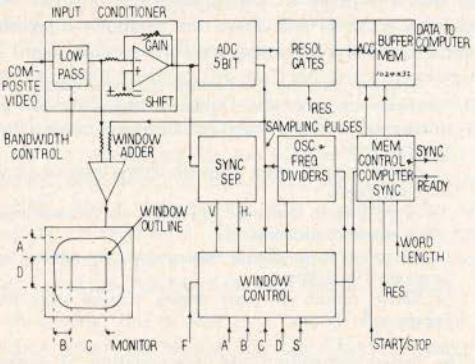


FIGURE 1

Block diagram for device to convert cineangiograms into data recognizable by a digital computer. (After Winter and Dinn[4])

Examples of data procedures have been given by Winter and Dinn,[4] and by Mutch.[5] Fig. 1 is a diagram of one such procedure. A video conversion system converts cineangiographic information into sampled video matrix, which is stored on computer magnetic tape. By this procedure the form of the video information is changed from analog data into digital data suitable for computer processing. The simple basis of analog-to-digital (A/D) conversion is illustrated in Fig. 2.

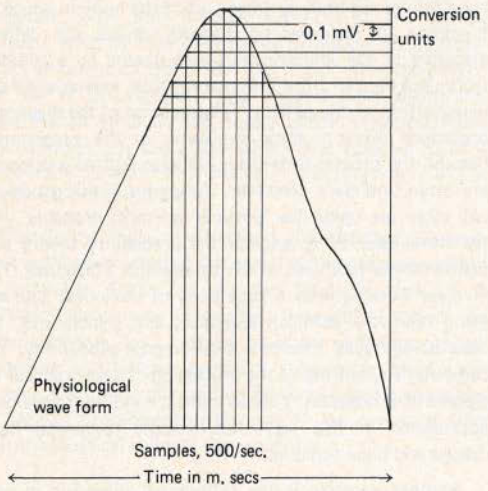


FIGURE 2

Basis of analog-to-digital conversion.

Voltage is sampled 500 times or more each second, so that pattern of wave can be analyzed digitally.

The digital information obtained from conversion can be used in various image processing systems. An example of such a system is non-linear enhancement. The non-linear system, showed in Fig. 3, is designed in the case of the cineangiograph to emphasize the major boundaries (that is, the heart boundary), so that the boundary in the output data is more obvious to an observer.

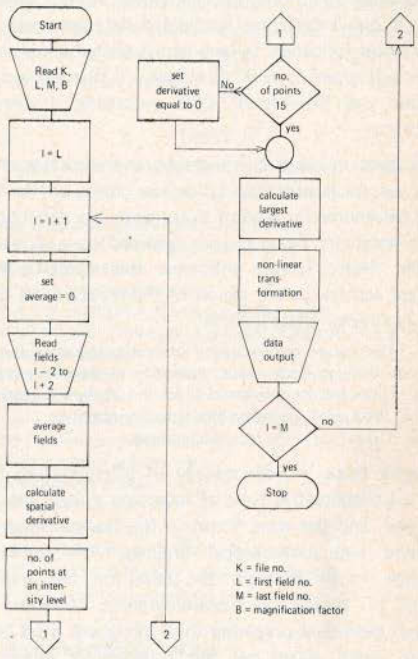


FIGURE 3

Block diagram for a computer program designed to change a video image with emphasis on certain features.

The digital computer is one of two types of computer, digital and analog. The latter works with the actual signal (no digitizing, that is, no numerical data are dealt with), and is extremely limited in its applications. For example, an analog computer works without the benefit of permanent storage, convenient input and output of information, and has only real time applications. A digital computer, in contrast, can have a variety of convenient input and output devices, a permanent memory, and it can perform a variety of functions, in real time or otherwise.

The characteristics of the computer are worth emphasizing. These are "its need for quantified information, its elementary vocabulary and its great speed, repeatable accuracy and versatility in control.[6] "Contrast these with man, who has "superb communication by speech, vision

and touch, an enormous vocabulary, ability to analyze qualitative information, and great adaptability, but he is very prone to error, slowness, fatigue and inaccuracy in exact repetition".[6] Herein are some of the advantages and limitations of the computer.

2. Data Processing

The computer characteristically processes information, whether this relates to words, numbers or patterns. The interpretation of information contained in electromedical signals is one area where automated data processing will have a major influence. In fact, computerized processing of electrocardiograms is with us already. A discussion of the problems and benefits of ECG processing is therefore appropriate.

The basis of electrocardiography is a recording of the heart's electrical potential at various points on the body with a galvanometric type of instrument, the deflection of the galvanometer being usually recorded by a strip chart recorder. Many factors influence the transmission of electrical activity in the region of the myocardium to the actual recording. These include:

i. Attenuation and frequency limitation inherent in transmission through body tissue, especially at the skin-electrode;
ii. Noise and other artefacts which distort the wave form;
iii. Frequency limitation of electronic apparatus;
iv. Distortion in the recording process.

Despite these, a methodology of interpretation based upon a galvanometric type of recording system has been developed, and the wave forms in the tracings have been correlated with pathological findings. Any automated procedure must therefore be based on the empirical findings of clinical electrocardiography. Moreover, the principal individual preparing these programs must be the clinician, who must tell the programmer where the diagnostic information lies within the ECG complex. Once criteria have been established, the computer can be programmed for objective analysis of wave forms without human variation, and new criteria can be tested.

Caceres and Rikli have discussed basic aspects of automated ECG processing procedures.[7] An essential step is A/D conversion. Amplitude, duration and slope form the basis of pattern recognition; data points along an ECG curve can be plotted by the computer and translated into digital form (as illustrated in Fig. 2). Conventional criteria were used initially for definition of wave onset, wave peak, wave termination, significant voltage fluctuations and time intervals in the ECGs. In order to obtain a constant point of reference, the first time derivative of the was used. The greatest rate of change occurs during ventricular depolarization; thus single heart beats can be isolated, and this also ensures that small amplitude QRS waves are not missed or confused with other waves. With the location of the QRS complex, the task of locating other waves in the ECG becomes easier.

In this way, the prototype of a system capable of automatically recognizing and measuring ECG parameters was developed.

The accuracy of computer programs for ECG analysis is unquestionable. Both 12-lead scalar ECGs and vector cardiograms are suited to computer interpretation. The field is steadily evolving and within a short time it is likely that the advantages of computer-assisted analysis over traditional methods will make the computer a valuable medical tool. These advantages are worth enumerating:

i. Accuracy, rapidity, and consistency, unattainable by the physician-interpreter, who is subject to fatigue, boredom, and inaccuracy, especially when large numbers of interpretations must be made;
ii. Development of better diagnostic criteria based on a larger volume of data;
iii. Long-distance diagnostic processing via common voice-grade telephone networks;
iv. Contribution to clinical research by easy retrieval and analysis of ECG data;
v. Better control of heart disease through mass ECG screening.[8]

The actual recognition and interpretation of patterns such as those in the ECG and the collection of data is only part of the subject of data processing, in whatever field this operates. The ability of the computer to deal with large bodies of data rapidly can be utilized efficiently only if data can also be stored for future retrieval; also, the reduction of cumbersome bodies of data to manageable amounts without sacrifice of significant quality is important in computer technology. *Data storage, retrieval* and *reduction* are therefore essential characteristics of the computer as a medical aid.

