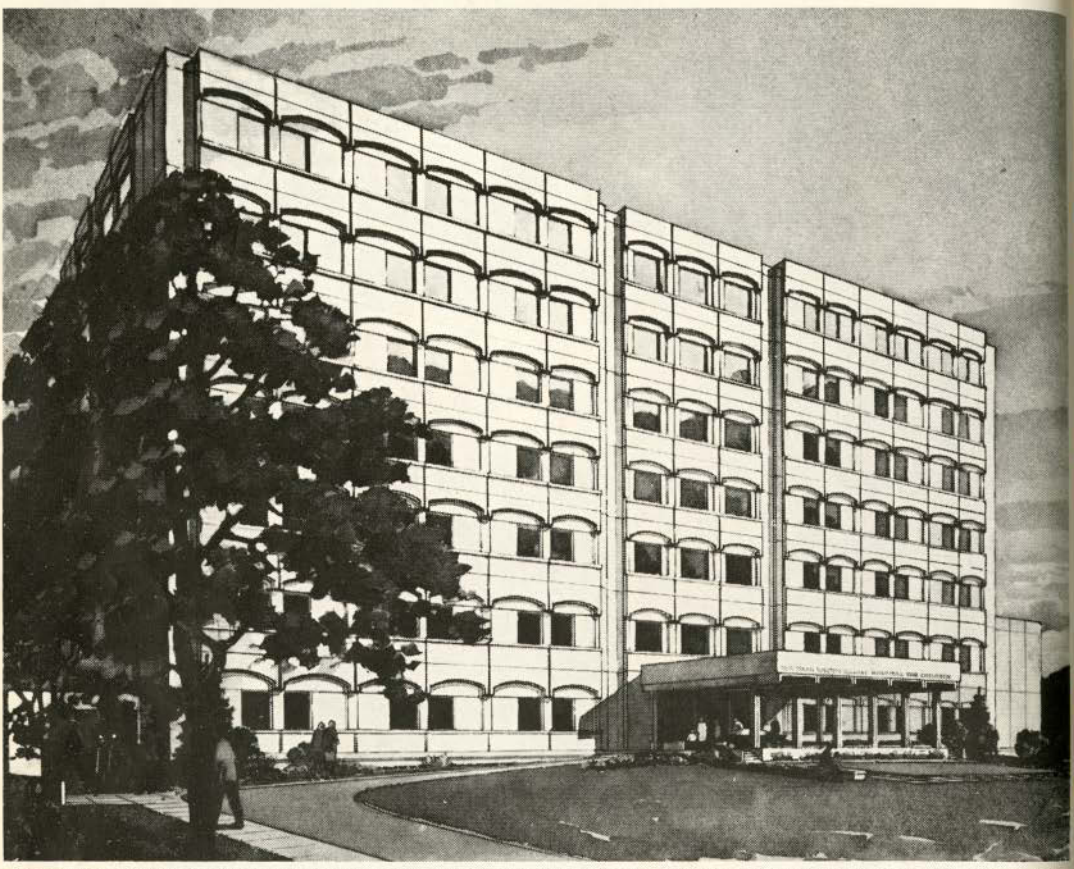
Message From The President, Board of Management



The new hospital has ten floors, including the underground levels, and will have 1,138 rooms of all kinds and a carousel for out-patients to play while waiting to see the doctors. (Courtesy of the Architects: Duffus, Romans, Kundzins and Rounsefell.)

"The Board of Management of The Izaak Walton Killam Hospital for Children is very pleased that the Medical Society of Nova Scotia is taking so much interest in our new hospital and we hope that the information contained in the *Bulletin* will give the medical profession some idea of our new facilities.

The Children's Hospital, as it was formerly known, was founded in 1909 by a group of interested citizens in Halifax and the first building contained cots. Over the years, during which the hospital became a referral hospital for the whole Atlantic area and the only children's hospital in the Maritimes, beds and ancilliary services were added and still the hospital was overcrowded.

In 1960 the Board engaged the services of Agnew Peckham & Associates, a hospital consulting firm from Toronto, to survey the hospital and make recommendations for enlarging the present building. The report was completed in 1961 and strongly recommended that a new structure be undertaken at the earliest possible date. To quote from their report, "The Hospital Board could carry through a campaign which would be successful beyond their rosiest dreams. The basic need is for a Board and supporting committees with the vision necessary to plan such a program and the courage to undertake it and carry it through".

And so it was decided to raise funds and construct new facilities. We are about $2,500,000 short of our goal of $19,500,000 but trust that we shall be able to raise the remainder during the next few years.

Facilities alone do not make a good hospital but with the transfer of our present dedicated staff, who have worked for years in an overcrowded and antiquated facility, we know we will have one of the finest children's medical centres on the continent.

I hope you will all have a chance to visit The Izaak Walton Killam Hospital for Children in the near future. I'm sure you will feel as proud of it as we do."

Kathleen Rowan-Legg,
President,
The Board of Management,
The Izaak Walton Killam Hospital for Children. □

THE NOVA SCOTIA MEDICAL BULLETIN

May 28, 1970

CONTENTS

Editor - DR. David A. E. Shephard

Editorial

The Role of a Children's Hospital

This special issue of the *Bulletin* signifies an important development in medical progress in the Maritimes: the opening of the new Izaak Walton Killam Hospital for Children, in Halifax. The significance of this impressive facility cannot be adequately assessed today: only the future well-being of countless children, those growing today and those yet unborn, will testify to the contribution that a fine new children's medical centre can make to this part of Canada.

The development of the "I.W.K." is a story in itself, and a brief account was given earlier this year by a member of the hospital's medical staff.[1] Many problems have demanded much time and energy of many willing workers; and even at this late date cuts in hospital budgets by government threaten to make difficult the provision of the best possible medical care for the children who will be served by the new hospital. Such economic facts of life can only be faced with the persistence and forcefulness of those who are determined to protect the standards of medical care for our children. Certainly the medical, nursing, administrative, and auxiliary staff of the hospital will actively defend the best interests of our paediatric patients at the I.W.K. "where", as the motto has it, "no child knocks in vain". For, as Morris West remarked of children in another context: "A child has no politics. A child has no nationality. He has only the right to live, the right to hope. If these rights are denied him, it is a crime against humanity and every honest man must raise his voice against it".[2]

This symposium may perhaps hint at the logistic problems of running a children's hospital and the delivery of high quality paediatric medical care, and hopefully the community will come to recognize the many problems and needs which are not easily understood. But mainly, this issue is an attempt to demonstrate something of paediatric hospital practice. The contributors are representative of the medical staff, and their contributions have been brought together in order to relate the essence of paediatric care to the needs of the community and to inform family physicians, whose practice is in part paediatric, about some aspects of paediatric thinking. Credit is due to the authors for their contributions under the former conditions of busy practice in cramped quarters. Indeed it must be reassuring for all the medical staff to realize that if their work was done under the difficult physical conditions of the old hospital, then surely their horizons will broaden dramatically following the move to the new one. The great work which many of us admire will continue, and the scope for even greater achievements will assure the success of special projects, one example of which is research into aspects of microbiology in paediatric practice. The remarkable clinical material which characterized the experience in the old hospital will continue to be a stimulus to the growth of what will surely become an important children's medical centre.

Space precludes the publication of all but a sample of the interests of the medical staff. A word must therefore be said of the work that is done by those who have not written here. Whether it be the straightforward attention to simple infections, feeding problems, or the many injuries that childhood is heir to, or whether it be the sophisticated assessment of complex cardiac

problems, the contribution of so many others unnamed has been a vital part of the hospital's work. One morning's visit to the hospital would bear witness to this, in the bustle of Emergency and Out-Patients, the suffering—sometimes quiet, sometimes vociferous—on the floors, and in the awareness of something strange and major about to happen in the operating room. The unnatural and enforced immobilization of children on the orthopaedic floors is sometimes distressing, and the dedication of the orthopaedic service has a flavour of its own: the relationship of orthopaedics to paediatrics is an old and special one, and it is one service along with all the others which helps to create the warm and friendly atmosphere which seems to characterize all children's hospitals.

Nor has obvious attention been paid to other aspects of paediatric practice which are as important as those which are presented here. Three such aspects might appropriately be touched on, because they illuminate some facets of the role played by a paediatric hospital, which are of fundamental importance if this role is to be understood and accepted by the community. In particular the rationale for the creation of a hospital for children as opposed to their treatment in a section of a general hospital must be understood.

The first example is that of the management of heart disease. The I.W.K. has developed into a referral centre for the investigation and treatment of congenital heart disease, and under the able direction of Dr. D. L. Roy, the cardiac unit has contributed greatly to the welfare of children. Patients with heart disease have been carefully studied and their cases discussed by a team of physicians, surgeons, and technicians who naturally are in tune with paediatric cardiology, a field with certain differences from that of adult cardiology, and which can best be practiced within a full-scale paediatric unit. With the development of a cardiac surgical unit, cooperation and co-ordination of effort has become the keynote, and the value of concentrating the unit in one specialized paediatric unit is clear. Furthermore the concentration of experience within a children's hospital has fulfilled the three chief aims of a major hospital; patient care, teaching and research, while the full-time practice of paediatric cardiology has contributed to the development of the I.W.K. as a regional children's medical centre.

The second example is the way in which, with a paediatric hospital, difficult clinical problems can be referred, investigated, diagnosed, and treated, with rapidity, accuracy, and safety. A somewhat esoteric illustration of this is a recently treated three-month old infant: this little girl was admitted from a different part of the province with the diagnosis of urinary infection. Within eighteen hours of admission, the diagnosis had been made and the correct surgical treatment instituted. This was an extremely rare case of parathyroid hyperplasia in infancy, only a few cases of which have ever been reported. The value of the I.W.K. as a referral centre for children is evident, as is the worth, indeed the real necessity, of an adequate range of diagnos services, the attendance of experienced paediatricia adequate treatment facilities, and co-ordination services within one institution.

This example also emphasises the needs whi must be met if a paediatric hospital is to give adequ service to the community. If good medical care is t objective, then an adequate physical environment, sat factory diagnostic and treatment facilities, and certai stimulating conditions of practice are essential if go physicians are to be attracted to a modern hospital su as the I.W.K. Only thus can a children's medical cen develop, only thus can the very best medical care provided for children in the Maritimes. Once the grow cycle has started, the hospital's maturity is likely; b the success of a first-class referral centre does al depend upon the support of the community. T Medical Society can here greatly assist, for its membe can demonstrate with understanding the valid ro which the I.W.K. can and should play in the communi Those of us who have the privilege of working in t I.W.K. are of course convinced of the value of a ch dren's hospital. To those who know the hospital le well, the invitations extended by the Presidents of t Board of Management and of the Medical Staff to vi the hospital and learn something of its work will hop fully be accepted. To the Medical Society a special pl is made to transmit to the community, especially executive, government, a sense of the unique contrib tion which the I.W.K. can make to Nova Scotia and t other Atlantic Provinces.

The final aspect of paediatric practice which essential to appreciate is this: the new hospital designed for children, who are independent althou immature individuals rather than small adults. Althou specific attention has not herein been paid to the em tional needs of children in hospital, this is not to s that it is unrecognized. Today there is a greater recogn tion of the psychological aspects of hospitalizatio with associated parental separation, mental and physi trauma, in a new, sometimes frightening but sometim creative, environment, and it is appropriate to emphasi the fact that in the new hospital, provision has be made for mothers to remain with their children if t occasion demands it. It is only in a children's hospit oriented towards all aspects of paediatric care, that t complete range of a child's needs can be satisfied, at least understood. With the move to a great ne hospital, the result of a generous bequest from t Killam family, the most pressing need is for us all retain what Dr. Alan Ernst, President of the Medi Staff, calls a "friendly spirit". In a fresh environme this will help us to remember the classical adage: " cure sometimes, to relieve often, to comfort always".

D.A.E.S.

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1. **Coward, N. B.:** *A Glorious Band.* Me Dal **2:** 12, Janu 1970.
2. **West, M. L.:** *Children of the Shadows.* Wm. Morrow, N York, 1957.

An Unchanging Friendly Spirit

"Dear Member,

I am taking this opportunity to write to you on the occasion of the opening of The Izaak Walton Killam Hospital for Children.

May 28, 1970 will be a great day for the children of the Atlantic Provinces, and it will be a great day for the children for decades to come. It will also be a proud day for the many contributors to The Izaak Walton Killam Hospital for Children and a day of great satisfaction for all who have planned so well and worked so hard to see its completion.

The actual move from the old Children's Hospital to the new Izaak Walton Killam Hospital for Children will create a sudden euphoria for all who will work in this new complex. So conditioned are the staff to working in an overcrowded environment that it is difficult for them to visualize the attractiveness and spaciousness of the new hospital. A pleasant surprise awaits them, and a surprise that every member of the hospital staff deserve, for the output of this hospital under our present conditions is a tribute to our staff and merits high praise indeed.

If you have had the opportunity to revisit a vacant ward of an abandoned hospital with only its obsolete equipment scattered about then you must have vividly experienced the fact that the vitality of a hospital is primarily dependent on the personnel working in that hospital.

