

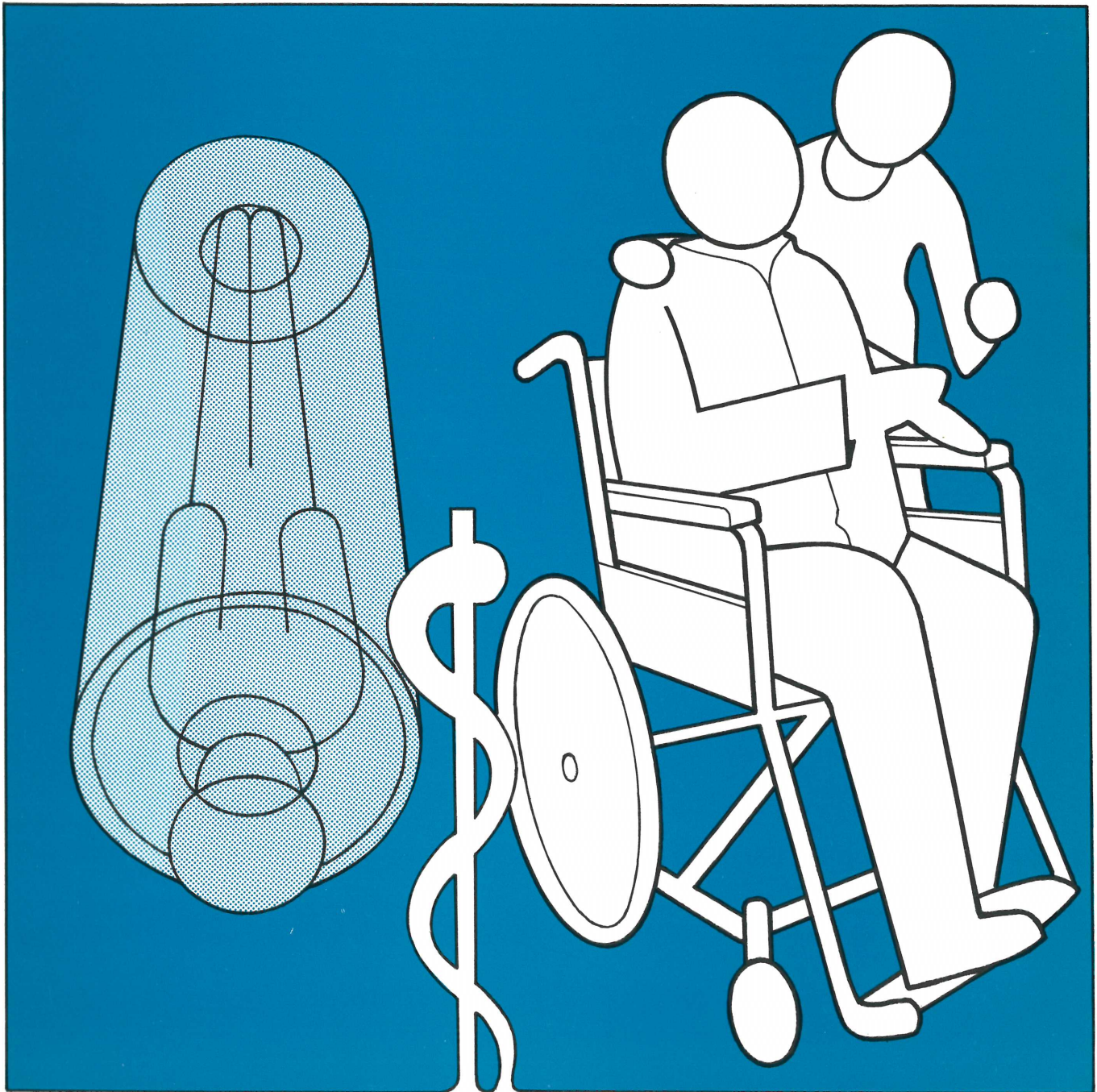


University of Manitoba Medical Journal

Volume 50, Number 3
Winnipeg, Manitoba, Canada
1980

Special Issue

RESPIRATORY POLIO REHABILITATION



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RESPIRATORY POLIO REHABILITATION IN MANITOBA

**Proceedings of the Manitoba Symposium
Rehab International Congress
Winnipeg, June, 1980**

**Supported by funds from the Department of Health
Government of Manitoba**

Guest Editorial

Dr. J. A. Hildes

A proposal for a major paper on polio rehabilitation for the Rehab International Congress held in Winnipeg in June 1980, was conceived by Dr. George Johnson, Deputy Minister of Health, late in 1979. This idea matured and developed into the programme for the half day symposium which is recorded in this special issue.