3. Automated Diagnosis

It is a short step from accurate processing of data to the interpretation of data, or the diagnosis of disease. McGirr has defined disease as an absence of ease or comfort, a condition of the body or some part of the body in which its functions are disturbed or changed; he has also defined diagnosis as the identification of a disease by a clinician from data derived from the interrogation, examination and investigation of the patient.[9] Automation of the diagnostic procedure presents some problems to the programmer because the process by which a clinician reaches a diagnosis are often unknown. However, during his interrogation, he will often use terms like 'possible' or 'most probable'. It is therefore essential to explore the probability theory as a mathematical tool with which to establish a diagnosis. This involves working with a large body of numerical data and using relatively complex equations and calculations, the basis being Bayes' theorem of differential probability. The computer's speed makes the processing of data practical for diagnostic procedures. Various clinical conditions have been approached in this way, for example congenital heart disease and bone tumours.

Another example is the differential diagnosis of non-toxic goitre. McGirr has described how data taken from cases in which a firm diagnosis had been established by histological examination can be manipulated to form the basis of the diagnosis of fresh cases.[9] The basis of computer diagnosis is the construction of a probability matrix. This

sets out in tabular form the incidence of relevant symptoms, signs, and investigations, and the data so accumulated forms the computer's "memory" or "experience" of the diseases in question. In the case of non-toxic goitre 30 items were collected from 155 patients. Taking just one item as an example, in Hashimoto's disease, 48 of 53 patients had a firm goitre, three had a hard goitre, and two a soft swelling. The fractions were then converted into decimals, used to build up the matrix. If, for example, the incidence of a certain item was one in 50 patients, this would be represented by the number 0.0200. All the relevant prevalences in the matrix are then multiplied together, and a mathematical score is obtained for each diagnosis. In reaching a diagnosis in a new patient, items from this new patient are matched against the established matrix, and the probable diagnosis is thereby indicated.

In a sense, this is akin to a tally of the votes in an election, when they have all been cast. There is, however, a second form of computer-based diagnostic procedure, known as sequential diagnosis. Developing the analogy of an election, this is more like the prediction of the result based on the current view of the situation at a particular moment in time, perhaps before all the votes are in hand. In this procedure, the computer enters into an association with the clinician and helps him develop a testing strategy, so that by intelligent consideration and utilization various tests, the physician can arrive at a diagnosis which is probably correct: this, "with a little help from my friends" the computer's components. The physician not only reaches the diagnosis, he also becomes educated in the process.

The accuracy of computer-based diagnostic procedures is high; it appears that it is "equal to that of an experienced specialist". By the end of the century, indeed, the computer may well become superior to the human clinician. After all, the information explosion and improvements in computer techniques and in our understanding of the role of the computer will become more significant, while human fallibility will surely remain constant. When one considers Garland's observation that observer error is really quite common in medicine,[10] the superiority of the machine is not surprising.

Despite the apparent attractions of automated diagnosis, most authorities feel that it is as yet a "remote and possibly impracticable dream"[11]. At this point in time, it is probable that many diagnostic procedures cannot be automated due to a lack of objective definition of the procedure and certain necessary features in computing-systems. Cost, lack of qualified personnel, and perhaps too the lack of preception on the part of the computer, also limit the practical value of the computer.

APPLICATIONS OF THE COMPUTER

Despite the limitations of computer technology, which in fact are often man-made, and which will become less significant as expertise grows, it is clear that the computer has a remarkable potential for medicine. There is no doubt that this potential will be developed extensively by the practitioners of tomorrow, and in order to gain a perspective of the role of the computer, it is worth first, enumerating actual and potential applications, and second, discussing certain of these. Rather than accepting the application of the computer as an "impossible dream", our task should be to consider how, for the optimum provision of health care in the next generation, the computer might be reasonably applied.

Table 1 sets out the main areas in which the computer has real and possible applications. Seven of these have been selected for further discussion to exemplify current progress and future trends.

TABLE 1.

Possible Areas for Applications of Computers in Medicine.

Simple question-answering service to patient
Patient-physician matching service
Medical history-taking
Mass health screening programs
Analysis of biomedical signals, e.g. ECG
Analysis of 'milieu interieur' e.g. blood chemistry, blood volume
Assistance in diagnosis
Delivery of therapy
Analysis of therapy
Maintenance of hospital and office efficiency
Record-keeping and retrieval
Population health monitoring
Epidemiological studies
Research, basic and applied
Medical education
Delivery of scientific and medical information
Administration and monitoring of health services

1. Automated History-Taking

The provision of relief from various routine but time-consuming duties is necessary if the physician is to provide optimum primary health care. At first sight history-taking might seem to be such an intimate part of the patient-physician relationship that it could not be seen in this light. However, work has been done to explore the feasibility of utilizing "information technology .... as an adjunct to the traditional direct physician relationship, especially for the collection of medical history data".[12]

In fact, the results of studies are surprisingly favourable.[12,13] Patient reaction and performance were both favourable, while physicians were also generally in favour. The correlation between the patient's stated chief complaint as reported in the automated system and the related symptoms reported was close; one system also produced 95% of the information about symptoms as recorded in the traditional medical record.[12]

Obviously there are limitations to this method: but there are also clear advantages, such as time saving, relentless logic and consistency of results, and the computer's lack of boredom, impatience, and a fearsome mystique. Perhaps it will require a great effort to overcome an almost innate objection to a machine performing a job traditionally done

by humans; but it is only in this way that the physician's total potential can be extended. Automated history-taking is an interesting starting point.

2. Analysis of Biomedical Signals

The ECG is the largest biomedical signal, and the role of the computer in ECG analysis has already been discussed. Three further points may be added. First, through immediate A/D conversion of ECG waves at the patient's bedside or in the physician's office, telephone linkage of this with a computing centre, and a reverse transmission of the answer to the physician, all within a short space of time, the computer participates efficiently in primary health care, sidestepping many tedious steps in the diagnostic path. Second, its role in aiding mass ECG screening also permits of better primary health care, in this case aspects of preventive medicine and public health being emphasized. Mass health screening plans of a more general nature are also aided by the computer. Third, the new generation of mini-computers adds a new look to monitoring. At present, monitoring implies the display of life signs (ECG, EEG, blood pressure, etc.) in real time and in a relatively unprocessed format. Using the computer as a data processing device in the monitoring situation, the information would not be displayed in its raw form. Instead, the data would be displayed as a *trend* in the value being observed: trends in arrhythmias, in blood pressure values or any other physiological variable. In other words, redundant data would be eliminated and only changes in the values of the particular variable being monitored would be displayed. In this way medical staff would be freed from the tedious task of consistently observing the monitored variable.