The physical characteristics of the old Children's Hospital have not changed in the past decade but inside that now nostalgic structure the activity has been intense and if you have not visited the Children's Hospital for some time it is unlikely that you will recognize the faces of the many new staff members each of whom brings with him a new skill that will enable The Izaak Walton Killam Hospital for Children to give your patient and you an increasingly more sophisticated service.

At the time of writing the Hospital Administration is faced with the threat of a possible reduction in its operation budget that would lower the standard of care below an acceptable minimum standard. This has created some anxious moments for the Board Members and medical staff and we sincerely hope that it is resolved by the time that the hospital is officially opened.

When the I.W.K. Hospital is fully operational it will supply the space that is needed for more efficient delivery of these services to your patients. The I.W.K. Hospital will also allow better coordination between such services as neurosurgery, psychiatry and neurology since they will now be under the one roof. Open cardiac surgery and the elaborate investigation of congenital cardiac disease have now become so commonplace that they have lost some of their glamour. This unit will be a more efficient one when the investigational unit and treatment unit are housed in one hospital. We look forward to more efficient facilities for these units.

The Children's Hospital and the staff of the hospital have always had a responsibility for training doctors and during the past few decades this responsibility has become broader so that we are now heavily committed to both undergraduate and postgraduate training. At present we have thirty postgraduate residents in training and our projected needs in the future include thirty to forty more. The residents are of course an important part of our treatment team and their presence in the hospital enhances the quality of the medical care given to our patients.

The delivery of diagnostic and treatment services and the training of residents has indeed undergone very noticeable changes during the past few decades but the I.W.K. Hospital must now also look towards its role in research. Our research facilties in the old Children's Hospital were indeed cramped. The Department of Paediatrics has plans well established and almost completed for a large unit for research studies in microbiology in children. As the new hospital matures we will look forward to a greatly broadened responsibility for research in other disciplines.

The general practitioners in the Halifax-Dartmouth area will have access to a greater number and a greater percentage of beds than they had in the old Children's Hospital and these beds will be so arranged that their patients will enjoy both intern and resident coverage. These features are not always available in all teaching hospitals.

Were one to reflect and look back sixty years and compare the opening of the Children's Hospital with the opening of The Izaak Walton Killam Hospital for Children one would have to conclude that the I.W.K. Hospital was blessed with a legacy of trained and silently dedicated staff members that would appear as an army of medical staff if compared with the small number of staff of the original Children's Hospital. With such a legacy the Izaak Walton Killam Hospital's future role in treatment, teaching and research should be an unqualified success.

If you are in town, drop in and see the new I.W.K. Hospital and feel free to attend our conferences. You will no doubt agree that there have been many dramatic and impressive changes but that the friendly spirit of the Children's Hospital remains unchanged."

Yours very truly,

W. Alan Ernst, M.D.
President of the Medical Staff,
The Izaak Walton Killam Hospital
for Children □

HOSPITAL INSURANCE COMMISSION

NOVA SCOTIA

CONGRATULATIONS and BEST WISHES

to

THE CHAIRMAN, BOARD OF DIRECTORS

DIRECTORS

and

STAFF

of

The Izaak Walton Killam Hospital for Children

On the occasion of your official opening

MAY 28, 1970

MR. A. N. SARTY *Chairman*
DR. G. G. SIMMS *Executive Director*
SISTER C. GERARD, R.N.
MR. M. R. CHAPPELL

Dr. D. F. MACDONALD
MR. D. C. McSWEEN
MR. J. H. MacCALLUM
MR. G. L. CALKIN

The Izaak Walton Killam Hospital for Children:

An Inside Look

Richard B. Goldbloom M.D. F.R.C.P. (C)*

Summary: *Some of the innovations seen in the new hospital are described. An attractive environment has been created in which expansion of services and teaching facilities will permit proper attention to the needs of sick and injured infants and children. The impetus thus given to the recruitment of personnel to this Maritime referral centre is emphasized, as is the continued need for collaboration within the medical community.*

Some time during the month of May 1970, a relatively small but very important parade will take place in Halifax. At that time the young patients of the redoubtable old Children's Hospital will walk, ride or be carried across a specially constructed covered passageway to be the first occupants of the new Izaak Walton Killam Hospital for Children.

The new hospital is in many ways a magnificent structure. It is equipped with the most modern diagnostic and treatment facilities, as well as many specialized areas for teaching and research. Most of these facilities are long overdue in what is, after all, the only specialized referral centre for children in the Maritime provinces. Thus, while we must be grateful for the availability of these services, we must also admit that our children deserve no less.

As every physician knows, beautiful surroundings and complex equipment do not of themselves elevate the quality of care. This quality is a function of the people who serve the institution: doctors, nurses, laboratory workers, volunteers and all the auxiliary health services. To my mind, the most exciting aspect of this great move is the effect it is having in attracting highly trained personnel whose special expertise has never before been available in this area. On the medical side, new or additional specialists in paediatric cardiology, neonatology, genetics, gastroenterology, endocrinology, immunology, neurochemistry, child psychiatry, infectious disease and general paediatrics have already joined our staff or will do so within the coming year. A full-time paedodontist will be added at the time of the move, making possible the most modern treatment of specialized dental problems of childhood, such as occur in association with cleft palate. As for surgery, an additional full-time paediatric surgeon will join us in July, 1970, and an entirely new Department of Paediatric Neurosurgery will for the first time permit the total care of children with neurosurgical conditions to be provided under the one roof.

Expansion of Services

For many years, a major deficiency has been the lack of in-patient and out-patient psychiatric services for children. The new hospital incorporates a beautifully designed and self-contained combined service of this kind, which will provide short-term hospital psychiatric care for the many youngsters in need of such attention.

Just a few of the other new services may be mentioned:

i. A specially designed burns unit.

ii. A 30-bassinet referral unit for the sick newborn.

iii. A 10-bed observation unit for infants and children requiring less than 24 hours of hospitalization.

iv. A clinic for speech and hearing disorders, with the latest in diagnostic equipment.

v. Special in-patient area for adolescents.

vi. A 10-bed Clinical Investigation Unit, staffed by highly trained nurses, designed for the performance of all varieties of special endocrine and metabolic studies and for the treatment of children with particularly complex disorders.

vii. Specially equipped wards for children with respiratory and infectious diseases.

viii. Surgical recovery and intensive care units, both staffed by specially trained nurses.

Out-patient and emergency departments, the 10 bed observation unit and the poison-control centre are all located on one floor at street level, and will be administered in a fully co-ordinated manner by a full-time medical director of out-patient services and an integrated nursing service. In anticipation of the new facilities, and as a result of new staff appointments, a number of new clinics have been established, such as a clinic for diabetic children, a clinic for children with arthritis and another for children with renal disease. These clinics will permit the co-ordination of all the

*Professor and Head, Department of Paediatrics, Dalhousie University and Physician-in-Chief, Izaak Walton Killam Hospital for Children, Halifax, N.S.

specialized health services that may benefit children with special and complex forms of illness.

Many features of the building are designed to speed and simplify service to the patients. A pneumatic tube system will deliver requisitions, charts and specimens to and from wards and laboratories. Drugs will be delivered by a special "dumb waiter". The communications system includes electronic paging of both house staff and attending staff. Food and supplies will travel on separate high-speed service elevators.

A number of innovations are being introduced to improve the quality of communication between hospital staff and physicians in the communities we serve. Both centralized and local dictating facilities will be available at all key sites. The medical record format has been totally revised with a view to simplification.

The number and proportion of beds available to family practitioners has been increased significantly. At present in the "old" hospital an average of 26 beds are used by family practitioners in the Halifax community. In the new hospital, 65 designated beds, will be available for this purpose.

Teaching facilities

Until this year, we have been a teaching hospital with virtually no teaching facilities. Students, interns and residents have been crowded around beds with innumerable auditory and visual distractions, making the examination of patients and the communication of ideas extremely difficult. The new hospital will provide privacy for interviewing and for teaching in all in-patient and out-patient areas. The main auditorium will be able to accommodate an entire class of medical students as well as large medical conferences. Besides being unusually attractive, the auditorium has excellent acoustics, all types of projection facilities situated behind the screen, and an appropriate proportion of writing surfaces for left-handed individuals.

An Environment for Children

Colour and the overall decorative aspects of the new hospital are prominent. Each ward has its own distinctive colour scheme; even such traditionally bland fixtures such as the ceiling-track curtains come in bright striped materials to match the decor of the particular ward.

Each patient floor has its own play and dining areas. Residents on call at night will sleep in special rooms on the ward. Roll-away beds will be provided for parents who are staying in hospital with their children.

Each ward and department has its own cheerful carpeted waiting area where small groups of comfortable furnishings will provide an atmosphere which will be a far cry from traditional hospital and clinic waiting rooms. A program has been instituted to gradually fill the hospital with outstanding works of art by children from all parts of the world.

These are some of the many innovations and attractive features of the new hospital. It is hoped that all physicians in the Atlantic region will visit the hospital to familiarize themselves with its services, for the needs of sick and injured infants and children are dependent on close collaboration between physicians throughout the Maritimes and the Izaak Walton Killam Hospital for children. □

Commentary

THE OTHER SIDE OF THE COIN

The Declaration of the Rights of the Child states that "Mankind owes the child the best that it has to give".

On the opening of the Izaak Walton Killam Hospital for Children, surely none of us disagree. We are pleased that the needs of our children are being met better than ever before.

But every right knows its wrong, the day its night: every coin has both a head and a tail. Is our own currency wholly true?

Just consider: About 690 million children under the age of 15 live where the national per capita annual income is less than $500. One out of every two children in the developing countries receives no formal education. Three out of four such children receive no medical attention at birth or later. 300 million pre-school children suffer from malnutrition. 5 million children infants and young children die each year from impure water, others from the lack of simple food and from diseases unfamiliar to us. The classification of calamity is cold and ceaseless.

The question is: am I not my brother's keeper? Doesn't the child whose photograph appears on this *Bulletin's* cover have a brother in another land? Do we not recognize him?

As we enter the doors of a great new children's hospital here in Nova Scotia, a great moment, could we not pause and look beyond the horizon? Let us spare a thought for the needs of children elsewhere: let us consider whether it might be the time to forge a bond between ourselves in Nova Scotia and children in another land. A voyage into space was necessary for astronaut Frank Borman to tell us that "We are one hunk of ground, water, air, clouds, floating around in space. From out there it really is 'one world'." In this "one world" there is much we could do. The Izaak Walton Killam Hospital for Children might do well to consider this, and to ask whether there are specific ways in which Nova Scotia might become linked more closely with the developing countries. Here, "no child knocks in vain"—but at least there is a door, a shelter: there, too often no such door exists. Can we not now build a door, a roof to complement our own fine new edifice?

D.A.E.S.

Pitfalls in Paediatric General Practice

Joan M. Crosby, B.Sc., M.D., C.M.*

Summary: *Some of the factors which make for good paediatric practice are considered. A logical approach is thorough assessment of problems affecting different ages: during the period of intrauterine environment, the immediate perinatal period, the late neonatal period, infancy, and childhood. Careful history-taking, examination and investigation, together with appropriate treatment, constitute the keystone of success in avoiding pitfalls in paediatric general practice, and guide-lines for the practitioner are presented.*

In paediatric general practice, most of us commit a "multitude of sins" with alarming regularity. Whether these are the sins of omission or commission, it is important to take stock at intervals. Only thus may we consider what is of fundamental importance to good paediatric practice, and only in this way do we avoid the chief pitfalls in paediatrics. Furthermore, the range of practice does not start with birth, so that any consideration of pertinent factors must include a review of the problems of the intrauterine period as well as the stages of development into the adolescence.

Problems Related to Intrauterine Environment

i. The Rh and ABO status of the pregnant woman should be known and all necessary follow-ups on serum titers and amniotic fluid levels carefully made. Referral to the Rh Committee for advice and possible intrauterine transfusion is mandatory in any borderline case. In less serious instances preparation for immediate post-natal transfusion can be made either by delivering the mother in the area of a large paediatric center or by moving the baby promptly, if necessary, to a paediatric intensive-care centre. If indicated in Rh-negative mothers lacking antibodies after the first delivery, the use of special gamma globulin is advocated to prevent future sensitization.

ii. Toxaemia in the mother with its attendant dangers to the foetus and neonate of eclampsia, premature vaginal delivery, emergency caesarian section, foetal malnutrition and subsequent hypoglycaemia, can all be anticipated before birth, and referral to an intensive-care unit is wise.

iii. Early rupture of membranes is an indication for broad-spectrum antibiotic therapy for the protection of the infant. Attention should be paid to the list of drugs available which cause no harm to the foetus. Following delivery the infant should be investigated with C-reactive protein, chest X-ray, blood culture (if febrile) and a lumbar puncture if necessary. Therapy, if indicated, should be ampicillin 100 mg./kg./24 hrs, kanamycin 15 mg./kg./day, or chloramphenicol 25 mg./kg. for first five days, then 50 mg./kg./day.

iv. Diabetes should be adequately controlled and delivery timed so that the infant will be born at the ideal period of gestation, 36-37 weeks, and in a normoglycaemic state. This, too, should be carried out in a centre where the infant can be carefully monitored and treated for hypoglycaemia and respiratory-distress syndrome (R.D.S.).