The time was desperately short to gather the data required to put meat on the bones, but Dr. Johnson put the resources of the Department of Health to the project and the deadline was met. An important concept emerged as the study took shape: the needs of the severely disabled ex-polio patients changed and increased with time, not only in terms of their physical disabilities but also in terms of their social circumstances. These changing needs were only partially compensated by developments of new technology. Therefore we must re-examine and provide for the changing needs of such patients.

In addition to this the symposium was not only a success in the presentation of interesting and useful new data for those attending the week-long Congress but our session was attended by many ex-patients, their families and friends: for them the occasion turned into a special reunion. This special issue is dedicated to them. The proceedings recorded here particularly reflect that aspect of the symposium, and it is for this reason – rather than for its scientific merit –

that the Editorial Committee of this Journal was enthusiastic over the prospect of publishing it in a special issue.

However, that Committee must not be given too much credit for original thinking since they had a precedent. In 1954 this Journal – or to be precise – its predecessor, The University of Manitoba Medical Student Journal, under the Guest Editorship of Dean Lennox G. Bell – a towering, learned and much loved physician in the Oslerian tradition published a special issue entitled “Inside the King George Hospital”. That issue contained a series of non-scientific current commentaries about the awesome epidemics of 1952 and 1953. At that time the material seemed rather parochial and mundane. As I recall, it was Dean Bell’s sense of history which insisted that those events be recorded.

The ten or so orthodox papers which recorded the medical scientific aspects of those epidemics were relegated to national and international journals such as *Circulation*, *Journal of Applied Physiology*, *Canadian Medical Association Journal*, *Surgery, Gynaecology & Obstetrics*. They are now largely forgotten as their content became part of the background fabric of general medical knowledge on which new advances are built. But the papers in the 1954 special issue of this Journal now provide an historical reflection of the human endeavours at that time.

We hope the same may be said about this special issue in another quarter century.

Acknowledgements

This symposium was part of the programme of the Rehab International Congress held in Winnipeg in June 1980, and we are indebted to the organizers of that Congress for the stimulation to prepare these papers and for the opportunity of presenting them.

We owe thanks to the many people who helped to put this material together during the hectic few months prior to June 1980 and in particular the Minister of Health – The Honorable Mr. L. R. Sherman and his Deputy Dr. George Johnson and the staff of the Department. The Government of Manitoba through the Department of Health provided the funds to carry out the research necessary to collect and analyze the data for the central paper. We also thank our interviewers and our computer colleagues.

Mr. John Buckner designed the figures for the paper by Alcock et al and also the cover motif. The Faculty of Medicine, Instructional Media Centre was very helpful, and in particular Mr. Glen Reid, in the final preparation of the drawings for this issue.

Most of all we are grateful to the ex-polio patients and their families who co-operated in the collection of data and who came to participate in the symposium.

And finally we thank the regular Editor of this Journal, Dr. Marion H. Ferguson for her meticulous care in guiding this issue as she does with all other regular and special issues, past all obstacles.

Chairman's Opening Remarks

Dr. A. J. W. Alcock

Honoured guests, Ladies and Gentlemen:

My name is John Alcock. I am the Medical Director of the Winnipeg Municipal Hospital and it is my privilege to be your chairman for the session this afternoon. We are honoured to have in our audience some of the participants in the study that form the basis of one of the papers to be presented. I would also like to acknowledge the presence of Dr. George Johnson, the Deputy Minister of Health for the Province of Manitoba, who masterminded this afternoon's symposium.

This symposium deals with poliomyelitis in Manitoba during the 1950's and its aftermath.

There are three formal papers. The first concerns the reaction of the Manitoba Government to the major epidemics of poliomyelitis in the 50's and will be given by the Minister of Health, the Honorable Mr. Sherman. This will be followed by an assessment of the physical and social consequences of respiratory polio, co-authored by Alcock, Hildes, Kaufert, Kaufert and Bickford. The third paper by Dr. Bryan Kirk concerns long term artificial respiration. These three presentations will be followed by commentaries from each of three poliomyelitis patients of the 1953 epidemic: Mrs. Martha Smith, Mr. Paul Sigurdson and Mr. David Steen.

As we have a relatively full programme, perhaps those of you who wish to ask questions or make comments might let me know in advance by means of a note, if you find that convenient.

This is an appropriate occasion to be reporting on poliomyelitis as it is now 25 years since Salk vaccine was released to the public. It made its appearance in the wake of mass casualties from this dreadful disease and offered a promise of protection from paralysis for those not yet exposed to the polio virus. And yet, while we now look upon polio as a preventable disease, outbreaks continue to occur with their tragic aftermath. There can be no doubt that the essence of rehabilitation is prevention in so far as polio is concerned; and it must be our dedicated purpose to ensure free access and effective utilization of polio vaccine to all members of our world community.