3. Analysis of the "Milieu Interieur"

Complex biochemical bodily changes can also be analyzed by the computer. A program has been designed to aid the diagnosis and management of acid-base disorders; remarkably the speed with which an answer to a specific question is of the order of only five minutes, and the cost lies in the range of many standard laboratory tests.[14] A particularly interesting aspect of the program is the ability of the computer to review, in almost human fashion, the pathophysiology of the disorder with the physician and to assist him in its correction. The computer is, as it were, a consultant which can both process data speedily and accurately, and through a process of logic guide the physician through the maze of clinical complexity. So, not only is the physician helped to treat the patient, he participates in an active process of education, the computer having been fed with an encyclopaedic diet of medical facts and having been programmed according to the school of branching logic. Thus, "use of the program contributes to the education of physicians as well as to the care of patients".[15]

4. Delivery of Therapy

When the calculation of a therapeutic dose is complex, or when administration of drugs must be related to minute-to-minute physiological variables, the computer's ability to manipulate large amounts of data and to analyze and to respond instantaneously to variables is valuable. Two examples may be given to illustrate this. First, in radiation dosimetry, dose calculation is complex and time consuming and fatiguing; by using the computer, "complete dose distribution can be obtained in a matter of minutes, whereas manually only a sketchy dose distribution can take one person as long as a week".[16] The second example relates to the controlled administration of anaesthesia. Servocontrol of anaesthetic agents has been studied for some years, the modalities of EEG waves, the electromyogram, P_{co2}, and blood pressure being utilized. However the complexity of the clinical task was too great for the earlier devices; the digital computer now presents the opportunity for this complexity to be matched, so that fields such as anaesthesia and intensive care may well benefit from applications of computer technology.[17]

5. Medical Education

Lindberg has remarked that "The ability of computer systems to retain and recapitulate data is the basis of their usefulness in medicine".[18] With the growth rate of medical information far exceeding the capacity of the physician to command such an army of facts and to marshal them on demand when he requires them for the provision of good health care, it is not surprising that the computer is more and more being utilized for the purpose of medical education. In the education of the doctor as medical student, as specialist postgraduate, and as a life-long practising and still studying physician or researcher, the computer is achieving a role in medical education which offers the promise of startling new dimensions to learning. Some of these have been referred to already: these may be referred to as on-line techniques, which can be utilized on a need-to-know basis. For example, a physician may not know whether or not a particular drug is available in oral form, as opposed to parenteral form, with which he is already familiar; he may also be unsure about the current information concerning its adverse reactions or side effects. The computer can provide such information, and educate the physician, while at the same time helping to provide good quality care for patients.

The purveying of information is one of three basic techniques of teaching, according to Lindberg. In his words, "Ordinarily, we have taken great pride in the burden of medical facts we carry about and distribute. Unhappily, the digital computer is a better purveyor of facts and information than anything yet devised."[18] In his view, the computer has a direct and an indirect role in education; not only can and should one turn to the computer for access to medical information, but it also frees the medical teacher "to help a student learn appropriate human values, to help him exercise good medical judgment, and to help him to adopt a scientific and scholarly approach to medical problems", none of which are done as well by the computer as by the physician.[18] This is Lindberg's second approach to teaching.

The third aspect to teaching is that of teaching techniques. The computer has an application here, as a reference to a plastic-skinned manikin known as Sim One will show. This is a device, driven by a computer, which reacts realistically to the interventions of a student anaesthetist, so that the student learns the reactions invoked by his own actions during simulated anaesthesia.

The contribution of the computer to medical education is limitless, and it will undoubtedly become an essential tool in the future. From sophisticated audiovisual techniques and medical literature retrieval techniques such as MEDLARS to the use of "fact banks" and techniques for providing on-line information, the computer has most useful applications in the field of medical education.

6. Management of Medical Records

Like the immortal Topsy, it appears that the medical record "Never was born"; instead, it seems, it just "grow'd". Certainly the hospital record often reaches mammoth proportions, and there must be a real fear that, like the dinosaur, its unmanageable size will be the death of it. This would not be desirable; the best patient care is likely reflected by the best medical records. With the complexity of present day medical practice, it is difficult to see how records could be made smaller.

One solution, would be to transplant a better brain into the dinosaur-like medical record. This is where the computer may well find one of its most important applications, for its is primarily a data processor, and it would be unintelligent not to make use of its primary functions of the reception, storage, selection, evaluation, and transmission of information.

The main problem at present is how far hospitals can go in computerizing records. Cost is an obvious factor, but another is our present understanding of computer techniques. There is one school of thought which believes that the way to approach the problem must be through a gradual reorientation and updating of intrahospital communication first; then simple items such as bed statistics, disease index, and drug analyses could be placed on magnetic or disc file. Later, when the value of the computer had become accepted and when the hospital experience was appropriate, the computer could be applied to a fuller recording of the vast amount of medical data which is available.

The value of the computer, as many accounts have indicated, is related to its open-ended nature as a source of information. The medical record is a potential goldmine in this respect, and data obtained on one particular day from one patricular patient by one particular doctor may lie dormant until tapped later, perhaps in an epidemiological study. It is essential therefore that the files and their contents must be standardized. For example, if one were to have a central index for drugs, a standard numbering system would have to be developed. The same is true for medical terminology. Reasonable agreement in the medical profession in this area is imperative.

An automated record-keeping system has many advantages, such as centralized data storage, reduction of redundant information, rapid access to files, and flexibility. But these advantages will only be realized if the system has features acceptable to the medical profession. Thus, it must be easy to use, it must return information in an acceptable format, suitable algorithms for the processing of medical data must be developed, and confidentiality must be assured. As with other areas for the computer, its effectiveness is entirely dependent on those who plan and make use of the system.

7. Efficient Provision of Health Care

The numerous advances in medicine we come to accept as being an important part of optimal health care. There are, however, many other aspects to the delivery of health care which are related to the logistics involved and to administrative matters. These are problems which must be tackled in order to capitalize on the benefits of medical research, and here the computer has another role to play.

As far as the medical profession is concerned, the emphasis is likely to lie on how computers can provide the physician with the information and services which are required for effective treatment. The profession must consider this seriously so that computer scientists, health service administrators and government can be guided in the way data and services should be used; otherwise the physician may lose his rightful influence by neglecting an important responsibility.

A growing problem today is the efficient utilization of present and future resources, in particular manpower and hospital facilities. The key here is better organization, increased efficiency, and improved service quality. For example, the admitting process in large hospitals is made unnecessarily slow and complicated by utilizing only conventional data storage and retrieval techniques. Such a function is easily computerized and the saving in manpower and increase in service quality would be enormous. Similarly the steady increase in demand for laboratory tests causes problems because of the shortage in personnel required to perform tests; here again the computer is capable of improving efficiency by speeding the output of laboratory data from new instruments such as the autoanalyzers.

Computer techniques should certainly assist cost-benefit analysis and in the study of how resources might be best distributed. Centralized data systems should lead to improved health care in the long run by increasing efficiency of storage and retrieval of data. Regional differences in hospital utilization, adequacy of various services, and the need for different types of equipment in different areas can all be studied by computers. Record-keeping, billing, and analysis of drug usage are other examples of areas of computer application.