The Immediate Perinatal Period

In both the normal newborn and in those included above after the early problems are corrected, a careful screening should be carried out for anomalies that are more difficult to detect. The more important of these are the following:

i. Respiratory System —
- Pneumothorax
- Pulmonary Hypoplasia
- Diaphragmatic Hernia

ii. Cardiovascular System —
- Cyanotic Lesions
- Acyanotic Lesions with or without murmurs.

iii. Gastrointestinal System —
- Tracheooesophageal Fistula
- Oesophageal Atresia—manifested by excessive mucus
- Duodenal Atresia—"double bubble" on X-ray
- Imperforate Anus

iv. Genitourinary System —
- Hypospadias
- Pseudohermaphrodism

v. Miscellaneous —
- Incompatibilities due to Rh factors or ABO group
- Phenylketonuria (Guthrie test on fifth day)
- Anomalies of eyes, ears, lip, palate, hips, feet
- Down's Syndrome and the trisomies (all obvious).

Hopefully in the near future routine screening will include an increasing number of conditions: iontophoresis to aid the early diagnosis of cystic fibrosis, and hearing tests are examples.

*Assistant Professor of Paediatrics, Dalhousie University, Halifax, N.S.

Late Neonatal Period, Infancy and Childhood

During this period the following headings should be utilized as guides at each contact with the patient whether in "Sickness or in Health"

i. Full History:

a. Family history
b. Feeding history and present diet
c. Allergies—colic, skin, diarrhoea, vomiting, wheezing
d. Emotional problems—parent, child and school

In this last respect the family physician has the advantage over the specialist in usually knowing the whole family and their environment.

ii. Full physical examination: This should include the usual examination with special attention to the physical and mental development, cardiovascular deviations from normal including blood pressure, and signs of subluxation or dislocation of one or both hips (most common on left). The last is not always evident at birth but should be picked up by three months of age for best therapeutic results.

iii. Investigation: Certain tests should be "routine" on an annual basis:

a. Haemoglobin
b. Urinalysis
c. Tine Test
d. Visual Acuity as early as is practical
e. Rough hearing test
f. Blood Sugar if family history is positive for diabetes

In any child the above routine will indicate whether further specialized tests need be done. These might include:

a. Complete blood picture
b. a.c. and 2-hour p.c. blood sugar levels
c. BUN
d. Immunoglobulins
e. Iontophoresis
f. X-rays of sinuses, adenoids, chest, long bones
g. Gastrointestinal series—upper or lower
h. Glucose Tolerance Test
i. Stool cultures, ova or parasites (very fresh specimen)
j. Psychological Assessment

All of these ancillary investigations can be done on an out-patient basis. It is important not to hospitalize a child with a reasonable home environment unless therapy is needed that cannot be given at home. A child will be less emotionally upset by his illness at home and a mother's care is usually superior to that of most busy nurses in an overcrowded ward. In addition, there is less danger of cross infection.

iv. Therapy: Under this broad category are included antibiotics, gamma globulin, vitamins, digitalis, diuretics, iron and immunizations.

a. ANTIBIOTICS: These are probably given at least twice as often as they ideally should be. Two main factors enter into this: pressure from parents for an "instant cure" for every upper respiratory infection, and, with patients up to six months of age, treatment with antibiotics simply to assauge one's conscience and the parents' feelings should the infant with a respiratory infection become a "crib death" statistic instead. However, before therapy is given to any age group, "silent infections" should be excluded if there is the remotest possibility that they are present. The most common of these are: meningitis, right middle lobe pneumonia, genito-urinary infection, early osteomyelitis and subacute bacterial endocarditis. The last two are usually in an older age group and are associated with a high fever. The first two can be very insidious and the child may have very little fever, especially in infancy. Cyanosis, listlessness and poor feeding may be the only positive signs. If these conditions are treated unwittingly the usual choice of antibiotics and the ordinary dose will not cure the disease but may disguise or ruin future cultures and positive diagnosis. The unpleasant side effects of almost all antibiotic therapy must be remembered, specifically diarrhoea, vomiting, and allergic reactions, while the tetracyclines may cause staining of the tooth enamel, and other drugs may be nephrotoxic or toxic to the eighth nerve. If one uses combinations of drugs, Pen sulfa, Novabrocin and tetracycline, and a reaction occurs, one is at a loss to decide which drug is the offender. In the neonate the safe drugs are few in number and include ampicillin, kanamycin, and chloramphenicol in proper dosage. When indicated antibiotics should be carefully selected, given in adequate dosage at regular intervals and for sufficient length of time. This must be impressed on the parent.

b. GAMMA GLOBULIN: We have recently passed through an era in which this substance was used rather freely in patients with recurrent upper respiratory infections. In the light of recent research in immunology it is now known that only Immune Globulin A deficiency can be improved with this therapy. This is rare and such therapy should be restricted to these cases and to those close contacts of hepatitis and rubella who have had neither the immunization nor the disease. It is probably of no value against chicken pox, mumps or roseola. It was formerly given to contacts of paralytic poliomyelitis but with present immunization procedure this should not occur. Hyperimmune gamma globulin is available through the Red Cross as a life-saving measure in severe vaccinial reactions such as eczema vaccinatum.

c. VITAMINS: These are probably much over-rated and overused. Vitamin D overdosage is possible. many dairies now add 200 units/pint of milk which is adequate for any child on a normal diet. Fruit juice supplies vitamin C, and most canned milks and pre-

pared infant formulae have adequate A, C, and D vitamins in them. Therefore it should be stressed to the mother that a normal milk intake for age and two to four ounces of fruit juice daily are all her "Johnny" needs.

d. DIGITALIS, DIURETICS, AND IRON: These are prescribed in specific dosage according to weight and medical indications. They are deadly poisons if taken in an overdose; the parents should be warned of this and told to keep the medications locked up. Only small quantities should be allowed in the house at a time. The same rule of course applies to barbiturates, A.S.A. and tranquilizers. The mother should be warned not to leave any drugs in her purse.

e. IMMUNIZATIONS: These should be managed by the family physician at the prescribed intervals and should include "quad", live measles vaccine, smallpox vaccination and triple toxoid. For adolescents who have not had mumps the "Jeri Lynn" vaccine is now available and is apparently without side effects. The time interval between immunizations is currently undergoing reassessment and change.

Last, but not least, if the condition of a paediatric patient is puzzling and does not respond to therapy after reasonable investigation, it is wise to refer him to a specialist (before the parent demands it). On these occasions it is important to provide the specialist with pertinent background information as to history, investigation, therapy to date and the urgency of the visit to the consultant. Yet many family physicians ask their receptionist to call a specialist for an appointment for "a Smith child", no age, diagnosis, degree of illness or previous therapy being given. This is unfair to the consultant, who naturally wants to know if the patient needs to be seen immediately or if a few days later would be satisfactory. All of this comes down to a lack of communication which is detrimental to the welfare of the patient. If the specialist is willing to devote an hour to seeing the patient, arranging necessary investigations, collecting the reports and sending out a full resume of findings, it seems only fair for the referring physician to take the time to speak with the consultant when the appointment is made initially. The usual reasons for referral are:

1. Recurrent respiratory infections
2. Allergies of skin and gastrointestinal tract
3. Abdominal pain
4. General malaise, fatigue and "joint pains"
5. Emotional problems
6. Feeding problems in infancy
7. Convulsions
8. Pyrexia of unknown etiology
9. Anaemia

The investigations to be carried out in these instances are usually fairly clear-cut with the possible exception of abdominal pain, general malaise, emotional problems and pyrexia. In the first three of these a knowledge of home and school environment and the temperament of parents and siblings is helpful, because in many instances abdominal pain and listlessness are functional. However, if necessary, the investigation should include a full genito-urinary work up, including urinalysis, urine culture and sensitivity, B.U.N., I.V.P. and voiding cystogram; a gastrointestinal series to exclude duodenal ulcer; a rectal examination, stool analysis for culture, ova and parasites; serum amylase, a.c. blood sugar to exclude diabetes; liver-function tests if indicated; and blood picture. If rheumatic fever is suspected for example because of listlessness, fever, heart murmur, joint pain, and rash, then a full-scale investigation is warranted to include: E C G, blood picture and sedimentation rate, and anti-streptolysin titre (A.S.O.T.) done serially. One should be very sure of the diagnosis of rheumatic fever before putting this label on a child as it will tend to make an invalid of him unnecessarily and will also ruin future chances for life-insurance coverage. If, however, the diagnosis is established beyond reasonable doubt then prophylactic penicillin is required, preferably Bicillin, 1,500,000 units intramuscularly each month (to be sure child receives full dose) or oral penicillin 500,000 units daily (if mother is reliable about giving medications). These should be continued through the 'teens at least. In the cases of unexplained pyrexia (103-105°F, 38-40.5°C) it is important to obtain blood, throat and urine culture and sensitivity, a chest X-ray (for the "silent" right middle lobe pneumonia), and possibly a lumbar puncture. The latter should definitely be done in an infant up to one year. With feeding problems in infants, pyloric stenosis, milk allergy and parenteral infections must be considered.

Thus, to avoid serious oversights in paediatrics, it is necessary to have a complete history and physical examination to know the child and family and their previous course, to use investigations as indicated and not to treat every minor fever or upset until a definite diagnosis has been established. All immunizations should be kept up to date. The tuberculin status, haemoglobin and urine should be checked at regular intervals. □

A simple child
That lightly draws its breath
And feels its life in every limb
What should it know of death?

—William Wordsworth

In praise of little children I will say
God first made man, then found a better way
For woman, but His third way was the best.
Of all created things, the loveliest
And most divine are children.

—William Canton

symbol of purity

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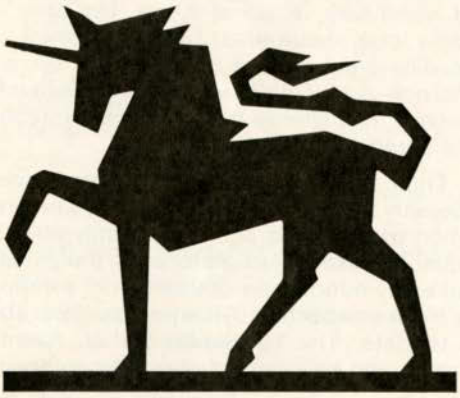

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Some Problems in Paediatric Surgery

D. A. Gillis, M.D., F.R.C.S. (C)*

Summary: *Some of the commoner surgical problems encountered in infants and children are discussed. Rectal bleeding, breast enlargement, tracheostomy, foreign bodies, pectus excavatum, intestinal obstruction, and herniae are assessed from a practical standpoint.*

In this paper, an effort will be made to outline briefly an approach to a few of the more common problems of a surgical, or potentially surgical nature encountered in infants and children.

Intermittent Mild Rectal Bleeding

This symptom, occasionally distressing to the child but more often of greater concern to the parents, may be encountered at any age but it is less common after the age of eight to ten years. Typically, the bleeding is bright and is seen only with defaecation. Pain is generally absent except in those instances where an obvious fissure is present; usually there is no evidence of a fissure or polyp on physical examination, sigmoidoscopy and barium enema. When these examinations are negative, and the child remains otherwise well, further investigation is rarely helpful; laparotomy seldom yields positive findings. The child's general health and blood values remain normal. The natural history in such cases is favourable; the bleeding tends to become less frequent as time goes on and then ultimately ceases altogether. In such cases, it is wise to reassure both child and parents that there is no evidence of serious underlying disease and that the problem will almost certainly require no further elaborate studies or treatment.

Enlargement of the Breasts

This problem is encountered in several forms, in addition to that which commonly occurs in neonates:

i. In females aged one to three years. The enlargement is commonly unilateral but may be bilateral. If unaccompanied by any other signs of secondary sexual development or other positive findings, it may safely be kept under observation since it usually subsides spontaneously. Most often the child remains basically healthy.

ii. In females, aged eight to twelve years. Usually unilateral and mildly painful, this presents as a "lump" beneath a normal areola in an otherwise healthy girl. Other overt signs of sexual development are generally absent. The swelling is firm and slightly tender. This is a benign and physiological phenomenon. Removal of such a "lump" would amount to a total mastectomy. The parents and child can be reassured that this is not a disease process and that it will ultimately be accompanied by the normal development of the opposite breast. Even a biopsy is not warranted.

iii. Adolescent males. This is generally mild and bilateral and is believed to be due to the secretion of oestrogens by the pubertal testis. Rarely does this condition last more than a year or so and seldom more than a few months. Biopsy or other surgical intervention is not warranted.