I would like to take a moment or two to set the scene for our present discussion. Polio has been around for a long time. The first epidemic reported in Manitoba occurred in 1928. Three more epidemics in Manitoba were to occur over the next 20 years with an overall total of 760 reported cases.

Then during the decade of the 1950's over 3600 cases of poliomyelitis were recorded in Manitoba; and almost half of these patients were admitted to the Winnipeg Municipal Hospital for surveillance and treatment. That hospital complex included a fever hospital of some years' standing, and a new extended care hospital when Hildes and I appeared on the scene in 1951. At that time there were only four tank respirators and only four electric circuits suitable for respirators in the Hospital; and one was taken up with a chronic respirator patient who had been confined to hospital and to a respirator since 1941.

The extended care wing first opened its doors in the spring of 1950. But within a few days the Red River, which winds its way through Winnipeg, went on the rampage and flooded vast sections of the city including the Hospital. For several days one could paddle a canoe down the main floor of the Hospital corridors. By a curious coincidence during that year, only 17 cases of acute poliomyelitis were reported in the province, but in 1951 two patients were admitted to the Municipal Hospital with respiratory polio and both died during the acute stage. This was our initiation into the precarious state of health of the acutely ill polio patient.

Marinelli and Dell Orto¹ astutely describe rehabilitation as a journey — not a destination. We are about to embark on an Odyssey that spans a period of 30 years from 1950-1979. During that period, much progress has been achieved in recognizing and responding to the problems of the handicapped; and the achievements which have been made are due in no small measure to the problems presented by the polio victims of the 1950's.

Our first speaker is the Honorable Mr. L. R. Sherman, Minister of Health in the Provincial Legislature. His political career spans a period of 15 years during which time he was a Federal Member of Parliament, subsequently a Member of the Manitoba Legislature under the banner of the Progressive Conservative Party, and is now the Minister of Health in the Manitoba Government. He was well trained for his entry into politics having had prior experience as a journalist, broadcaster and publisher following his graduation from The University of Manitoba with the degree of Bachelor of Arts in 1949.

Mr. Sherman's paper is entitled, "Manitoba's Response to a Major Epidemic of Poliomyelitis and the Consequences for Rehabilitation Services".

¹Marinelli, R. P. and Dell-Orto, A. E., *The Psychological and Social Impact of Physical Disability*. Springer Publishing Company, Inc., New York, 1977.

Manitoba's Response to a Major Epidemic of Poliomyelitis and the Consequences for Rehabilitation Services

The Hon. Mr. L. R. Sherman
Minister of Health, Government of Manitoba

Ladies and Gentlemen;

It is a special privilege for me to be here this afternoon, to offer introductory and participatory remarks to a presentation on Manitoba's response to the polio epidemics of 1952 and 1953, and as John has pointed out, the consequences for rehabilitation services in this province.

I bring you greetings from the Premier, the Honorable Sterling Lyon, his and my colleagues in the Cabinet, but in particular, my own personal greetings as Minister of Health, and my own personal thanks to every one of you in this room and many beyond it who have assisted me so graciously in the past two years and eight months when it has been my privilege to serve in the vineyards of health care which are so challenging and yet so gratifying.

Manitoba's experience during these epidemics, 1952 and 1953, illustrated what high standards of medical care and efficient organization can accomplish during the acute phase of the disease, poliomyelitis. Although the aftermath of the outbreak posed a tremendous problem in rehabilitation, it was handled with the same orderly efficiency as marked the treatment of the acute phase of the disease.

During the summer of 1952, after 10 years of comparative freedom from cases of polio, a major outbreak occurred in Manitoba with the highest incidence of cases occurring in rural areas. During the outbreak the Honorable Ivan Shultz, Minister of Health of the day, established a Ministerial Technical Advisory Committee under the Chairmanship of Dr. J. D. Adamson, Professor of Medicine at the University. Members of the Committee included Dr. M. Elliott, Deputy Minister of Health, his predecessor Dr. Donovan, Dr. Bruce Chown, Chief of Paediatrics at the Children's Hospital, the Medical Director of the Municipal Hospital, the Provincial Epidemiologist, City and Provincial Public Health officials and nursing representatives. That committee co-ordinated the response to the epidemic, and established medical routines at the King George Hospital for the care of patients requiring treatment in respirators.

By these means, extensive experience and a high degree of skill in combatting poliomyelitis was acquired by a group of professionals who were vitally interested in the problem of prevention and treatment, and in the rehabilitation of patients who had contracted the disease.