A recent British study summarized the situation in this way:

> "within our time horizon the most hopeful prospects arise from the simpler rather than the more ambitious applications, particularly in laboratory automation and reporting, listing and transfer functions . . ., simple clerical replacements and scheduling schemes . . . and in the development of service evaluation methods based upon simple data capture and record linkage operations."[19]

IMPLICATIONS OF THE COMPUTER

The place of the computer in medicine is apparently established: this within a very short time. It is essential at this point, in assessing the role of the computer, to consider what the implications are for the medical profession. For, in the words of one cautionary observer, "In this field, as in so many others, technology has become a two-edged sword with demands careful handling".[20] We have a responsibility then to see that we utilize the potential of the computer wisely.

Limitations of Computer Applications

It is likely that in the near future cost will limit the wide use of computers. Priorities will have to be established before the computer is utilized to any great extent. Present methods of communication must be polished, for there are many areas in which telephone systems, paging systems, and closed circuit television, for example, could be used more widely, at lesser cost, and which would give personnel experience in various forms of communication. A complex computer system requires an informed body of hospital staff, such as is presently unavailable. One writer has stated that the provision of a real time multiaccess system without a major learning process on the part of the health professions would be like giving champagne to a man dying of thirst: all he needs then is water.[21] Apart from cost, then, the shortage of trained personnel is another limiting factor; the computer is basically a tool: the craftsman must be the well-educated physician or medical scientist. The problems of medicine will not be solved by the computer unless the machine is programmed correctly by those who understand both the nature of those problems and computer technology.

In this connection, a major problem appears to be the impossibility of ensuring that computer systems do not fail. At present the reliability of computer systems is not as good as that of the telephone network. Nor is there agreement about minimum accepted standards to which computer systems must adhere.

A more publicized danger is that of misuse. Misuse could be either accidental or intentional. Accidental misuse could result from human error, for example if tapes became mixed up. Fire or explosion in computer centres would obviously have a serious effect.

The intentional misuse of the computer, concerned with patient records for example, has posed the threat of privacy. This is a special problem "because the effort to safeguard privacy would have to balanced in system design against the need to make information quickly and easily available to the physician who requires it"[3]. Safeguards might be provided by classifying information in terms of its degree of sensitivity, access to the most private data being permitted only through the activation of complex procedures utilizing keys or passwords.

Another unique problem is the assignation of liability in the case of system errors for example, if inaccurate information were delivered, or if a complication arose from computer-administered anaesthesia. The responsibility might extend from the manufacturer to the programmer to the medical personnel. This and the matter of confidentiality are perhaps theoretical at present, but it is important that the medical profession become aware of problems like these, and moreover that the public understand that efforts are being made to protect the rights and interests of the individual.

The Computer as Health-Care Servant

Set against these problems are the positive implications which the computer has for the future of medical care. While the computer is clearly useful in performing tedious logistic tasks such as administration of patients' appointments, medical record-keeping, and processing of laboratory operations, it is perhaps more important to consider the implications of the computer in the context of fundamental problems like the shortage of physicians, the use of non-physician manpower, and the provision of preventive medicine as is being aided by computer-assisted mass screening programs.

The computer may be utilized as "a consultant that is built into the very structure of the medical-care system and that augments or replaces many traditional activities of the physician".[3] The value of the computer in history-taking, ECG interpretation, and automated diagnosis lies in freeing the physician so that he can concentrate on tasks which are particularly suited to his traditional role as healer and teacher.

The computer might also be used to serve developing allied health personnel, or physician assistants, so that part of the responsibility for the delivery of primary health care would become redirected. Schwartz's concept is interesting:

> "Guided by the computer, constrained from exceeding his capacities by instructions built into the computer programs, and linked to regional consulting centers by appropriate display devices, the new breed of "health-care specialist" could make a major contribution to the resolution of the seemingly insoluble problem of maldistribution and shortage of physician manpower".[3]

These are revolutionary ideas; they may not be readily accepted.

On the other hand, the computer provides the interested physician with a new dimension of thought stimulated by the need to think carefully about problems before programming computers, added responsibilities in giving good medical care, and a stimulating challenge to master medical knowledge in a new way. The rearrangement of health services and the growing inter-relationship of complex medicine, computer science, and administration will require a new approach to medicine, a new breed of

"health information scientist" and challenging areas for decision-making.

It would be a mistake to think that the essence of the physician-patient relationship will disappear in this new technological age. Paradoxically there will be a greater opportunity for the physician, freed from the need to store vast amounts of information and from routine time-consuming duties, to attend to the proper facets of medical care. Wayne has emphasized that:

> "the computer should lift from us clinicians the burden of carrying in our minds a mass of information about the relative importance and significance of different symptoms and physical signs and laboratory findings, and it should thereby enable us to devote more attention to the patient himself, to look at him as a sick human being, to see him in relationship to his environment and to help him in this way. It should help us to supervise his progress and to offer support to his relatives. No computer has common-sense, courage and compassion, and it is this which we must provide. In the future the ability to deal with human beings will be more, not less, important than at present."[22]

Rather than becoming obsessed with the danger of the Machine, there is for us an opportunity to consider how computers might serve as tools rather than tyrants, and to "set about the task of developing humanitarian uses for these inanimate machines".[15] □

References

1. Report of Royal Commission on Medical Education, London, H.M.S.O., 1968.
2. **Payne, L. C.:** Computing in medicine. *Brit. Med. Bull.* **24:** 189, 1968.
3. **Schwartz, W. B.:** Medicine and the computer. *New Eng. J. Med.* **283:** 1257, 1970.
4. **Winter, D. A. and Dinn, D.:** Video image interface to a digital computer. Presentation at Seminar on Man-Machine Communications, Nat. Res. Council, Ottawa, May 28-29, 1969.
5. **Mutch, D.:** Correlation and non-linear processing of dynamic physiological images. Thesis for M.Eng., Electrical Engineering, N.S. Technical College, Halifax, N.S., 1969.
6. Editorial: Limitations of computers in medicine. *Canad. Med. Ass. J.* **104:** 234, 1971.
7. **Caceres, C. A. and Rikli, A. E.:** *Diagnostic computers,* Springfield, Ill., C. C. Thomas, 1969.
8. **Milliken, J. A., Wartak, J.** *et al.:* Use of computers in the interpretation of electrocardiograms, *Canada. Med. Ass. J.* **101:** 39, 1969.
9. **McGirr, E. M.:** Computers in clinical diagnosis. In *Computers in medicine,* Rose, J. (ed.), London, J. and A. Churchill, 1969.
10. **Garland, L. H.:** Studies on the accuracy of diagnostic procedures. *Amer. J. Roeutgen.* **82:** 25, 1959.
11. Working Party. On *Computers in medicine,* B.M.A. Planning Unit No. 3, London, Brit. Med. Ass., 1969.
12. **Mayne J. G., Weksel, W., and Sholtz, P. N.:** Toward automating the medical history. *Mayo Clin. Proc.* **43:** 1, 1968.
13. **Slack, W. V., Hicks, G. P.,** *et al.:* A computer-based medical-history system. *New Eng. J. Med.* **274:** 194, 1966.
14. **Bleich, H. L.:** Computer evaluation of acid-base disorders. *J. Clin. Invest* **48:** 1689, 1969.
15. **Bleich, H. L.:** The computer as a consultant. *New Eng. J. Med.* **284:** 141, 1971.
16. **Stockley, A. V.:** Computer application in radiation dosimetry. *In Computers in medicine,* Rose J. (ed.), London, J. and A. Churchill, 1969.
17. **Murphy, T. W. and Mazzia, V. D. B.:** Bioengineering and anesthesia. *Bull. N.Y. Acad. Med.* **45:** 301, 1969.
18. **Lindberg, D. A. B.:** *The computer and medical care,* Springfield, Ill., C. C. Thomas, 1968.
19. Working Party. On *Computers in medicine,* B.M.A. Planning Unit No. 3, London, Brit. Med. Ass., 1969.
20. **Hawkes, N.:** The computerized society. *Science J.* **7**(1): 10, 1971.
21. **Brown, F. T. S.:** Computers in hospitals. In *Computers in medicine,* Rose J. (ed.), London, J. and A. Churchill, 1969.
22. **Wayne, E.:** Computers in medicine. In *Computers in medicine,* Rose. J. (ed.), London, J. and A. Churchill, 1969.