Tracheostomy

It is not intended here to review or discuss the indications for tracheostomy in the paediatric population. It is well known that there is some controversy as to the relative merits of tracheostomy versus endotracheal intubation in the management of certain respiratory problems. Both techniques are useful and neither is likely to replace the other completely. The technique chosen will obviously be determined by the circumstances of the particular problem; however, once the decision has been made to perform tracheostomy, several vitally important facts must be borne in mind.

i. Tracheostomy in children should *always* be done in an operating-room. If the need for an airway amounts to an emergency, whether in the emergency room or a ward, there is no doubt that it is best met by endotracheal intubation. As an emergency measure this is not always easy but it is certainly less difficult and a great deal less hazardous than trying to carry out a tracheostomy under local anaesthesia (or without anaesthesia) on a struggling hypoxic child. In such circumstances, bleeding is likely to be excessive, the lighting and technical help available will be poor, and major complications frequently are encountered. On the other hand, once an endotracheal tube (or bronchoscope) is in place, the child's lungs can be suctioned and ventilated, preparations can be made for the operation under the most ideal conditions available, and light general anaesthesia can be administered while the operation is carried out. However, the procedure could still be done under local anaesthesia if desired. The conditions for the performance of the operation then help to make it a safe and simple procedure.

*Associate Professor of Surgery, Dalhousie University, and Surgeon-in-Chief, Izaak Walton Killam Hospital for Children, Halifax, N.S.

ii. No part of the trachea should be hinged or excised in a child. The so-called "flap" tracheostomy may have distinct advantages in adults but these are outweighed by disadvantages of the technique when applied to children. A simple incision in the trachea will suffice for the safe insertion of the tube and will allow a much safer subsequent extubation when the tracheostomy is no longer required.

iii. Life-threatening complications may follow the performance of a "successful" tracheostomy. After the operation, the child requires constant careful observation, increased humidification of the atmosphere, and great care to keep the tube and tracheobronchial tree free from obstructing secretions. It is the doctor's responsibility to be sure that adequate observation is continuously available and that those caring for the child have been instructed in the details of post-tracheostomy management. As a general rule it is advisable to obtain upright A-P and lateral films of the chest as soon as conveniently possible following tracheostomy. This will confirm the proper position of the tube and will also detect the occasional pneumothorax and evidence of any other previously unsuspected thoracic disease.

Swallowed Foreign Bodies

Coins are the most commonly ingested foreign bodies and, if arrested in their passage, are most likely to be caught at the oesophageal inlet. Less often the swallowed object will be held up at a lower level. Foreign bodies stuck in the oesophagus usually lead to at least transient functional obstruction with pain, dysphagia and drooling. X-ray studies are diagnostic in cases where the material is radiopaque and may also be used (with contrast material) where a non-opaque object is suspected. Removal of foreign bodies in the oesophagus is generally not difficult although certain ones, notably open safety pins, pose special hazards. General anaesthesia is employed.

With rare exceptions, any foreign body traversing the oesophagus successfully will also pass through the remainder of the gastro-intestinal tract. Thus, coins, buttons, safety pins (open or closed), for example, may safely be left alone if entry into the stomach can be demonstrated, although at times complete passage through the gut may take several days or even weeks. Complications such as erosion and perforation are very rare and a waiting period of at least several weeks is justified.

Pectus Excavatum

This is the commonest clinical type of chest wall deformity. The depressed sternum and deformed costal cartilages adjacent to its lower half may be conspicuous even in infancy. Occasionally, the condition is familial. Studies of affected children have so far failed to demonstrate any distinct correlation between pectus excavatum, regardless of its severity, and significant alteration of cardio-pulmonary function. There is no justification, therefore, in ascribing such symptoms as diminished exercise tolerance, wheezing and frequen upper respiratory infections to the presence of pectu excavatum. The condition does not appear to alte normal life expectancy. On the other hand, a sever pectus deformity, especially in males, can constitute major cosmetic liability. This is the only real indicatio for surgical correction at the present time. There is n doubt that the operation is warranted in such selecte situations, most often in boys with a marked deformity It is important for the parents to understand fully tha the child's physical health will not be measurably im proved following the surgical procedure. When indi cated, the operation is best carried out some time be tween the age of 4 and 10 years although it can b done satisfactorily in any age group.

The same statements can be applied to the much less common pectus carinatum, or pigeon breast.

Early Post-appendectomy Mechanical Intestinal Obstruction

Although uncommon, this poses a problem in regard to surgical intervention. It is encountered within 1-3 weeks following the removal of a perforated appendix and usually in the midst of an otherwise uncomplicated convalescence. The child complains of crampy abdominal pain, becomes distended, and vomits. X-ray indicates mechanical low small-bowel obstruction (Figure 1). The obstruction is due to relatively soft fibrinous adhesions resulting from the recent peritonea irritation. It should be managed by Levin-tube decompression of the stomach and intravenous fluids in appro

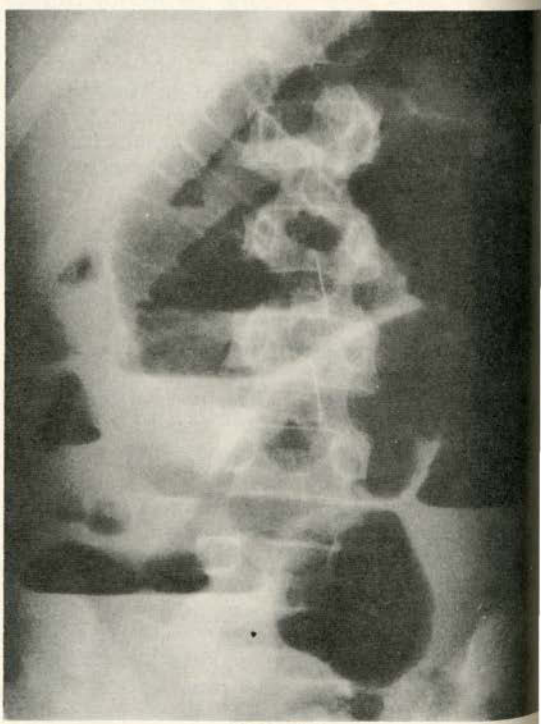

FIGURE 1

priate amounts; with the rarest of exceptions, it resolves within a few days. In contrast to many other forms of mechanical small-bowel obstruction, the need for a second laparotomy does not arise.

Herniae

i. INGUINAL

The incidence of complications of inguinal hernia, such as incarceration, is significant, particularly during the first year or so of life. Since inguinal herniae show no tendency to spontaneous closure, it is therefore a sound rule that, other things being equal, an inguinal hernia in a child should be refrained soon after it has been identified. It is obvious that prematurity, another illness or deformity, and other factors will modify this decision from time to time. Much has been written in support of routine bilateral herniorrhaphy in children under the age of four years. However, routine bilateral repair is not warranted. Since a one-year-old child who undergoes repair of a clinically unilateral inguinal hernia has about a 15% chance of developing a clinical hernia on the opposite side at some later date, routine bilateral exploration will be of no value in up to 85% of such cases and should not be advised. This statement holds true whether the original hernia is on the left side or on the right.

In young females, particularly under the age of six months, it is well to note that the ovary and Fallopian tube are commonly encountered in the hernial sac as a type of sliding hernia. In the repair of such herniae, care must be taken to avoid any damage to the adnexal structures or to their blood supply.

Simple scrotal hydrocoeles under the age of one year seldom require operation. These are common in newborn males and have a distinct tendency to subside gradually. Those which appear suddenly at a later age, or which persist beyond a year or two, are associated with a patent processus vaginalis (hernial sac) and require the same type of operation as one carries out in a child with an inguinal hernia. Hydrocoeles in infants and children should not be aspirated.

Repair of an inguinal hernia in a patient with associated cryptorchidism on the same side should include simultaneous orchidopexy.

ii. UMBILICAL

Umbilical herniae, on the other hand, show a strong tendency to gradual closure during the first few years of life. Also, the incidence of complications is very small, and in contrast to inguinal herniae, the risk from an umbilical hernia is actually less than the small risk of its surgical repair. The vast majority of these should be left alone for at least several years. Strapping has not been shown to be of any value in hastening fascial closure.

iii. FEMORAL

While distinctly uncommon, femoral herniae do occur in children. They seem to be as common in males as in females. The statements regarding repair of inguinal herniae could be applied equally well to those which occur along the femoral canal.

Finally, brief mention should be made of several other conditions which ordinarily require no surgical intervention. This would include most anal fissures, mucosal rectal prolapse, the vast majority of capillary haemangiomas, diastasis recti and tongue-tie. All of these are potentially treatable by surgical techniques but can almost always be left alone with the confident anticipation that they will lead to no serious harm. □

"ONE MILLION CHILDREN"

The problem of children with emotional and learning disorders is now a major one. Over 1,000,000 Canadian children suffer in this way, according to A National Sudy on Canadian Children with Emotional and Learning Disorders, the CELDIC Report. This report, which should be of interest to the medical profession, will soon be available. Address for further details: The Commission on Emotional and Learning Disorders in Children, 165 Bloor Street East, Suite 302, Toronto 5, Ontario.

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ADVERTISERS' INDEX

It's Only Statistics:

An Approach to Perinatal Mortality in Nova Scotia†

K. E. Scott, B.Sc., M.D., C.M.*

Summary: *The relatively high perinatal mortality rate in Nova Scotia is analyzed. Particular reference is made to the regional variations existing within the province, the factors in perinatal mortality, and to the ways in which the perinatal mortality rate might be reduced. Recommendations are made for a program of improved perinatal care, so that both perinatal mortality as well as morbidity might be radically reduced.*

The statistics of perinatal mortality in Nova Scotia make grim reading indeed. In Canada as a whole the mortality rate is almost the highest of any technologically advanced Western country. In 1965 Nova Scotia lay midway between the other Canadian provinces, but an increase in our mortality with a decrease elsewhere in Canada placed us ninth in 1967, only the Newfoundland rate exceeding that of Nova Scotia. Even more disturbing is the regional variation in mortality within Nova Scotia ranging from a low of 23.2 deaths per thousand births to a high of 38.6. Outside Halifax the chance of a pregnancy ending in a stillbirth is 40% higher than in Halifax, while in Cape Breton it is 80% higher. Outside Halifax a premature infant has a 60% higher chance of dying, in the Northumberland and Western Regions 80%. A full-term infant has twice the chance of dying in areas other than Halifax.

Someone recently remarked that these were only statistics, and really they did not mean much. In fact these statistics represent numbers of people who died, many of whom should now survive. If the mortality rate in the non-Halifax area were the same as in Halifax, there would have been 320 fewer deaths in the period 1965-1968. It is true, of course, that man threatens to overgrow the earth, with the natural controls of our species having been removed by the sciences of farming and medicine. The birth rate is still two and one-half times the death rate in our country. It is also true that about one-quarter of Nova Scotians migrate to Upper Canada. Meanwhile we produce about 400 mentally retarded infants a year, and few of *them* migrate. It is estimated that between 20 to 40% of this retardation is produced by perinatal events and therefore potentially preventable. A long-held attitude amongst physicians has been that with reduction of the mortality rate the number of damaged infants will increase. This was based upon old follow-up studies of prematurity, which are now irrelevant because of radical changes in premature infant care. The present evidence strongly suggests that the opposite is true: by reducing mortality rates the incidence of cerebral damage is also reduced. If only we knew which infants would die we could leave them all without treatment, but if we leave them all without treatment some would survive and be damaged who would otherwise be normal. The cost of adequate high risk obstetrical care and intensive neonatal care is high, but far less than the cost of facilities for the mental retardation which could thereby be prevented. Two classical instances in which prevention of death also prevents mental retardation in others are brain damage due to jaundice and neonatal hypoglycemia. These two conditions, left untreated, will kill some infants and damage many more, but adequate treatment will prevent death and also prevent cerebral damage.

Factors in Perinatal Mortality

What is the cause of the high perinatal mortality rates in Canada, and in Nova Scotia? We know that economic factors are not of major importance, as the richest country in the world (U.S.A.) has the highest mortality rates, while the second richest (Sweden) has the lowest mortality rates. We know that geographic factors are not of importance: Norway, with severe geographic conditions has a very low mortality rate; the Lunenburg-Queens Region of Nova Scotia, with its relatively scattered hospitals, has a mortality rate almost as low as Halifax; while Cape Breton South with the greatest concentration of hospitals and deliveries in a small area has the highest mortality rates.

Nor is it the availability of physicians: Cape Breton North, with about one-half the physician-to-patient ratio of the rest of the province does not have the highest mortality; Cobequid, with the best ratio outside Halifax does not have the lowest mortality; while the Western Region with almost the highest premature mortality rate has almost the best ratio. If the high mortality rates are specifically due to circumstances surrounding prenatal-obstetrical-neonatal care, then regional differences in maternal mortality should follow the same pattern as perinatal mortality. The first three graphs in the Figure show these rather striking relationships. A woman in Cape Breton has two and one-half times the chance of

†Supported by National Health Grant (Canada), No. 602-13-13.

*Associate Professor of Paediatrics, Dalhousie University, Halifax, N.S.

dying during pregnancy as in Halifax. That this is not due to differences in the quality of medical care, social attitudes, or hospital facilities affecting the total population is illustrated in the fourth and fifth graphs of the Figure. Regional differences in infant mortality follow the above trends only slightly, and older population mortality not at all.