From past experience it seemed unlikely that a major epidemic would occur in 1953, one year later. However, during the summer of 1953, one of the most devastating epidemics in history raged until October. The total number of cases reached 2,300 — representing an incidence of over 300 per 100,000 population. This outbreak was marked by a high incidence of paralysis, including large numbers of cases with respiratory and bulbar paralysis.

Despite the unexpected and unprecedented emergency suddenly created by the epidemic, the staggering problem of dealing with a rapidly increasing number of serious cases was handled with dispatch, and admirable efficiency. The Technical Advisory Committee to which I referred was recalled by the new Minister of Health and Public Welfare of the day, the Honorable Frank C. Bell, with the additional membership of Manitoba's first specialist in Physical Medicine, Dr. Max Desmarais, and Dr. Wiebe of Winkler, Manitoba where the 1952 outbreak has been centered. The Provincial Government granted the committee wide powers in providing adequate equipment, medical and nursing care, and the administration of preventive measures, including adequate supplies of gamma globulin.

Plans were made for all acute cases to be centralized for medical care in the King George Hospital under the direction of Dr. Jack Hildes and his staff, bringing into immediate action the highly skilled team which had proved to be effective during the outbreak of 1952. The task undertaken by this group called for almost super-human effort and precise judgement because of the sustained tempo of the epidemic and the rapidly increasing number of patients requiring full respirator care. The work of Dr. Hildes and his staff, including efficient organization and round the clock vigilance provided care for as many as 93 respiratory patients simultaneously. The success of this admirable effort is reflected by the fact that despite the large number of cases of respiratory paralysis, the total mortality rate was only 3.5% — a rate lower than that in comparable epidemics elsewhere.

One of the major problems related to polio was the administrative requirement inherent to the sudden influx of large numbers of patients into hospital. At the King George and Princess Elizabeth Municipal Hospitals, for instance, approximately 1200 acute cases were admitted in six months, during the summer and autumn of 1953. One of

the fundamental difficulties in dealing with the second polio epidemic in 1953, was that because it was impossible to predict the staff, equipment and space requirements with any precision, available facilities could not be maintained in precise readiness at all times. Fortunately a core staff of key personnel and sufficient equipment to carry the initial patient load was already in place, and plans to mobilize the health system to keep abreast of the epidemic were put into effect.

Although there was a shortage of trained nursing personnel, an attempt was made to maintain a full complement of registered nurses on the chronic respirator ward, as a nucleus which could be expanded as required. You may find it of interest that a recommendation to pay the government nurses the grand sum of \$12.00 a day for their increased work-load was rejected as too bold a move for the times. None the less, the Department of National Defence Nursing Sisters and Nursing Assistants were posted to the King George Hospital from military establishments across Canada. Registered nurses were loaned from other hospitals. They also came from City and Provincial Health Departments, and from the Department of Veterans Affairs. Many nurses who had been inactive, or who were already nursing full-time at other institutions, volunteered their services during the epidemic. Medical students were recruited for nursing duties which they performed with commendable skill. Physiotherapists were recruited locally and from abroad, and the Technical Advisory Committee arranged to transport a number of them from the United Kingdom.

The King George Hospital was expected to admit children as well as adults, and arrangements were made at the Children's Hospital to have paediatric staff attend at the King George during the epidemic. Additionally, the protocol for the management of seriously ill patients was reviewed, and notes were prepared for the guidance of interns and nurses.

When cases began to occur in June of 1953, short-range planning became more active. The Technical Advisory Committee with its epidemiologists, paediatricians, hospital administrators, senior nurses, representatives from The University of Manitoba and the Armed Forces, as well as hospital medical staff met to resolve problems related to the new epidemic, and plans were prepared to meet the challenge of the epidemic on the basis of expert epidemiologic predictions of its course and magnitude.

The care of poliomyelitis is characterized by heavy requirements for special and expensive equipment, including respirators, suction pumps, tracheotomy tubes, bronchoscopes and physiotherapy equipment. During the 1950's there was a serious shortage of respirators in Manitoba, and indeed in the whole of Canada. Manitoba had only ten including the old wooden models. In view of the difficulties experienced in obtaining equipment in 1952,

provisions had been made to stock-pile a number of respirators, and to make closer contact with a number of manufacturers of other special equipment. A visit to the eastern United States in the spring of 1953 accomplished these objectives satisfactorily. At the same time, new types of equipment were inspected, and the experience and advice of other individuals working in the field was sought and compared with the Manitoba situation. Respirators were also borrowed from the Armed Forces in Canada, and the Armed Forces in the United States.

During the anxious periods of acute equipment shortages, the Royal Canadian Air Force made special flights to deliver respirators directly from the manufacturer to the hospital. The special equipment required extra maintenance performed by hospital engineering staff, and adequate electrical power. Walls were wired to carry the extra load, and a stand-by plant was installed by the Armed Forces to ensure uninterrupted power supplies.