It has been stated that the computer is the greatest machine developed by man, only exceeded by the human brain — which can be produced by the millions with unskilled labor.

The doctor and his leisure

1. Travel

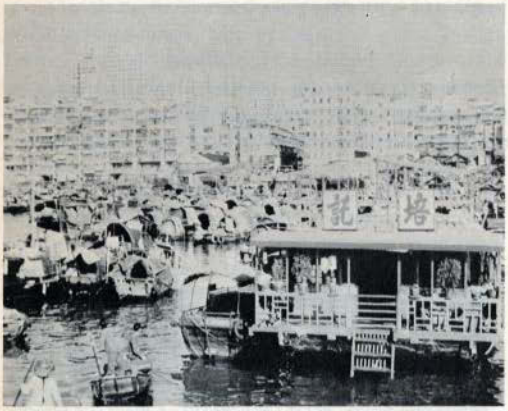
Impressions of The Orient (II)

A. M. Marshall, M.D., C.M., F.R.C.S.(E)

Halifax, N.S.

Arrival in Hong Kong

When we left Inchon, Korea on January 27, 1970, the temperature was 24°F. As we travelled down the coast of Asia the temperature rose to 50°F, and on the following day it was 60°F. On January 29th, we arrived in Hong Kong Harbour. Fog covered the beautiful city but we could see many ships in the harbour including small fishing vessels and ferry boats.



Life on the water in Hong Kong Harbour with Kowloon in the background.

The Everett Travel agent came aboard and changed our money into Hong Kong dollars, one American dollar fetching six Hong Kong dollars. He then took us ashore in his boat to the Kowloon side of Hong Kong. It was raining, which was unusual for this time of year. We looked for a hotel, the agent booking us in the Hotel Miramar.

In the evening we went to a night club in the Ocean Terminals and saw two floor shows, which featured many Oriental dances including the "Tea Cup Dance", the "Sword Dance", the "Lion Dance", the "Ribbon Dance", and the "Fairy Dance". We then walked back to the Hotel Miramar enjoying the many sights and the beautiful lights of the city and harbour.

The next morning we relaxed and read the "Hong Kong Standard" which had been pushed under the door of our room, compliments of the hotel. This paper we received daily, and on the morning of February 8th, we were surprised to see on one page a large picture (size 7 inches by 4½ inches) of the crippled Liberian tanker "Arrow" on the rocks in Nova Scotia's Chedabucto Bay. Above the picture was a three column article beginning with the words, "HALIFAX, Nova Scotia", describing the event.

On our first day, we went downstairs in search of a place to eat breakfast. We found a very ornate diningroom and enjoyed fish and potato cubes and coffee. After that we took a harbor tour on a "junk". Leaving from alongside the Star Ferry Terminal we went first to the Yaumati typhoon shelter, built in 1914; a long concrete breakwater sheltered hundreds of boats. We were told that five generations of families have lived in these boats. One blue boat, which was very elaborate, was used for weddings and parties. There was a school boat and another boat used as a church which was operated by the Salvation Army; another beautiful boat with hanging baskets was called the store boat. Many people live their whole lives on these boats, never going ashore. Many boats bring produce from Communist China and the occupants are not allowed to go ashore.

We then passed from the Kowloon side of the harbor to the Hong Kong side with its many high rise commercial buildings and high rise apartments. We went alongside the Royal Hong Kong Yacht Club. We saw several children rowing in small scow-like boats with an oar in the stern. As we cruised around the harbour we came to the air line strip which was begun by the French in 1922. It is one and one half miles long and eight hundred feet wide. 22 air lines use it.

The next day we took a taxi to the Christian Mission to Buddhists at Sha Tin Village, where we visited the church and school. At the workshop we saw Chinese men painting cups, saucers, plates, and other items. We bought some of the finished products which were shipped to our home; the crate arrived about two months after we had returned home with only one cup broken. We then toured the outskirts of Kowloon and saw many old refugee houses which are now being torn down, high-rise apartments being built for these people. We then visited a "red" Chinese shop and bought two beautiful ginger jars.

In the evening we went to the Ondine Room on the roof of our hotel. Here was a beautiful view of the city and harbour. We had lobster newburg Hong Kong style, and heard a dance orchestra, direct from the London Palladium. There was a floor show and we saw an exotic dancer who danced beautifully with filmy pink scarves.

The next day was Sunday. We took a walk along Nathan Road and noted that almost all the shops were open for business although a few were padlocked. We attended St. Andrew's Anglican Church, where the service was in English. The preacher spoke on the union of the Anglican and Catholic churches. After the service, we were invited to partake of coffee which was served on a table under the trees in front of the church. The weather was beautifully warm, the temperature being in the mid-seventies. The people were very friendly, many of them speaking to us and making us feel welcome. In the afternoon we crossed the harbour on the ferry to the Hong Kong side; the tickets cost 25 cents in Hong Kong money, equivalent to four cents in ours. There were crowds of people crossing on every ferry. There were four lanes, and four ticket takers at each ramp to the ferry. The side of the ferry boat was lowered and the crowds swarmed on. Ferry boats left about every five minutes taking about twenty minutes to cross the harbor.

On the Hong Kong side we toured on foot, observing the beautiful modern buildings. Two large stone lions guarded the doors of the Bank of China. We noticed a turbaned Indian who opened the door as we entered the Mandarin Hotel. Then we walked to the Peak Tram station and took a cable car ride up to Victoria Peak. Here we had an excellent view of Hong Kong, and the harbour; we could see beyond Kowloon on the opposite shore to the New Territories.

Hong Kong is a British colony. It consists of an island which is called Hong Kong Island and a mainland part, Kowloon, which is a small peninsula with an area of only three square miles. In 1898, 356 more square miles of territory adjacent to Kowloon were leased from China for 99 years; this land is called the New Territories. Hong Kong has a population of over four million people. With 8,000 people to each square mile Hong Kong has the highest density per square mile in the world.

The New Territories

On February 2nd we hired a private taxi for a trip to the New Territories, which extend to the boarder of Communist China. Here soldiers are posted at the crossing-point.

Planting rice in the New Territories.