The high mortality rates surrounding the period of pregnancy and childbirth is, then, an isolated specific phenomenon, which almost certainly represents a peculiar attitude to the particular area of human reproduction. This is pointed up by attendance at prenatal clinics, which is roughly inversely related to reproductive mortality rates in the regions. As an example, the Lunenburg-Queens Region has a relatively good prenatal clinic attendance record and very low mortality rates. This phenomenon may also represent a situation peculiar to the reproductive time of life when the kind of medical care and facilities is so different from that for the usual kinds of illness that it can be given well only with concentrated facilities by people with additional training. If this is so there is great hope for rapid improvement as changes of attitude by the pregnant woman, concentration of high-risk patients in slected facilities, and additional professional training should bring about rapid reduction in mortality rates.

A few years ago a high maternal death rate was accepted as inevitable but with modern obstetrical care the death of a mother is a rare event. The high neonatal mortality rates which we still accept are also no longer inevitable. Until recently most neonatal deaths were thought to be due to Nature's mistakes but in fact 80% of these infants are normally formed. Also until recently very little time and effort was expended on neonatal care though 50% of pediatric deaths are in the neonatal age group.

That the high mortality rates in this country and province are not necessary is amply demonstrated by England and New Zealand. The great majority of pregnant women there get their prenatal care in special clinics, delivery is usually by midwives and infant well baby care is given in other special clinics. Most of the health care surrounding pregnancy is given by non-physicians, yet their maternal and perinatal mortality rates are much lower than ours, their costs of this kind of care are cheaper, and physicians are spared for other tasks.

Reduction in Perinatal Mortality

In Nova Scotia only one-third of deliveries take place in Halifax, the other ten-thousand annual deliveries occurring in the thirty-nine other hospitals in the province, none of which deliver more than seven-hundred per year. It would be virtually impossible to provide each of the thirty-nine hospitals with well-equipped and staffed obstetrical and neonatal units to care for the high risk mother and sick newborn infant. We are faced, then, with two alternatives: either to accept the present state of high pregnancy losses of both mother and infant, and certainly high cerebral damage rates, or to organize the care of high risk mothers and infants in geographically selected units.

Some attempts to reduce perinatal mortality are already underway. An intensified program of medical student education in the care of the newborn has been initiated. The Rh Committee has introduced amniocentesis, selected early induction, and intrauterine transfusion in Rh hemolytic disease. Post-graduate visiting lectures on obstetrical and neonatal care are being

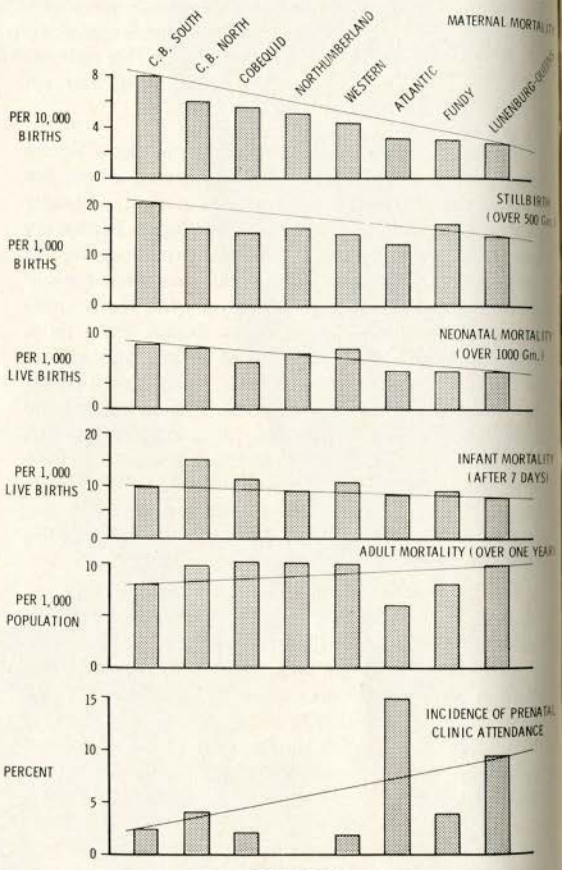

FIGURE 1

carried out. A clinical traineeship in neonatal care for physicians has been started, and although only one physician has so far taken advantage of it, hopefully more will follow. Seven nurses in the province have taken the two month course in care of the ill newborn. Short visits by nurses to the Grace Hospital for refresher courses of 1-2 weeks' duration have been initiated. A neonatal procedure manual has been completed. The "neonatal club", a three day refresher course for general practitioners with clinical traineeship and for pediatricians, has been started.

Since 1962 neonatal mortality has fallen by 19% in Canada, but by only 17% in Nova Scotia, this latter fall

being due almost completely to a 31% fall in the Halifax area. Nevertheless, between 1965 and 1968 there was a noticable reduction, from 14 to 10%, in premature infant mortality outside Halifax, with Cape Breton South contributing a large measure to the fall by a reduction from 14% to 9%. This is an early but welcome indication that the cause has been taken up with enthusiasm.

Nevertheless, if all Nova Scotians are to have access to the best possible care during pregnancy and delivery, an enormous amount of work is still necessary. It is evident that high mortality rates are associated with low attendance at prenatal clinics and vice versa (see Figure). Therefore all possible media, particularly television, newspapers, should be used to educate the public in obtaining early and adequate prenatal care, whether from stationary or travelling clinics, or the family practitioner. The reality which must be faced is that of the diffusion of high risk obstetric and sick newborn care in thirty-nine hospitals outside of Halifax. The Cape Breton South Region is the most extreme example of this phenomenon: about three-thousand deliveries annually are divided amongst seven hospitals, all conducting their own high risk and premature care, and within ten miles of each other.

Recommendations for Improved Perinatal Care

First, all pregnancies with a high risk of fetal loss, predictable before the onset of labour, should be sent to one of three or four high risk obstetrical units in the province. Second, in each area one hospital should be designated as the hospital for unexpected premature labour, and for small premature and sick infant care. The designated hospitals should be staffed and equipped to accommodate this load. The hospitals and medical societies should be involved in making these decisions, and then all means should be used to educate the pregnant patient to take advantage of these facilities. The dramatic regional differences in mortality rates surrounding the time of pregnancy and delivery point up the fact that our present pattern of hospital care does not meet this problem. Third, individual physicians are advised to consider the following guide-lines to the planning of obstetric and perinatal care:

i. Screen all pregnant women for high risk factors present before labour.

ii. Send all high risk pregnancies to a high risk referral center.

iii. Promote with confreres the concept of a single conveniently located hospital in your area for care of the woman in unexpected premature labour, and for the transfer and care of the premature infant born unexpectedly.

iv. Take steps to educate the public on the use of the one hospital in the area for any woman who goes into premature labour.

v. Send all newborn infants who are ill at birth or become ill subsequently, to the same area hospital.

vi. Make sure that your hospital has copies of a list of high risk pregnancies for referral to the high risk obstetrical unit, and a list of the categories of newborn infants to transfer to the area hospital for premature and sick newborn care.

vii. If working in an area hospital for premature care encourage one or two physicians to take a post- encourage one or two physicians to take a clinical traineeship in care of the newborn. Also, make sure that nurses are trained in care of the sick newborn at one of the available courses.

viii. Promote the idea of one physician being in charge of the policies and overall quality of care in the nurseries.

ix. Promote the obtaining of autopsies and the setting up of a perinatal committee to review all the hospital stillbirths and neonatal deaths, not for the purpose of assigning blame, but to improve care of the next patient in the same circumstances.

For this one group, then, we must be prepared to abandon our professional pride in our own hospital and be prepared to centralize facilities to cope with this unique problem.

With the vigorous application of the principles outlined, within the near future perinatal mortality in Nova Scotia could be the lowest in the country, such a pattern setting an example for other countries. In addition, a new program of detection and prevention of mental retardation and cerebral palsy could then be initiated.

Acknowledgment

I am indebted to the many physicians, Record Room heads, and administrators throughout the province for their co-operation in supplying the data upon which much of this work has been based, to the other members of the Nova Scotia Perinatal Mortality Committee both past and present, including Dr. Donald Smith, previous chairman, and Dr. D. Cudmore and Dr. D. Reid, present chairman and member, and the Nova Scotia Medical Society and Department of Maternal and Child Health who supported these studies, and to Mrs. S. Stone and Mrs. L. Murphy for their work in assembling data. □

Children have neither past nor future; and that which seldom happens to us, they rejoice in the present.

—La Bruyere

The childhood shows the man,
As morning shows the day.

—Milton

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Acute Osteomyelitis in Infants and Children: Antibiotic Therapy

R. L. Ozere, M.D.*

Summary: *In infants and children, acute osteomyelitis remains a relatively common condition. The etiology and epidemiology are discussed, and the importance of early diagnosis is emphasized. The need for rapid identification of the infecting organism and for early institution of appropriate treatment is made clear. Antibiotic therapy is described in detail, but the importance of early surgical decompression is stressed should the clinical signs not respond to medical treatment within twenty-four hours of admission to hospital.*

Early diagnosis, rapid identification of the infecting microbial agent, and immediate institution of appropriate antibiotic treatment are urgent and crucial in acute infections of bone and joint of infants and children. Appropriate treatment instituted immediately in suspected cases can prevent extensive bone or joint damage and the occurrence of long lasting and disabling chronic osteomyelitis.

Etiology and Epidemiology

Most infections in children are hematogenous in origin, but predisposing preceding infectious lesions or diseases may be present including furunculosis, chickenpox, vaccination, impetigo, burns, sickle cell anemia, leukemia, splenectomy, the dysgammaglobulinemias, and penetrating contaminated wounds. Not infrequently a history of mild trauma to an extremity can be elicited prior to the onset of infection. Paradoxically, in the case of hematogenous osteomyelitis, the nidus of infection in the bone may not correspond to the site of original injury, and the etiological role of prior injury is controversial.

In small infants, bone is relatively spongy with large cancellous spaces, and the entire bone is much less rigid than in older children or adults. Consequently, although osteomyelitis may result in considerable bone destruction, swelling of the distensible shaft and escape of purulent material subperiosteally occur much more readily, minimizing ischemic bone necrosis. Small infants thus may show incredible recovery and remodelling of new bone after extensive bone destruction under appropriate antibiotic treatment.

In older children with more rigid bones osteomyelitis results in the development of pus under pressure with coalescent abscesses and extension of infection along the medullary canal with extensive ischemic necrosis.

In Great Britain the incidence of acute osteomyelitis has been estimated at one case for every five thousand children. An understanding of the epidemiology of infective causes in the various age groups of infancy and childhood is essential, since the institution of immediate and appropriate antibiotic therapy as soon as the diagnosis is suspected is based on an "intelligent guess" as to the likely nature of the infecting organism. Bacteriologic laboratory identification of the bacterium responsible may take several days and ideally should confirm the clinician's original guess as to the likely cause.

In the neonatal period and up to three months after birth, Stapylococcus aureus and β-haemolytic streptococci, in that order, are the most frequent infecting organisms. However, due to relative absence of effective macroglobulin antibody, occasional cases may be due to Gram-negative enteric bacilli, including Escherichia coli, proteus species, Aerobacter aerogenes, Pseudomonas aeruginosa, and salmonella. Moreover, due to colonization with hospital strains of staphylococci in newborn nurseries, infections in newborn infants caused by this organism are almost invariably resistant to penicillin.

In the age group beyond three months and extending to the age of five years the majority of acute bone and joint infections are caused by Staphylococcus aureus. The carrier state of penicillin-resistant staphylococci continues from the neonatal period and extends over the first two years falling appreciably thereafter. In this age group, therefore, the possibility of a penicillin-resistant infection must always be borne in mind. Infections due to Hemophilus influenzae are also more common in this age group than any other, and the possibility of occasional infection by this organism should be covered by initial choice of antibiotic. Other infective causes include β-haemolytic streptococci, particularly if impetigo is prevalent within the family, and the pneumococci.

In children with sickle cell disease, particularly between the ages of two to four years, bone infections caused by salmonella or shigella are fairly common.

*Professor of Paediatrics, Dalhousie University. Halifax, N.S.

Beyond five years the vast majority of cases are due to Staphylococcus aureus, very often strains that are penicillin sensitive. Much less frequently seen are infections produced by β-hemolytic streptococci or pneumococci.

In children with leukemia or other disorder treated with steroids or immunologically suppressive drugs, various types of bone infection may occur caused by staphylococci, streptococci, pneumococci, Gram-negative enteric bacilli such as E. coli, pseudomonas, and occasionally fungi. In these children a broad spectrum of antibiotic coverage is essential in the initial treatment before the specific infectious agent is cultured.

Diagnosis

Fever and bone pain, with or without local heat, are the presenting symptoms of acute osteomyelitis. Pain, swelling, and acute tenderness of a single joint with fever readily establish the clinical diagnosis of acute septic arthritis. In small infants, swelling in or close to a joint with tenderness and limitation of motion of the affected extremity are most frequently seen. The infection in the neonate is often of a more indolent nature with little or no fever despite the serious nature of the infection.