Although at the outset it appeared that the King George Hospital could provide adequate services during a major outbreak, it became apparent that not all patients from urban areas could be hospitalized. It was decided to admit only paralytic cases except under extenuating circumstances and many cases with minor paralysis were sent home from the admitting room. There were four 25-bed wards at the King George available for acute polio cases. One of these was partially occupied by chronic respirator cases from the previous outbreak, and another 100 beds were freed at the Princess Elizabeth Hospital for convalescent cases. Although admissions and discharges were monitored closely to maintain beds for seriously ill patients, at the peak of the epidemic, there were as many as 330 poliomyelitis patients at the two hospitals.

As the epidemic spread from the urban to the rural areas, many acute cases from the western part of the province were admitted to the Brandon General Hospital. Only a small number of the seriously ill were transferred to the main treatment centre at the King George. Because of the wide-spread geographical distribution of the population of this province, plans for the transportation of respirator cases had been formulated, and a few portable respirators obtained for that specific purpose. At least 35 patients arrived at the King George by ambulance or air using portable respirators and accompanied by specially trained transport teams. These teams were trained in the use of respirators, oxygen, suction pumps, and were aware of medical complications that could occur during transport, and supplied advance information on patients due to arrive at the King George.

At the hospital, medical staff was sub-divided into special groups to undertake special tasks. Because the hospital served not only as the main treatment centre, but also as a special diagnostic unit, a twenty-four hour Admitting Department was established, staffed by medical, nursing,

clerical and laboratory personnel responsible for patient assessment, diagnosis, and admission. In order to avoid unnecessary delays in the treatment of more severe cases, close liaison was maintained between Admitting and Ward staff.

In order to conserve equipment, and to utilize medical and nursing staff to the best advantage, it was essential to concentrate acute cases in special wards staffed by teams of nurses, interns, and senior physicians responsible for urgent respiratory treatment, tracheotomies, surgical and obstetrical procedures. Although the majority of cases did not require such careful supervision, most patients did require fomentations, analgesics, frequent changes of position and physiotherapy. Many individuals needed meticulous care to bladder and bowel functions, and many required assistance with feeding.

The control of visitors to the hospital demanded balance between the protection of already busy staff and the legitimate demands of relatives to visit and obtain information about acutely ill patients. This required enlarging the telephone facilities and the information bureau.

Efficient discharge procedures were also necessary to ensure adequate beds for the admission of new cases. Patients with no or little residual paralysis were carefully assessed prior to discharge in order to ensure appropriate arrangements for future care and follow-up treatment. The Physiotherapy staff, charted the details of the individual's paralysis, and the hospital's Director of Physical Medicine established contact with families to instruct them in home care. As soon as possible after discharge, case summaries were forwarded to family doctors, and arrangements were made for private or outpatient follow-up visits.

The polio epidemic provided an opportunity (an unwanted one, to be sure, but nevertheless an opportunity), to review and improve methods of treatment of cases with bulbar and respiratory involvement. Frequent discussions among attending physicians and careful consideration of autopsy findings, in consultation with bacteriology, respiratory, and physiology experts, were undertaken; both to assist in the daily care of patients, as well as to contribute to the knowledge of the disease.

Preventive strategies during the epidemic were based on research by Dr. W. Hammond at the University of Pittsburgh, which had shown that gamma globulin, if given to children before contact with the disease or shortly thereafter, seemed to prevent the development of paralysis or at least alleviate the severity of the attack. The Department of Health and Welfare in Ottawa consulted with various provincial departments, and it was agreed that stocks of Red Cross blood plasma left over from World War II would be used to manufacture gamma globulin. A clinic was established at the Princess Elizabeth Hospital to administer gamma globulin free of charge to persons between the ages of six months and 30 years, and to all pregnant women who

had been in contact with paralytic cases. In rural areas, Medical Directors of local health units, and family physicians administered the product and a twenty-four hour long service, seven days a week, was maintained to distribute gamma globulin as paralytic cases were identified.

The 1953 epidemic was the greatest in the number of cases of death, and severity of paralysis in the history of any North American urban population of over 200,000. One hundred and ninety (190) cases were treated in respirators, and many of them required tracheotomies and suction of fluid from the trachea. Eighty-nine persons died during the period of the epidemic, representing a case fatality rate of 3.7 per 100,000. This low fatality rate is attributed in large measure to the quality of care given, and the physicians, nurses, technicians and volunteers who gave untiringly of themselves during the epidemic. In 1952 many Manitobans had purchased insurance against poliomyelitis with a face value of \$2,000 or \$3,000 which assisted in covering the cost of hospitalization, wheelchairs, and other equipment. We must remember of course, that those were the days before Medicare and Hospital Insurance. Only tuberculosis and mental illness were designated as provincial responsibilities. But during the epidemics, the Province agreed to provide hospital care free of charge to indigent patients and to other patients after 40 days in hospital. And so, in a very real way, this was probably the very first initiative in Canada whereby citizens received health coverage from a provincial government.