On our trip we passed a mountain rock resembling a mother carrying a baby on her back. This is a natural rock formation and is called 'Amah Rock". The trip covered 63 miles, and showed us primitive Chinese life. We passed through a fishing village, but also we saw three hospitals, the Royal Hong Kong Golf Club, a bowling green and riding club. We visited an Oriental rug factory where we saw girls making beautiful rugs by hand, using a punch and scissors. We passed by duck farms, and fields of lettuce, watercress, soy beans, sweet potatoes, and various Chinese vegetables. We saw women with water pails on both ends of a bamboo rod, carried across their shoulders, watering the crops. There were many water buffalo ploughing the ground. We were told that rice was grown on the same ground after the other crops had been harvested at the beginning of the rainy season. We saw the walled city of Kam Tin, the walls of which are hundreds of years old. Royal palm trees, bread fruit trees, bamboo groves, and fishing markets were also of interest. From one spot, a mountain had been removed and cast into the sea, to provide room for resettlement apartment buildings. On our way back we went by three settlements with apartments built to accomodate one million people! As we came back to Kowloon, the sun was setting behind the islands in the sea, with beautiful red, orange and yellow hues in the sky.

The Stores of Hong Kong

Shopping in Hong Kong is a pleasure. In every store tea is served (beer, if desired), then you are shown the goods. We bought cultured pearls, opals, dresses, knitted suits, evening bags, happi coats, and little Chinese pyjamas and housecoats with matching slippers, as well as Chinese dolls with their babies strapped on their backs, for the grandchildren back home. The tailor-made suits were too much temptation to pass up. Two days after measurements were taken the suits were delivered, well made, of English wool and a good fit. These suits can be made in 24 hours, if necessary, but this does not give time for a fitting. Hand-carved chests, coffee tables, cabinets, nests of tables, and elephants, mostly made of teak wood, were among the many things that were so attractive and well done. We decided to buy a few souvenirs; well packed, they were shipped and three months after we were home they arrived in perfect condition.

The hotels were very ornate and modern, beautifully furnished and air conditioned. The dining and reception rooms were especially decorative. We always had a choice of Western and Chinese menus and we enjoyed trying their different dishes and even mastered using chopstocks to a degree.

We were impressed by the politeness of the Oriental people and thought it would be well to see a little more of such courtesy in our Western world.

A very interesting and different tour took us to the "Tiger Balm Gardens", which have been called the Disneyland of Hong Kong. There are towers, pagodas, winding grottos, Chinese effigies from mythology done in

flamboyant colors, even some grotesque statues as well as beautiful mermaids and figures of the animal world.

A Chinese, Aw Boon Haw, became wealthy from the sale of 'tiger balm', an ointment which was thought to cure everything. He had these gardens built in 1935; they are a great tourist attraction and enjoyed by the throngs of natives who visit them every day.

February 6th. was Chinese New Year. Working people who take no vacation during the year have two weeks to celebrate at this time. Stores and restaurants are closed and practically no work is done. All the families visit each other and take gifts of fruit and flowers. The elderly people are especially visited and they have coins to give the children. The streets and shops are gaily decorated. Great banners and balloons and extra lights decorate the streets and the buildings. An immense, beautiful peach tree standing in a large antique vase, valued at $2,000, stood in our hotel lobby. If the blossoms came out on New Year's Day, good luck would come to all those within; it did just that. Thousands of pink blossoms burst into bloom. People went outside the city to buy these especially grown peach trees, just as we get our Christmas trees.

We spent Chinese New Year's Eve in the 'Mandarin Room' of our hotel. We were entertained by lovely Chinese girls in beautiful silk costumes dancing and singing. There were also excellent acrobatic acts. The stage was elaborate with a fountain and waterfall which would rise up bearing the orchestra or actors, then descend and disappear. Our menu consisted of Supreme Sharkfin soup, steamed chicken and ham garnished with shrimp and walnuts, deep fried garoupa, rolls, fried noodles with shredded chicken and sweetened cream of walnut for dessert. This was the beginning of the 'Year of the Dog'.

Next day's tour was very interesting. After crossing the harbour on a car ferry, we went by bus to Victoria Peak. This afforded one of the most panoramic views of Hong Kong, the harbour and Kowloon on the opposite shore. Beautiful winding highways took us up and up where on the top were many expensive homes and apartments, also two castles owned by wealthy Chinese, all with gardens.

On the downward ride we stopped several times for picture taking as it was a beautiful, warm, clear, sunny day. After this, we drove to secluded Repulse Bay, named for a British warship which came many years ago to drive pirates from this bay, sometimes called "the Waikiki of Hong Kong". People swam and generally enjoyed the sandy beach. Our bus tour then took us to Fisherman's Wharf at Aberdeen, world-renowned home of thousands of water people who are born, live and die on their junks or sampans. All the boats were home today bedecked with flags for Chinese New Year.

The night market in Hong Kong is well worth visiting. Certain streets are cleared of traffic and goods of every imaginable description are assembled, some of them on tables or stands, others directly on the pavement. Hundreds and hundreds of people throng this market and buying and selling goes on all night. Naturally, there are some very good bargains.

Another interesting place to visit, of a kind we found in many cities, was a revolving restaurant located on top of a high building. The view was beautiful and it usually took an hour to make one revolution. We found that the elderly people in China stay home at night: we were the "odd couple".

The Union Jack was seen flying everywhere: indeed Hong Kong is a British Crown Colony.

We had such a warm feeling for Hong Kong and its people, we prepared rather reluctantly to leave. However, on February 13th we left for Bangkok by Japan Air Lines. This was an interesting flight, even flying over Vietnam. Here the weather was warm, but nearly all buildings were air-conditioned, so we found it very pleasant.

Thailand, the Land of Temples

Our first tour in Bangkok started at 7 o'clock in the morning, thus avoiding the noonday heat. This was called the 'Floating Market Tour', We drove to a wharf on the Chau Phya River, 22 miles from its mouth, the Gulf of Siam. Then a canopied tourist boat took us along this river

Ruined Temple and Breadfruit tree in Ayudhya, Thailand.

and through many miles of canals. We saw boats of every kind and description: many speeding up and down the river, all very busy, most carrying cargo, others were house boats. Houses were built right over the water's edge and we could see happy children jumping in and out of the water, naked, of course, laughing and waving at us. The family wash was done in the river, and dish water, and worse, was just tossed out of the door into the water. We came to market boats laden with produce, mostly paddled by women. Along the river banks all sorts of tropical trees were growing, such as palm trees, bamboo, cocoanut, bread fruit, kapok, mango and even orchids. Unforgettable on our return trip were the beautiful temples which we saw. The first one, Wat Aram, is called "The Temple of Dawn". This was the first of the many magnificent structures which we found so very interesting.

The next day, we visited the ruined city, Ayudhya. It made a sad sight to see the once beautiful temples in complete ruins. This city, once the seat of commerce, culture and government of Thailand, was sacked, pillaged and burned over 200 years ago by invading Burmese. Some of the ruins were restored, but the task was too great; therefore, it has been preserved as a tourist attraction. Inside the walls were many statues of Buddha, even huge ones of the reclining Buddha. Some of them were quite ruined, others in better repair. While at Ayudhya we visited the summer palace of the kings of Ayudhya. In the beautiful gardens there were many shrubs trimmed to resemble various small animals. On our return trip we passed by well-irrigated fields where vegetation is rich and abundant, two crops of rice being grown each year. Sugar cane, watermelons, tea and sweet potatoes are also produced. All the heavy work is done by the water buffalo, and the men and women working in the fields are often in mud and water halfway to their knees.