Radiographic changes in bone may take from five to ten days or longer to develop and are not to be relied upon for early diagnosis. This interval may be even longer if an inadequate course of antibiotic therapy has been given early in the course of the infection.

Early diagnosis as to the nature of the infecting organism is based upon blood culture. At least three, preferably four, such cultures should be taken within a time interval of two to three hours. Antibiotic therapy may be started as soon as the first culture is taken. The height of the child's fever bears no relationship to the presence or absence of bacteremia. Bacteremia, however, is always intermittent early in the course of any infection, and a single blood culture may therefore be insufficient.

Treatment

If a septic joint is suspected the joint fluid should always be aspirated by needle for purposes of culture as well as direct gram staining for organisms. If frank pus is aspirated adequate surgical drainage of the joint may be usually necessary.

If acute osteomyelitis is suspected, and the child has had fever, severe bone pain, tenderness, and oedema which has not responded to intensive treatment including immobilization, elevation, and antibiotic therapy within twenty-four hours of admission to hospital, then *exploration, drilling, and decompression is mandatory* in order to evacuate pus which is under great pressure. Release of pressure will minimize extensive bone destruction and necrosis. Following this, *the wound must be closed primarily without the use of drains.* In addition to surgical decompression, immobilization by plaster cast or traction must be instituted. Such pus as is obtained should be stained directly for organisms by the gram method as well as cultured.

In the management of these cases, initial antibiotic therapy should always be given by the intravenous route in order to ensure high active blood and tissue levels. Intravenous therapy preferably should be maintained for not less than two weeks until all signs of acute system illness, local pain, and tenderness have abated, then may be continued either by the I.M. route or orally.

The choice of initial parenteral antibiotic therapy (where possible, always give intravenously—exception kanamycin) is shown in the table.

TABLE

DOSAGE OF ANTIBIOTICS

i. In the very young infant or neonate:

a. Penicillin and Kanamycin combination
- Penicillin 50,000 U/kg/day in 4-6 divided doses, I.V. Intraarticular 10,000 U/ml in N. Saline
- Kanamycin 7.5 mg/kg/day, I.M. Maximum duration of therapy 12 days. Intraarticular 2.5 mg/ml in N. Saline

or b. Ampicillin and Cloxacillin in combination
- Ampicillin 100-200 mg/kg/day in 4-6 doses, I.V.
- Cloxacillin 50-100 mg/kg/day, I.V. in 4-6 doses

ii. In older infants and up to 4 years of age:

a. Penicillin and Cloxacillin
- Penicillin 50,000 U/kg/day in 4-6 divided doses, I.V.
- Cloxacillin 50-100 mg/kg/day, I.V. in 4-6 doses

or b. Ampicillin and Cloxacillin
- Ampicillin 100-200 mg/kg/day, I.V. in 4-6 doses
- Cloxacillin 50-100 mg/kg/day, I.V. in 4-6 doses

iii. In children over the age of 4 years:

a. Penicillin and Cloxacillin
- Penicillin 50,000 U/kg/day in 4-6 divided doses, I.V.
- Cloxacillin 50-100 mg/kg/day, I.V. in 4-6 doses

or b. Lincomycin, particularly if the child has suspect penicillin allergy
- Lincomycin 10-20 mg/kg/day, I.V. in 3 doses 30-60 mg/kg/day orally in 3 doses.

If a specific infecting organism has been cultured from blood cultures or direct aspirate and is found to be sensitive to one or other of the above antibiotic mixtures, further therapy can be continued with the single appropriate antibiotic. In children over five years of age this often turns out to be penicillin. If no organism is cultured combined thereapy should be continued.

With regard to duration of antibiotic therapy, it is difficult to generalize. To a large extent it depends upon the nature of the infective organism, the extent of bone destruction, and the presence or absence of underlying disease states. However, those infections caused by staphylococci, at any age, and those produced by gram-negative enteric bacilli in the neonate require the longest periods of treatment, usually at least six weeks. Therapy by the oral route may be given after

an initial two to three weeks of intravenous therapy. Infants and children should be free of fever and pain, with continued and sustained radiographic evidence of bone regeneration for at least one month before thereapy is discontinued.

Occasional relapses of infection do occur, particularly in staphylococcal osteomyelitis, usually within three months after discontinuation of therapy. In such cases, re-treatment with antibiotic is necessary, usually for a period of at least three months. □

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INSTRUCTIONS TO AUTHORS

Members and others wishing to contribute to *The Bulletin* are invited to submit their material to the Offices of The Medical Society, Sir Charles Tupper Medical Building, Halifax, N.S. In general the rules laid down for the *Canadian Medical Association Journal* and published therein under the heading "Instructions to Contributors", should be followed.

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The Poison Control Centre

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

Summary: *A brief analysis of the functions of The Poison Control Centre, the regional unit for Nova Scotia, is presented. Based on work at The Izaak Walton Killam Hospital for Children, the experience gained during five years of specialized attention to poisoning by the Centre is presented in tabular form. Comments on childhood poisoning are included.*

The period of infancy and childhood is one which is subject to much harm from accidents. One aspect of this is poisoning, which has become commoner as a host of toxic chemicals has become increasingly available to children in the home; a Canadian child is accidentally poisoned once every fifteen minutes. During the last few years immediate expert advice and treatment in cases of poisoning has become essential, and so regional poison control centres have grown up. In Nova Scotia, the Poison Control Centre is located in The Izaak Walton Killam Hospital for Children.

Functions of the Poison Control Centre

The experience at the Izaak Walton Killam Hospital indicates that the functions of such a centre includes:

i. The provision of emergency treatment to poisoned children who are brought to the Centre.

ii. The collection of extensive up-to-date information from multiple sources about the chemical contents and toxicity of drugs and household products.

iii. The rapid provision of telephone advice (twenty-four hours a day, seven days a week) to the public, physicians and hospital emergency rooms. Information about the effects and first-aid treatment of accidental poisoning is being sought more frequently by physicians from New Brunswick and Prince Edward Island, as well as Nova Scotia.

iv. The reporting of the incidence, treatment and type of poisoning accidents to the Food and Drug Directorate of the Federal Government of Canada.

v. The sending of Public Health Nurses into the homes of children who have been accidentally poisoned, in order to help the mother locate other potential health hazards within the home.

vi. The use of all the communications media in an attempt to educate the public about the lethal substances which fill their homes, e.g., furniture polish, drain cleaner, liniment, turpentine, acetylsalicylic acid (A.S.A.), vitamin pills with iron.

vii. Lectures by Poison Centre personnel to Medical and Pharmacy Students, in an attempt to promote wide use of "Safety Closure" drug containers.

*Assistant Professor of Paediatrics, Dalhousie University and Medical Director, Out-Patient Services, Izaak Walton Killam Hospital for Children, Halifax, N.S.

Contributions of the Centre

Since a new manual entitled "The Emergency Treatment of Poisonings" has recently been prepared by the Centre,[1] it is unnecessary here to give detailed information on the general treatment of poisoning and the prevention of poison absorption by using syrup of ipecac or gastric lavage. However, a brief analysis of the work that forms the basis of our experience can be given in tabular form and a five-year review of the services provided by the Centre is shown in Table I; the ingestants taken by children treated at the hospital are shown in Table II.

Salicylates continue to be the major cause of childhood poisoning. This situation should have begun to improve since April 1, 1970, when new federal legislation (C.O.1. 02qB of the Food and Drug Regulations)

TABLE I

THE IZAAK WALTON KILLAM HOSPITAL FOR CHILDREN
POISON CONTROL CENTER - UTILIZATION (1965-1969)

	1965	1966	1967	1968	1969
Deaths	1*	1†	0	0	0
Total number of telephone calls	1,874	2,629	2,725	2,878	2,958
Consultations by telephone only	870	1,522	1,736	1,932	2,017
Telephone calls from doctors	96	?	91	132	162
Telephone calls from hospitals	?	?	71	96	101
Number of children brought to hospital	1,004	1,107	1,016	946	941
a. Halifax	267	307	276	219	407‡
b. Dartmouth	387	368	339	301	335
c. Halifax County	332	413	376	406	186‡
d. Other areas	18	19	25	20	13
Admissions	187	216	207	201	194
Hospital days	275	432	519	519	390

* Acetylsalicylic acid. † Stove oil. ‡ Figures changed because of annexation of County by City.

came into effect prohibiting the sale of more than 24 single doses of children's A.S.A. (maximum 81 milligram per tablet) per package or container. More serious salicylate poisonings in children occur with the bottles of 36 tablets (81 mg. each) of children's A.S.A.

The load of work at the Poison Control Centre would be greatly lightened if physicians would prescribe the widely available "safety closure" or "Palm 'N' Turn" containers for all prescriptions (tablets or liquid bottles) issued to patients who have contact with small children.

The Poison Control Centre now issues a questionnaire (Table III) to every person who makes telephone inquiries about a poisoned child or brings the child to the hospital (see opposite page).

It is an idealistic and perhaps unrealistic hope that eventually the combination of physicians, prevention and public education will lead to the extinction of the Poison Control Centre. □

Acknowledgment

The author acknowledges the contribution of Mrs. P. Daley, R.N., the public-health nurse who operates the Centre and without whom it would not function. Special mention is due to the previous medical director of the Centre, Dr. R. L. Ozere, who has built up the quality of the Centre over the past seven years Finally, the author thanks the many paediatric residents who have given and continue to give devoted 24-hour service to the Centre.

Reference

1 **Medical Society of Nova Scotia**: *The Emergency Treatment of Poisonings*. Available from Branch Society Secretaries, 1970.

TABLE II

Types of Accidental Poisonings (1965-1969)

Ingestant	1965	1966	1967	1968	1969
Acetylsalicylic acid	321	450	381	315	346
Tranquilizers, sedatives, hypnotics	48	67	61	37	55
Other prescription medications	183	251	162	235	193
Methyl salicylate*	8	9	3	11	14
Volatile hydrocarbons	67	105	121	146	121
Miscellaneous household products	377	225	288	202	212

* Present in liniments, "Electrolux" air fresheners. N.B.:—One teaspoon is equivalent to 12 adult A.S.A. tablets (300 mg.).

TABLE III

POISON CONTROL CENTRE
THE IZAAK WALTON KILLAM HOSPITAL FOR CHILDREN
HALIFAX, NOVA SCOTIA

Have you locked storage for

Yes	*No*	
		Aspirin
		Iron Preparations
		Vitamins with Iron
		Tranquilizers (Nerve Pills, Antidepressants)
		Sleeping Pills
		Oil of Wintergreen
		Liniments

Where are the following stored? Out of reach of children.

Yes	*No*	
		Bleaches
		Drain Cleaners
		Oven Cleaners
		Floor Waxes
		Furniture Polishes
		Gasoline
		Kerosene
		Stove Oil
		Turpentine

Is your home safe for your children?

Yes	*No*

Do you insist on safety closures for all prescription drugs?

Yes	*No*

Do you transfer substances from original containers to pop bottles, etc.?

Yes	*No*

Is storage for hazardous substances geared to the growth and development of your child?

Yes	*No*

Are there prescription drugs in your purse? In grandmother's? In aunt's?

Yes	*No*

Some Practical Aspects of Chronic Respiratory Diseases in Children

C. T. Gillespie, M.D., C.M.*

Summary: *Chronic respiratory diseases, a leading cause of morbidity and mortality in infants and children, are discussed from the standpoint of long-term treatment. The experience gained through the management of children with cystic fibrosis has led to the development of a program for the domestic treatment of other chronic respiratory diseases. The underlying pulmonary pathophysiology and clinical picture are discussed and details are given concerning the use of inhalation therapy, a technique which has significantly prolonged life expectancy in this disease group.*

Infants and children with respiratory disease constitute a significant proportion of problems confronting the family physician. In recent years the application of techniques of inhalation therapy to these problems has enabled many children to be active and fully participating in all childhood activities despite chronic or recurrent respiratory disease. This is especially true of cystic fibrosis (C.F.), in which life expectancy has been significantly increased by prophylactic pulmonary treatment.

In addition to acute viral and bacterial infections, common recurrent or chronic respiratory disease in infants and children includes anomalies of the respiratory tract, cystic fibrosis, and allergies. This discussion will concentrate on the practical management of these conditions with emphasis on clinical clues and diagnostic procedures and the use of inhalation therapy in management. It is based on the experience gained at the Izaak Walton Killam Hospital for Children where preventive measures for long-term home treatment of chronic respiratory disease have been used to treat over 300 children with recurrent asthmatic bronchitis. This form of treatment was originally developed in children with C.F. of which over 80 cases have now been treated, and which has served as a treatment model for asthmatic bronchitis and bronchiectasis.

*Director, Cystic Fibrosis Clinic, Izaak Walton Killam Hospital for Children, and Assistant Professor of Paediatrics, Dalhousie University, Halifax, N.S.