The Manitoba Government of the day also introduced an innovative programme for Respirator Home Care, developed to provide care for those patients in hospital, who could function safely on machines in their own homes.

Health grants from the Federal government were used to purchase sixty-six tank respirators at \$2,200 each, five portable respirators and five Emerson rocking-beds. Other equipment for tracheotomy, suction and special supplies, splints and braces, totalled further expenditures of thousands of dollars. Additional respirators borrowed from the Armed Forces, other provinces, and the Kenny Institute in Minneapolis were returned after the crises of the epidemic had diminished. Travelling expenses for physiotherapists from the United Kingdom were provided by the Provincial Government. The Crippled Children's Society of Manitoba's March of Dimes fund also supplied appliances to patients, and hydrotherapy facilities were provided at H.M.C.S. Chippawa, the Naval training centre.

The polio epidemics focused international attention on Manitoba once more in a decade which had begun with the Great Flood of 1950. There are no words of praise adequate enough to thank the doctors, nurses, administrators, military personnel and volunteers who quite literally saved hundreds of lives. We also continue to be grateful for the support and expertise provided from outside of Canada during the epidemic and the continuing effort of our health

care personnel working in the field of polio rehabilitation. And of course, we acknowledge with pride the near reverence, the enormous courage and stoicism demonstrated by those who were victims of the polio crisis and its aftermath.

During this afternoon's presentation, the aftermath and consequences of the 1953 epidemic will be examined. It is my sincere hope that all of us here today find Manitoba's experience a valuable and thought-provoking event.

Thank you.

COMMENTS

Dr. Alcock

Thank-you Bud. I guess that will bring back a few memories for some of you here.

One of the saving graces of those age limits of gamma globulin therapy was that at least some of us who were over the age of thirty did not have to go limping down the hallway with the rest of the staff.

Has anyone any comments or questions they would like to make at this time? There are none.

Therefore I will call upon our second speaker, Dr. Jack Hildes, but before he speaks I would like to say something about the other co-authors with me of the second paper.

Dr. Pat Kaufert is a National Health Research Scholar and is on staff of the Department of Social and Preventive Medicine at the Faculty of Medicine, The University of Manitoba. Dr. Joseph Kaufert is Associate Professor in the same department. Miss Joan Bickford, who received her Master of Science in Nursing from the University of Washington, is presently attached to the Planning Division of the Manitoba Health Services Commission. As I mentioned earlier, the paper will be read by Dr. Jack Hildes. I had the privilege of working with him during the early 1950's when he was Medical Director of the Municipal Hospital. At that time he was also in the Department of Physiology in the Faculty of Medicine. He had previously spent four years at the Royal Postgraduate Medical School (London) following his demobilization from the Royal Canadian Army Medical Corps where he had attained the rank of Lieutenant Colonel. He is at present Associate Dean of Community Medicine, and Director of the University's Northern Medical Unit. As such he is responsible for physician services to various outposts in the distant wilderness of this province. In recognition of his achievements in this field he was recently inducted into the Order of Canada. The title of our paper is, "The Physical and Social Consequences and Rehabilitation of Respiratory Polio".

The Physical and Social Consequences and Rehabilitation of Respiratory Polio

A. J. W. Alcock, J. A. Hildes, P. A. Kaufert, J. M. Kaufert and J. Bickford

Presented by Dr. J. A. Hildes

Mr. Chairman, Ladies and Gentlemen.

As you have already heard from both our Chairman and from Mr. Sherman this paper is concerned with the follow-up of the great polio epidemics in Manitoba of the 50's. The reason why we undertook this study, and why we are making this presentation is because we think that the lessons of polio are applicable to the rehabilitation of many other conditions.

What is Respiratory Polio?

I should begin by saying something about the disease poliomyelitis itself since some of you may not know why it was such a dreaded condition.

Polio is a viral infection which can give rise to paralysis by attacking the nerve cells which control our voluntary muscles. The paralytic effects are quite variable from case

to case depending on the part of the nervous system affected. The legs and arms are often involved and it can affect breathing in two ways. High spinal paralysis affects the muscles of breathing directly — the muscles of the chest and the diaphragm. This requires that a machine take over the breathing function. In the 1950's the only type of machine available for this purpose was the iron lung or the tank respirator into which a patient was placed for as long as he required it.