One of our guides told us that there are 380 Buddhist temples in Bangkok and 20,000 in Thailand, or Siam, which was its old name, changed thirty years ago. Thailand and Laos were once one country and their language differs somewhat from the Chinese – their alphabet has 44 letters. They believe in only one Buddha, whereas the more northern countries have five.

A special tour was the "Grand Palace Tour". It is difficult to describe the great art and beauty of the palaces and surrounding buildings. Intricate designs were fashioned from pieces of porcelain, dainty colors forming flowers, angels and other figures. Serpents seen on roof tops are believed to keep away evil spirits. The guide showed us where the kings were crowned and where they kept the ashes of dead kings; he also told us that some old queens were allowed to live in the back palaces. The movie "The King and I" was filmed at this place and indeed the art work is beyond imagination.

Of all the oriental places we visited, Bangkok had the most beautiful temples, palaces and pagodas.

One day we were in a tea room taking a cold drink, when we got in conversation with a lady who was of Irish decent, but married to a native of Thailand, and has lived there many years. She invited us to her home, which was a typical Thai house, very plain, no rugs, and many fans going to make it comfortable, as Bangkok gets very warm, over 100°F. We took off our shoes before entering as we did also in temples, and after serving us cold beer she got her servants to cook a delicious meal of typical Thai food. When the servants approached us, they were on their knees.

Night Club entertainer in Bangkok, Thailand.

The next day our hostess took us to a monks' temple, as we were very much interested in the customs of these people. The monks, clothed in saffron robes, receive no salary, but appear on the streets with a bowl and receive generous donations of fruit and food of all kinds; the people believe that they will be blessed in proportion to their generosity. To this temple, its altar laden with statues of Buddhas, flowers and candles came a young girl who was a medical student, to receive the monk's blessing before writing her exams. First the monk prayed before a 1,000 year-old Buddha high on the altar. Then he had a candle lighted before a bowl of water containing a lotus flower, which is sacred. Twine extended from the altar to the girl. Praying all the time the monk poured several glasses of the holy water over her. She then retired, took off her wet

(continued on page 57)

What is Your Diagnosis?*

S. D. 2 yr. old girl.

Inferior Vena Cavagram and IVP: (Figs. 1 and 2).

Both kidneys are opacified promptly.

The left kidney is displaced and rotated downward and laterally, however, it remains *intrinsically normal.*

The inferior vena cava is displaced to the right and compressed. There is widening of the mediastinum at the level of the 8th and 9th ribs.

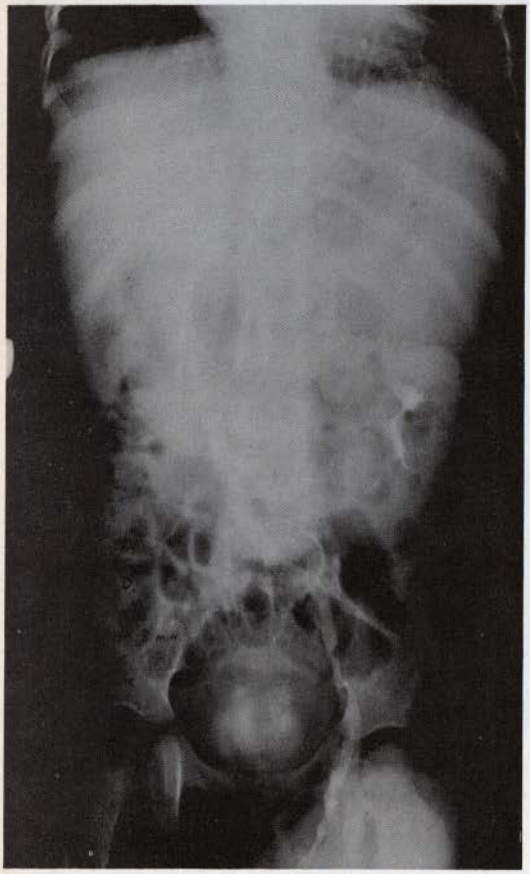


FIGURE 1

FIGURE 2

Diagnosis:

Retroperitoneal mass crossing the midline with mediastinal deposits. At operation this was found to be due to extensive neuroblastoma.

*Contributed by: B. St. J. Brown, M.D., F.R.C.P.(C), Associate Professor of Radiology, Dalhousie University and Izaak Walton Killam Hospital for Children, Halifax, N.S.

K. N. 15 month old girl.

IVP: (Fig. 3).

There is a large right side *intrarenal* mass distorting the collecting system; the lower pole calyces are not opacified; the upper part of the kidney is the only functioning portion.

The left kidney is normal.

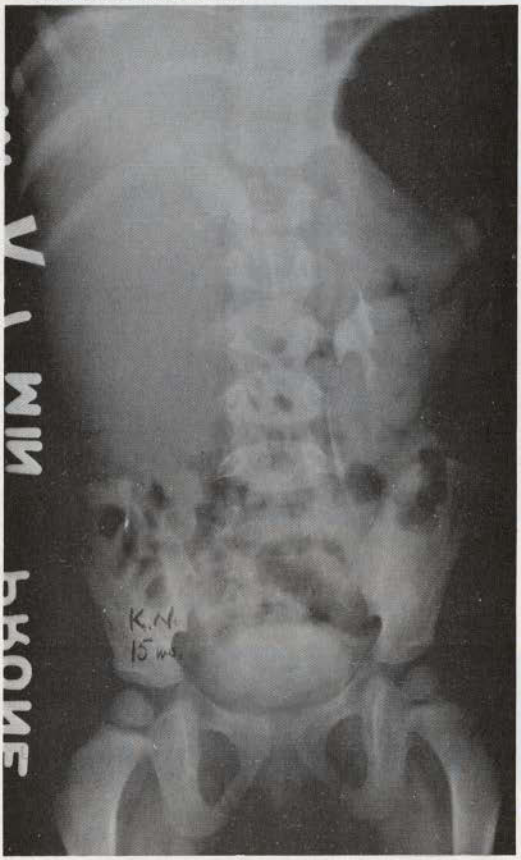


FIGURE 3 Diagnosis:

Wilm's Tumour.

□

LOCUM

1970 Dalhousie Graduate, resident in Physical Medicine is available for Locum. May-June 1971. Halifax or County. Write Armdale P. O. Box 953.

Impressions of The Orient *(continued on page 55)*

baptismal gown and returned, looking fresh and clean and reassured. We then took off our shoes, knelt before the monk and he blessed us and prayed for our safe journey home and our good health.

In Thailand all young boys have to spend a minimum period of three months as Buddhist monks, usually during Buddhist Lent, which is the three months of the rainy season. Some of them decide then to become monks. After being a monk for a rather long time, they may leave the Order and marry.