Pulmonary Physiology in Infants and Children

Certain basic aspects of pulmonary physiology in infants and children are essential to understand if a long-term home-care program emphasizing prevention is to be developed. The bronchial tree, a system of branching tubes enmeshed in a vascular network, lengthens and widens on inspiration and shortens and narrows on expiration. At any given level of the bronchial tree, there is an internal diameter of airway at normal full inspiration and a smaller internal airway diameter at end expiration. For practical purposes in the healthy individual, expiratory volume equals inspiratory volume. If the internal diameter of the airway is reduced to a certain point, expiratory volume is less than inspiratory volume and "air-trapping" results, as is often seen in asthmatic bronchitis. Expiratory wheezing, however, does not occur until a large reduction (estimated as much as 60%) of airway diameter occurs. Since the asthmatic child is usually not treated unless wheezing is present, significant airway obstruction often goes untreated. Treatment given is usually aimed at relieving the acute attack, and often ends there.

The effect of age on lung size is seen in the table.

TABLE: Age and Lung Size Data of Dunnill, M. S.: Thorax **17**: 329, 1962.

Age	Numbers of Alveoli ($X 10^6$)	Number of Airways ($X 10^6$)	Air Tissue Interface (m^2)	Body Surface Area (m^2)
Birth	24	1.5	2.8	0.21
3 months	77	2.5	7.2	0.29
7 months	112	3.7	8.4	0.38
13 months	129	4.5	12.2	0.45
4 years	257	7.9	22.2	0.67
8 years	280	14.0	32.0	0.92
Adult	296	14.0	75.0	1.90
Approximate fold-increase birth to adult	10	10	21	9

Certain clinically useful points emerge from these data. The internal surface area of the bronchial tree is large: the air-tissue interface in the adult lung is approximately equivalent to a small tennis court, while that of the newborn lung is equivalent to the floor area of a 6 ft. x 6 ft. room. Since this surface is normally lined by mucus, in any disease such as C.F. or asthmatic bronchitis which causes increased production of abnormal mucus, the large amounts of mucus become significant factors in considering treatment. In addition to mucus, mucosal and submucosal edema and bronchospasm are important factors in airway obstruction. The three factors combined are usually present in these conditions. Since resistance to air flow in a tube is inversely proportional to the 4th power of the radius, it follows that in the tiny bronchioles and bronchi of infants and children, a small reduction in effective airway diameter causes a disproportionately greater increase in airway resistance and its consequences than in adults. In addition to increased work of respiration, airway obstruction causes uneven distribution of air, disturbs the ratio of ventilation to perfusion, and causes hypoxia. It is now well known that the non-cyanotic child with chronic respiratory disease is often hypoxic. Weng et al. have reported that *all* symptomatic asthmatics and 50% of non-symptomatic asthmatic children have significant hypoxia.[1]

Clinical Applications

Since increased amounts of mucus, edema and bronchospasm (all of which may be increased or complicated by infection) are common features of chronic respiratory disease in many infants and children, attempts to alter or even prevent these basic abnormalities from causing disease are worth attention. Experience in children with cystic fibrosis has shown the value of various forms of inhalation therapy in attacking these factors.

While many medications are available to treat edema and bronchospasm, few medications effectively alter mucus, especially in chronic and recurrent pulmonary disease. However, distilled water in 10% propylene glycol has been used in "mist tents" to liquefy abnormal mucus thereby promoting more effective removal by cough or postural drainage.[2, 3]

Because of the large surface area of the bronchial tree large volumes of water in 10% propylene glycol must be delivered to this area. This requires the use of a plastic canopy over the patient into which the nebulized water particles are delivered. For disease in the upper airway a standard croupette delivering large particles is sufficient but for mucus in the peripheral airway nebulizers capable of delivering particles in the 1 to 5 micron range are required. The tent should be cool since body heat can raise the temperature as much as 10° F above room temperature thereby increasing the patient's problem. The mist should be of sufficient density to make it difficult to see the patient.

Generally the patient stays in the tent only during normal sleeping hours but intermittent nebulization of appropriate medications during the day is useful in reducing edema and relieving bronchospasm. In addition to retarding evaporation of the water particles propylene glycol has anti-bacterial properties which reduce the possibility of contamination by water-borne bacteria.

Several nebulizers are available for home use* and the deVilbiss Ultrasonic nebulizer is available for hospital use. Compressors used to operate the nebulizers must be oil-less.

The Bennett twin-jet nebulizer can be used with an oil-free compressor operating at 30 or preferably 50 p.s.i. while in hospital compressed air at 12 p.s.i. or oxygen at 6/Min. flow is the power source. Since many asthmatic patients are hypoxic, in hospitalized patients oxygen tanks or wall lines are used whenever possible. The compressor usually is the same as that for the tent but since many patients do well on only daily aerosol if a tent is not required, a less expensive compressor is available.

The basic solution nebulized is 1/8% neosynephrine (phenlyephrine) in 10% propylene glycol:

Rx: 1/8% phenylephrine 90ml.
U.S.P. Propylene glycol 10 ml.
Sig. 2 to 4 cc by inhalation t.i.d., q.i.d., etc.

If wheezing is present isoproterenol 1 : 200 is added to the basic solution. The dosage in use at the Izaak Walton Killam Hospital is 0.1 ml. per year of age up to five years. After five years the maximum amount of isoproterenol used is never greater than 0.5 ml. Since there are many reports in the literature describing the dangers of isoproterenol, it is important to note that these refer to either pure isoproterenol (as in pressurized hand nebulizers) or isoproterenol and saline mixtures. No adverse effects have been noted in thousands of administrations at the Izaak Walton Killam Hospital when the combination of 1/8% phenylephrine in 10% propylene glycol and isoproterenol has been used. A relative contraindication is a pulse rate of 180/minute before administration and an absolute contraindication is the use of isoproterenol and epinephrine together.

In the child with recurrent wheezing, the administration of an aerosol containing 1/8% phenylephrine and isoproterenol delivered by oxygen is as effective as subcutaneous adrenalin, and it is painless, giving more direct relief of hypoxia. Steroids may be administered by aerosol. Dexamethasone 0.25 ml. (1 mg.) added to the basic solutions has sometimes been found useful.

Clinical Considerations

Current practice at the Izaak Walton Killam Hospital is to use mist tent and aerosol therapy for all patients with C.F. when they are first hospitalized. This treatment is carried on at home when the patient is discharged. Asthmatic bronchitis can also be effectively treated in this manner; over three-hundred of these

*Details of equipment are given in Appendix.

patients continue at home with daily intermittent aerosol and a smaller number with mist tents as well.

Selection of patients is generally not too difficult. Important points in history are: repeated "colds" followed by cough and wheezing lasting a week or two and recurring frequently, limitation of activity because of cough and wheezing, recurrent episodes of night cough, or persistent sputum production. Pertinent findings, on physical examination, include "emphysema" or air-trapping (even in the absence of wheezing, the increased AP diameter of the chest indicating "air-trapping" usually indicates significant airway obstruction), prolonged expiratory phase on auscultation (often enhanced by hyperventilation) poor or uneven air entry. Fever and leucocytosis are often absent.

For the allergic child institution of aerosol therapy should be accompanied by removal of common offending items such as stuffed toys or feather pillows, observed food allergies or a trial of non-specific hypoallergic diet avoiding fish, whole wheat products, eggs, nuts and peanut butter, and chocolate for one month; each of the items is reintroduced one at a time every two weeks thereafter.

Aspects of Diagnosis

Chronic respiratory diseases are the leading causes of morbidity and mortality in infants and children. In our area the common disorders likely to be encountered by the family physician include cystic fibrosis, allergic respiratory disease, foreign bodies, tuberculosis, anomalies of the respiratory tract, and immunologic deficiency states. Most of these diseases can be easily diagnosed with a combination of history, physical findings and readily available laboratory tests.

Cystic fibrosis, one of the commonest serious chronic diseases of infants and children (incidence 1:1,100 to 1:1,600) often presents with signs and symptoms attributable to allergic disease. Elevated levels of chlorides in the sweat (above 50 mEq/L.) are diagnostic and can be detected by pilocarpine iontophoresis; this should be done in every infant, child or adolescent with chronic or recurrent respiratory problems. At the present time this test is available only at the Izaak Walton Killam Hospital for Children but trials of a rapid and reliable procedure for sweat chloride determination are underway and it is hoped that this procedure will become available for use in regional hospitals throughout the province. Successful management of the disease depends on early diagnosis and *early* institution of prophylactic measures designed to prevent or minimize the obstructive pulmonary lesions.[3] Allergic pulmonary disorders are very common; particularly in children whose problems are triggered or accompanied by infection, the prophylactic use of mist tent and aerosol therapy has been very helpful in reducing the morbidity and preventing progression of the respiratory disease.

Tuberculosis is still with us and the use of the intradermal P.P.D. or Tine test to rule out tuberculosis in infants and children with recurrent respiratory disease is to be encouraged. Tests for immunoglobulin levels are more readily available and should be used when hypogammaglobulinemia or other immunologic deficiency states are considered in the differential diagnosis.

In the past three years at this hospital three children with asthmatic bronchitis have been found to have vascular rings. Diagnosis of the latter was made by barium swallow which should be done in the presence of a persistent harsh non-productive cough.

Finally, since the best treatment is prevention, in addition to the measures outlined above, measles vaccine should be given to all infants and children but particularly those with chronic respiratory disease. □

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APPENDIX

Equipment for intermittent aerosol and mist tent therapy:

a) Intermittent aerosol:
   Bennett Twin Jet Nebulizer
   Hudson Pediatric Disposable Face Mask (Plastic)
   Maximyst Compressor No. 3410—Mead Johnson

b) Mist Tent
   C. F. Home Therapy Mist Tent with Armstrong nebulizer, Zefex compresor, tent canopy and frame and Bennett Twin-Jet Nebulizer

Equipment is available through the Social Service Department of the Izaak Walton Killam Hospital, Halifax.

Cephaloridine BDH

DESCRIPTION: Cephaloridine B.D.H. is a semi-synthetic antibiotic substance obtained from the parent antibiotic cephalosporin C, presented as a water soluble crystalline powder.

INDICATIONS: Infections by the following gram-positive bacteria: Staphylococcus aureus, Streptococcus pyogenes, Streptococcus viridans, C. diphtheriae and D. pneumococcus. An in vitro concentration of 1 µg/ml. or less inhibits most strains. An in vitro concentration of 8 µg/ml. also inhibits most strains of E. Coli, Proteus mirabilis, Klebsiella spp., H. influenzae, N. gonorrhoea, N. catarrhalis. Infections where penicillin cannot be used, either because the organism is penicillin-resistant, the infection is likely to be mixed or the patient is penicillin sensitive.

ADMINISTRATION: Cephaloridine B.D.H. is administered parenterally either by injection or intravenous drip. Intramuscular or deep subcutaneous injection is the general route and is generally free from pain even with repeated injections. No phlebitis is reported from large doses by intravenous drip. The intravenous injection of a concentrated solution is not recommended. Peak serum levels after intramuscular injection are obtained in about 30 minutes and good levels maintained for 6 to 8 hours.

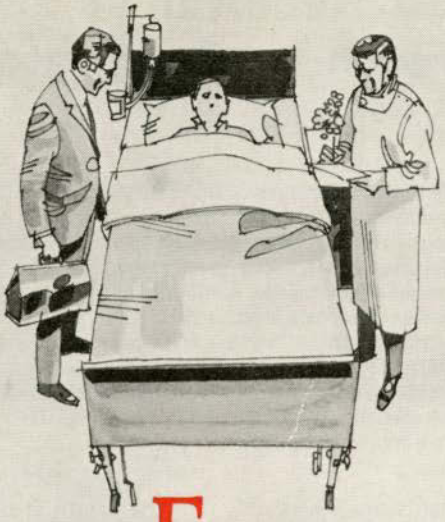
DOSAGE: A chart for the purpose of calculating dosage is included in the package. Cephaloridine dosage of 20 mg/Kg/day will kill gram-positive organisms and infections due to gram-negative organisms and mixed infections will usually respond to 40 mg/Kg/day. Higher dosages have been used and in severe infections of unknown aetiology, subacute bacterial endocarditis, septicaemia, post operative infections, osteomyelitis and peritonitis, as much as 100 mg/Kg/day have been given. As clinical experience with high dosage is limited, it is probably unwise to exceed 6 grams daily in adults, and the patient should be carefully watched for side effects.

PRECAUTIONS AND CONTRAINDICATIONS: Since human experience with Cephaloridine is limited it should not be used in women of child bearing age unless, in the judgment of the clinician it is essential to the welfare of the patient.