The other way polio affects breathing is by paralyzing the muscles of swallowing and speaking. This is called bulbar polio. It causes obstruction to the airways and aspiration of saliva into the lungs. This requires an operation called a tracheostomy to keep the airway clear. Often the two types occur together; so many bulbo-spinal cases require both a respirator and a tracheostomy.

Polio Manitoba 1950-1959

Figure 1 shows a map of Manitoba. In the 1951 census there were three quarters of a million people in Manitoba,

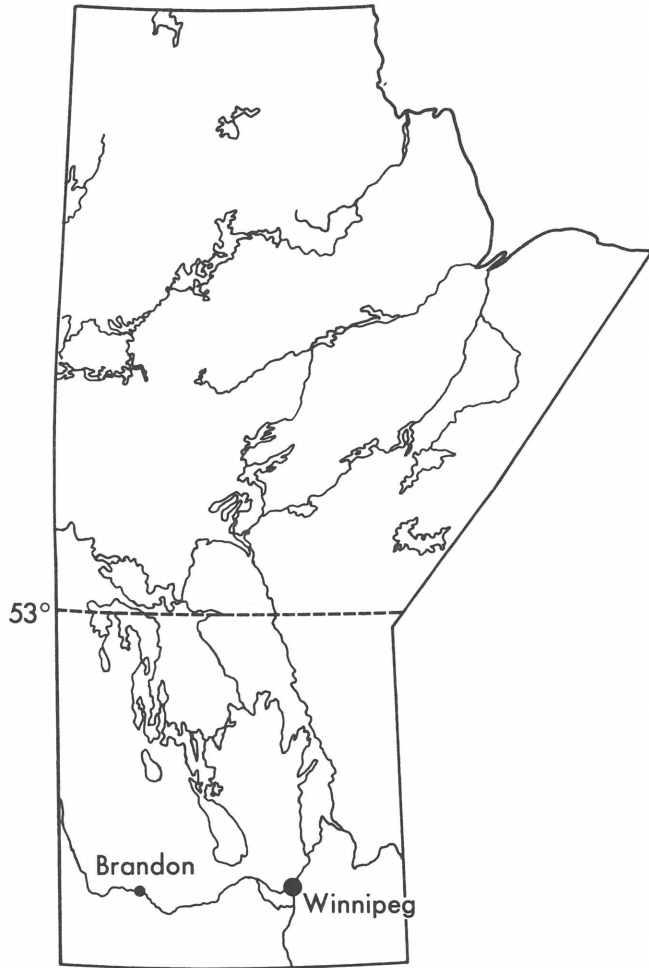


Figure 1 – Map of Manitoba.

45% of them living in Winnipeg; and aside from Brandon, the remainder were in widely scattered small towns and farms. The Manitoba Northland was even more sparsely inhabited then than now since Thompson did not exist then.

At that time comprehensive public hospital insurance and health insurance as we know them now in Canada were not available. There were no formal home care programmes in place at that time; and although many people had private insurance for acute illness, and although a few had private insurance against medical calamities, polio posed not only a terrible threat to life and limb, but also a very great economic threat to families.

Mr. Sherman mentioned the very great shortage of respirators in the province. He failed to say that half of them were old, wooden affairs, charitably donated years before to all hospitals in the Commonwealth by the British industrialist, Lord Nuffield. They were mostly lying unused and deteriorating in storage sheds.

Figure 2 shows cases year by year in Manitoba and admissions to the Winnipeg Municipal Hospital. In 1952

there was a major outbreak with 139 cases admitted to the Municipal Hospital. The King George wing was the local fever hospital for quarantine of cases with contagious diseases, and although at that time some other hospitals, particularly the Children’s Hospital in the city and small rural hospitals, took in poliomyelitis, the rural hospitals had serious problems handling respirator cases because of the lack of equipment and lack of experienced personnel. Such cases had to be transported to Winnipeg, often with respirator assistance, by road or air ambulance.

The experience in 1952 led to the decisions mentioned by Mr. Sherman that the Municipal Hospital be the major provincial resource for poliomyelitis, the King George wing for acute and respiratory cases, and the new Princess Elizabeth unit for rehabilitation. The Manitoba Rehab Hospital now in Winnipeg did not exist at that time, and the Princess Elizabeth, designated for geriatrics, was wheelchair accessible, and had a good Physiotherapy Department. That was later to be supplemented by the Hydrotherapy Department and a workshop for aids and devices. As Figure 2 shows – in 1953 the epidemic exceeded all expectations, and admissions to the Municipal Hospital, now limited to paralytic cases only, were close to 1200.