Memories of Bangkok

We have many interesting memories of Thailand. For us Westerners, we found it unusual that a lovely young Thai girl, who accompanied our hostess, was married to a Japanese man, who was also married to her older sister. She spent the weekends with him and everyone was congenial. It was fascinating to watch the girls weave the Thai silk. In the stores they would take your measurements and next day you could get a beautiful dress all hand made. We bought a few of these, also ties and scarves. Finally in a Bangkok Bank we were surprised to see, beside the King of Thailand, a picture of Queen Elizabeth the Second of England.

Soon we were ready to start our journey by air back to Hong Kong, thence to Taiwan or Formosa, which it was originally called. The airport was a busy place, people of all nationalities travelling alone or with families, and there were many soldiers from Vietnam. The flight was pleasant, the air crew most gracious and the filet mignon excellent. Soon we were sitting down in our much loved Hong Kong, but we were to travel further, before returning to our home.

□

NEULEPTIL

pericyazine

is more and more appreciated in GENERAL PRACTICE for the control of **hostility, aggressiveness and impulsiveness** in the psychologically unbalanced, neurotic, "difficult" geriatric patients, "problem" adolescents, alcoholics, epileptics — after emotional shock — in reactive psychological changes of sexual life in women.

dosage forms: capsules of 5 and 10 mg

usual starting dose: 5 mg at midday, 10 mg in the evening; elderly patients: 5 mg per day

contraindications: circulatory collapse, coma

precautions: caution should be exercised in elderly patients, in cases of glaucoma or prostatic hypertrophy; if CNS depressants used in association, reduce the doses by half

side effects: at the beginning of treatment, drowsiness, reactions of the ANS, psychomotor troubles may appear but are transient; possibility of side effects due to phenothiazines

overdosage: no specific antidote; gastric lavage or administration of an emetic, symptomatic treatment

complete information upon request

Poulenc

MEMBER PMAC

NEW READING MACHINE*

In view of the great problem of keeping up with the literature, we have recently designed a new computer-based machine for reading the literature. The machine reads each journal as it arrives in the library. This is about 496,000 journals per day or 6,917,814,200 articles per day or . . etc. The other day I stopped in the library to see what was of current interest. The machine had obviously been reading at a voracious pace and I turned to see what was coming out of the other end of the machine and lo and behold blank (clean) toilet paper was unrolling out. When I raised a question with the librarian, a certain Miss Thinn, she was quite adamant about the paper being clean, that is unused. I asked her how many people were making use of the new machine and she said nobody was, that sometimes the machine produced toilet paper with print on it but the library didn't have enough money to buy the computers which read the printed toilet paper so in the meantime with no funds and nobody complaining the machine was just reading and not producing anything. Well, I went home feeling pretty good because its nice to know everything is going so well in the library. Then the following day it happened. Somebody designed a machine which reads only 0.1% of all the articles and yet this machine yields the same amount of information as my total recall machine. The competitors advertised their machine for $17,645 less than ours and we were in serious trouble. (It was obvious that a problem like this could not just be solved by using cheaper toilet paper). Finally one of my co-workers hit upon the now well-known Eat Reading Machine which burns the other 99.9% of the articles for energy and thus saves a considerable amount of electricity. We have since put our competition out of the Reading Machine business. Also, we understand the HIH is considering adopting the 99.9% principle in awarding grants. Some of the people do not want their grants applications burned, however, and this is causing some difficulty. Anyway, who cares, grants schmants, I've made four million dollars off my Eat Machine. □

*By Kirk E. David. Reprinted by permission from Journal of Irreproducible Results, April 1969, p. 83.

The Prime Minister was married recently. It is reported that the bride is 22, going on 23 – the groom 51, going on pills.

* * * * * *

"Dad, what is heredity?"
"Heredity, my son, is what a man believes in until his son begins to act like a fool."

* * * * * *

Horse sense, naturally, dwells in a stable mind.

* * * * * *

"Hello! Is this the Help Line?"
"Yes, what can I do for You?"
"I need a new crib for my baby."
"What's the baby sleeping in now?"
"The box my color T.V. came in."

* * * * * *

We're always being urged to tell the truth, but nobody wants to hear it.

"Take two of these pills daily and give two to the other dummy!"

Personal Interest Notes

Dr. D. S. Nathanson, of New Waterford, was recently appointed to the executive of the Canadian Federation of Mayors and Municipalities; he will be travelling to Saskatchewan in June to attend their meeting.

Several members of the Society have been vacationing in the West Indies. **Dr. Peter Jackson,** Sydney River, was in Barbados; **Dr. Phil Jardine** spent a holiday in Grenada; and **Drs. W. Nicholas** and **Carl Stoddard** enjoyed the warmth of Jamaica.

On the other hand, the unlimited snow with a limited amount of sunshine brought those with a lean and hungry look out onto the "slopes". Wentworth is becoming a popular spot, and it will be interesting to watch the development of the new area near Ingonish. Seen skiing, among others, were Drs. M. T. Casey, W. A. Ernst, P. MacGregor, D. F. Smith, S. C. Robinson and D. Johnston. Some of the editorial staff took time off, too, Mrs. Tove Clahane enjoying the skiing with her husband, Vern, and Dr. David Shephard achieving the unexpected triumph of avoiding that call to the Broken Bone Club.

Dr. D. H. MacKenzie, Sydney, and **Dr. M. P. Chaturvedi,** Glace Bay, attended a postgraduate course in surgery, held at the University of Toronto in February. **Dr. M. A. Naqvi** attended a surgical course in Montreal, and took in a meeting of the American College of Surgeons.

Dr. R. O. Jones recently visited Bermuda, where he was Psychiatic Adviser to the Bermuda Hospital Board.

Most members will be aware that the annual meeting of the CMA will be held this year in Halifax, from June 7-11. The Medical Society is pleased to be able to offer its facilities to friends from this historic province. About 800 doctors are likely to attend. A steering committee has been hard at work planning, and there has been a fine *entente cordiale.* **Drs. W. D. Parsons,** St. John's, and **J. F. L. Woodbury** are coordinating chairmen, while other subcommittees have been looked after by **Dr. L. C. Steeves** (scientific program), **Dr. F. A. Davis** (scientific exhibits), **Dr. W. R. Gillis** (hospitality), **Dr. W. C. Nicholas** (entertainment), and **Dr. D. Shephard** (promotion). **Mrs. J. F. L. Woodbury** has been ably assisted by a Ladies' committee in looking after an excellent program for ladies and also for youth. Newfoundland Premier Joey Smallwood will be guest speaker at a dinner for the general council. Included among major items of business during the annual meeting will be the association's policy statement on abortion, voluntary sterilization and professional economic discipline.

The association's final submission to the commission of enquiry into the non-medical use of drugs, prescribing habits concerning mood modifying drugs and the methods of electing senior CMA officers, will also be reviewed.

The scientific program looks as though it will attract large audiences, although the added spice of a lobster soiree and an energetic squid-jigging contest may be more memorable for some. □

Obituary

A tragic accident took the lives of *Dr. & Mrs. M. A. Thomas* of Glace Bay. Dr. Thomas was a pathologist who came to Canada from his native India two years ago. They are survived by six children, including a son at St. Francis Xavier University, Antigonish. Our deepest sympathy is expressed to the family.