Renal function tests, coagulation studies, routine leucocyte and platelet counts should be made during therapy. Renal function and cephaloridine levels should be carefully watched when used in patients with renal impairment. Cephaloridine is inactive against protozoa, helminths, fungi including Candida albicans. Proteus species with the exception of Proteus mirabilis, Brucella abortus and Ps. pyocyanea are insensitive to cephaloridine and it has low activity against M. tuberculosis. Strains of Streptococcus faecalis and Aerobacter aerogenes vary in sensitivity. Generally, organisms which develop resistance to other antibiotics retain sensitivity to Cephaloridine B.D.H. so that penicillin-resistant staphylococci is usually sensitive to Cephaloridine B.D.H

SIDE EFFECTS AND TOXICITY: Dosages of 6 Gm. of Cephaloridine B.D.H. daily may produce hyaline and granular casts in the urine less commonly accompanied by proteinuria without renal dysfunction. These are reversible with cessation of therapy. Rare reports have been received of a temporary neutropenia and agranulocytosis and of a transient rise in S.G.O.T. Skin rashes have occurred though patients hypersensitive to penicillin usually tolerate the drug well. Renal disturbances with high dosage or in patients with kidney dysfunction have occurred.

HOW SUPPLIED: Cephaloridine B.D.H. is issued in vials containing 250 mg., 500 mg., and 1 gram of Cephaloridine in boxes of 5.



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Mechanical Removal of Secretions: An Approach to Respiratory Care

A. S. Wenning, M.D.*

Summary: *The value of mechanical removal of secretions in resistant pulmonary problems is discussed. The danger of oxygen desaturation during suctioning and the necessity of supplemental oxygen is stressed. Emphasis is placed on the importance of establishing the correct etiology: foreign body, bronchial adenoma, mediastinal tumors, especially must be excluded as causative factors. Saline as the "washout" vehicle is proposed in preference to "mucolytic" agents. It is suggested that in formula aspiration corticoid therapy is not required. An attempt to maintain sterile technique and the use of high vacuum pressures in suctioning the tracheo bronchial tree is proposed.*

Experience gained through the management of children with operative and post-operative pulmonary complications showed that the mechanical aspects of such therapy could be applied to a wider range of problems than was originally thought possible.

Under normal circumstances secretions from the lower respiratory tract are moved towards the trachea and pharynx by the sweeping activity of the cilia and the expulsive action of mechanisms such as coughing, sneezing, and crying. In disease processes involving the lung, this ciliary action may be lost, secretions may be more tenacious and copious, and fatigue or pain may decrease the efficiency of the expulsive processes. These retained secretions cause varying degrees of obstruction in portions of the bronchial tree, with loss of aeration of lung tissue beyond the block. Although the amount of lung parenchyma involved in the inflamatory process is originally small, much larger areas of lung may thus become non-functional. The amount of blood passing through the lungs without being oxygenated is increased and this is reflected in a decreasing arterial partial pressure of oxygen. If these areas of lung remain atelectic then infection may extend to involve the whole area.

Frequently, the judicious use of antibiotics, expectorants, increased humidity and physiotherapy, will be the adequate treatment for the vast majority of these problems. However, when the situation fails to respond to the more usual processes of management, other methods must be used to remove these secretions, and, if indicated, to reinflate the atelectic areas. These mechanical methods are the most important part of the treatment when dealing with an aspiration pneumonia.

Mechanical Methods Used

The technique applied to remove secretions and to reinflate atelectatic lung is subject to some variations, depending on the thickness of the secretions and the amount of atelectasis.

The patient, if of an age to understand, has the procedure explained to him. He is told that although the procedure is uncomfortable, it will not last long. Following adequate oxygenation, direct laryngoscopy is carried out without anaesthesia to give a good view of the glottic opening. One of these procedures is then followed: —

i. Passage of a suction catheter directly between the cords. This is the technique most frequently used in situations where secretions are thin and can be removed with minimal suctioning. We use clear plastic catheters with an open end and one side eye, using size 8, 10 or 14 French according to the size of the glottic opening. There should be sufficient space between the outside of the catheter and the glottic opening to allow a free flow of air. The catheter is well lubricated, and the distal end is kept sterile. It is passed into the bronchial tree until resistance is met without suction being applied. Suction is only used during the steady withdrawal of the catheter, utilizing a high vacuum pressure, since this will remove more secretions with less trauma than several attempts using a lower vacuum pressure.

ii. Passage of a suction catheter through an endotracheal tube. After exposure of the cords, a sterile endotracheal tube, well lubricated with a water-soluble jelly is passed as soon as a normal breathing pattern is established. The size chosen should be suited to the age and size of the child. (See appendix). An airway or bite block held between the teeth prevents occlusion of the tube when the laryngoscope is removed.

This variation of the technique allows more prolonged and repeated suctioning, and has two

*Instructor, Department of Anaesthesia, Dalhousie University and Head, Department of Anaesthesia, Izaak Walton Killam Hospital for Children, Halifax, N.S.

additional advantages. First, if secretions are dry and tenacious, 5 to 10 ml. of saline can be instilled through the tube, and suctioning repeated after two or three breaths. We have found saline to be as effective as any of the commercial mucolytic agents in loosening secretions. Second, if atelectasis is present, the gentle application of positive pressure oxygen or air to the endotracheal tube will often produce re-expansion of the affected areas.

If foreign body aspiration is suspected, bronchoscopy will be essential to treatment. This particular technique of tracheo-bronchial toilet in no way excludes the careful extraction of associated foreign bodies.

Patients Helped by Mechanical Methods

Groups of patients in which we have most frequently used the technique are: —

i. Infants who have aspirated following regurgitation of the formula used in feeding, presenting, most frequently, with a right upper lobe pneumonia. In general a minimal saline washout is employed. We have not found it necessary to use corticoids in these cases, a finding contrary to the accepted management of older children and adults who have aspirated stomach contents.

ii. Patients with post-operative lung complications make up the largest single group, principally children who have undergone pulmonary or cardiac surgery. Infants having had correction of oesophageal atresia with or without tracheo-oesophageal fistulae frequently require repeated tracheo-bronchial toilet.

iii. Cystic fibrosis patients who have not responded to their usual means of management or who, because of an acute episode, have progressed to a particularly severe state in their pulmonary status do very well with concentrated efforts at tracheo-bronchial toilet. These patients require relatively large volumes of saline to mobilize their secretions and the suction catheter must be passed repeatedly.

It is important to recognize that in these patients especially, and sometimes in others, pulmonary function may be very poor and that repeated assisted respiration with oxygen is indicated during the procedure.

iv. The so called "Middle Lobe" syndrome is seen with surprising frequency. Persistent collapse of this lobe, if left unattended, will eventually require surgical intervention. Having excluded a foreign body, or an intrinsic or extrinsic new growth as a cause, if atelectasis persists in spite of adequate antibiotic therapy, moisture and physiotherapy,

a more aggressive attempt to re-expand the lobe is indicated.

A careful tracheo-bronchial toilet with saline washout is performed and controlled positive pressure with oxygen or air is applied. This requires the use of a reasonably close fitting endotracheal tube. On occasion, fluoroscopy can be used to control the procedure.

Re-expansion will not be achieved in all cases, but when it is, continued active physiotherapy, use of the mist tent, and intermittent positive pressure treatments are indicated to maintain the expanded state.

v. Children with bronchopneumonia, generally those under two years old, who, for reason of general debility or the presence of antibiotic resistant organisms, are not improving may be greatly helped by the mechanical removal of the copious secretions.

Material from the tracheo-bronchial tree shou be collected for culture and sensitivity tests. The tests have greater validity in these samples than expectorated samples, the specimen being rel tively free of contaminants from the oro-pharynx.

APPENDIX

SIZES OF ENDOTRACHEAL TUBES:

Age	Size
1-3 mos.	3.5 mm.
3-12 mos.	4.0 mm.
1½-3 yrs.	4.5 mm.
3-5 yrs.	5.0 mm.
6-7 yrs.	5.5 mm.
8 yrs.	6.0 mm.
9-10 yrs.	6.5 mm.
11-13 yrs.	7.0 mm.

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He that hath children, all his morsels are not h own. —*George Herbert*

Respect the child. Be not too much his paren Trespass not on his solitude. —*Ralph Emerson*

Childhood Sarcoidosis

Summary: *In a series of eighteen cases of sarcoidosis in children, outcome of the disease was more favorable in those who were asymptomatic at the time of diagnosis than in those who had symptoms. Sarcoidosis may be more prevalent in children than has been estimated.*

Sarcoidosis is rarely diagnosed in children in an early stage. One reason is that children are not usually included in chest X-ray surveys which may lead to the discovery in adults of the clinically silent, early intrathoracic sarcoidosis. By the time sarcoidosis is recognized in children it may be advanced, with one or more extra-thoracic components.

In a study of 18 cases of proved sarcoidosis in children, the outcome of the disease was found to correlate largely with the presence or absence of symptoms at diagnosis.

In age the children ranged from 9 to 15 years. Eleven were boys, seven were girls. The disease was symptomatic at the time of diagnosis in 11; asymptomatic in seven. All children 12 years of age and under, but only six of those 13 to 15 years of age, had symptoms at the time of jiagnosis.

Seven of 11 children with symptoms already had chronic disease, and the disease in five of the seven asymptomatic children was in the subacute stage. Extrathoracic involvement had occurred in all the children with disease in the chronic stage, but only three of the asymptomatic children had such involvement.

Two of the children had normal X-ray films initially; the others had hilar adenopathy either alone (3) or with pulmonary mottling or mottling alone (13). Five of the children with hilar adenopathy and pulmonary mottling showed flocculent infiltrations; five had miliary nodules, and three had focal streaking. In one child who had parenchymal densities without hilar adenopathy, the lung pattern was diffusely reticular.

Eight of the *symptomatic* children had hilar adenopathy with pulmonary mottling Two children with extrapulmonary sarcoidosis had a normal chest film. Three children with no symptoms at onset showed hilar adenopathy alone, and four others showed hilar adenopathy and pulmonary mottling.

Presenting Signs

Enlargement of the peripheral lymph nodes was the presenting sign in four of the 11 children with symptomatic onset. In three others, dimness of vision in one eye was the first sign. Signs in the other children were respiratory symptoms, weight loss, erythema nodosum, and parotid enlargement.

The Kveim test was positive in 16 of the 18 children. Both children in whom it was negative had had sarcoidosis for more than three years when the Kveim test was applied Diagnosis was confirmed by biopsy. Eleven children in all had organ biopsies.

All but two children had negative tuberculin tests, which is common in sarcoidosis. The two positive reactors responded only to second-strength PPD.

Ten children received drug therapy consisting of daily doses of either prednisone (or an equivalent hormone) or chloroquine; two of the 10 received both drugs at different times.

Observation Period

Seventeen of the children were observed for periods ranging from one to nine years (a mean of three and one-tenth years). At the end of the observation period, activity had subsided and all lesions had cleared in five, four of whom had been asymptomatic at onset. Ten other children improved, but clearing was not complete. Only two children, both with symptomatic onset, became worse.

Improvement, but not clearing of lesions, was observed in 14 of the 17 children during the *first* year, and was maintained in all but one of these. The remaining patient in this group developed bilateral nerve deafness in the second year. One child who became worse in the first year later lost the sight of one eye.

The course and outcome were distinctly less favourable for children with symptomatic onset than for those who were asymptomatic and whose disease was detected by mass surveys or routine roentgenography. Six of seven asymptomatic children, all 13 years or older at the time of diagnosis, were clinically well when last observed.

However, of the 11 symptomatic children, only two were entirely well, and nine had varying grades of disease activity. Temporary improvement did occur spontaneously or with therapy in all the 11 children Corticosteroid therapy helped control recent lesions. Chloroquine was of particular value in treating cutaneous sarcoidosis. Respiratory failure has not as yet been observed in any of the children.

The discovery that asymptomatic sarcoidosis was relatively common among young adults dates back to the mass X-ray surveys of Armed Forces recruits in World War II There has since been growing recognition that a presymptomatic stage, marked only by silent, bilateral hilar adenopathy and frequently associated with a negative tuberculin test, is more common in the general population than had been recognized. Since children have not been included in mass radiographic surveys, the prevalence of childhood and adolescent sarcoidosis has not until recently been estimated in any country. In Japan and Hungary, children are being included in such surveys and asymptomatic cases are being uncovered at a prevajence rate approaching that of adults in those two countries.

Predicting Prognosis

In the series reported, the children with sympomatic onset were younger and had more extensive disease than those whose illness was detected in the asymptomatic stage. Because of the delayed detection of sarcoidosis in children whose symptoms were already present, corticosteroid therapy was required more frequently and for a longer time than it was for the asymptomatic group. The prognosis was also less favourable for the symptomatic child. Prognosis could be predicted with a fair degree of accuracy by the end of the first year of observation.

Thus, it appears that sarcoidosis may come and go unrecognized in children, especially in those approaching adolescence, and that the disease is more frequent in children than had been estimated.

A possible diagnosis of sarcoidosis should be considered in children with unexplained mediastinal or superficial lymphadenopathy, hepatosplenomegaly, uveitis, enlargement of the salivary or lacrimal glands, cystic bone lesions of the hands or feet, lung infiltrations or granulomatous skin lesions. Organ biopsy, Kveim test and appropriate radiography can lead to early diagnosis, after which proper therapy can be instituted, with the prevention of some of the irreversible organ damage. □

Louis E. Siltzbach, M.D., and Gerald M. Greenberg, M.D. *The New England Journal of Medicine,* December 5, 1968.
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