MANITOBA CASES AND ADMISSIONS WINNIPEG MUNICIPAL HOSPITAL

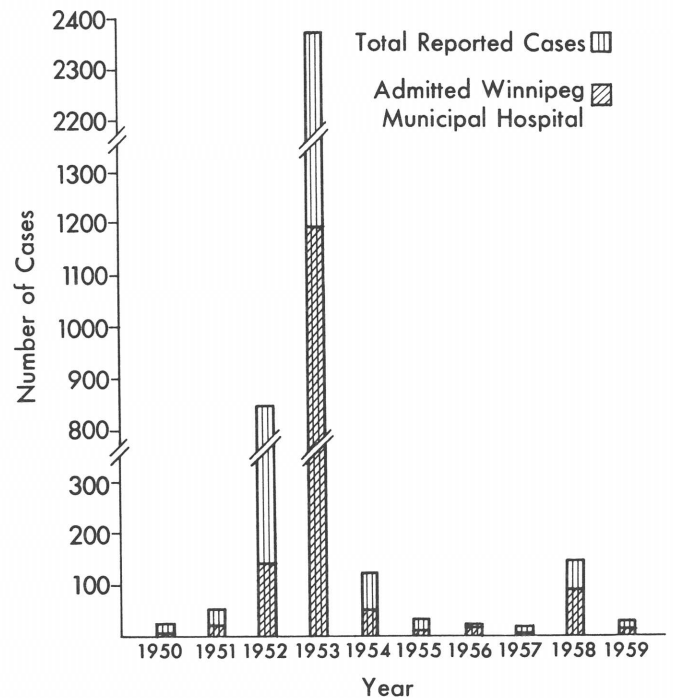


Figure 2 – Admission of polio cases to Winnipeg Municipal Hospital by year

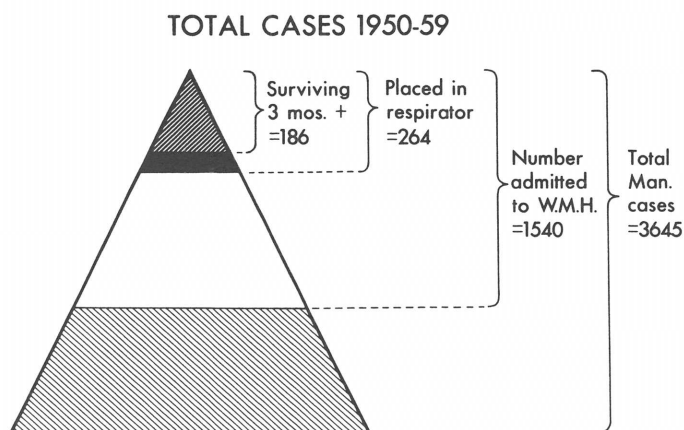


Figure 3 – Total number of cases of Poliomyelitis, 1950-59 and numbers admitted to hospital, placed in respirator, and surviving more than three months

In 1954 the cases dropped off to 117 and although there was a flurry of activity in 1958, that was the end of polio epidemics in Manitoba.

Figure 3 shows the same basic information presented in another way. The largest triangle shows all the cases of the decade in the province. The next triangle shows those admitted to the Municipal Hospital. The next shows the cases who required respirator treatment, and the tip of the figure represents 186 cases who were in respirators and survived for three months or more. This group is the cohort of 186 patients, the rehabilitation of which is the subject of this presentation.

DISTRIBUTION OF CASES BY AGE AT ONSET

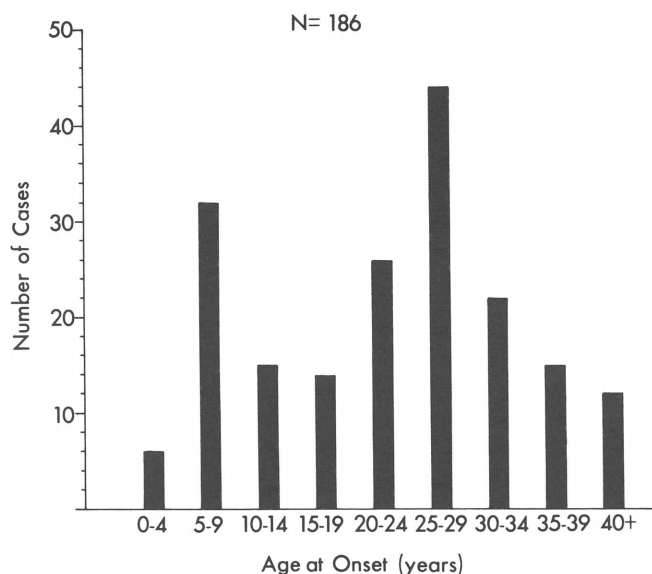


Figure 4 – Distribution of cases by age at onset

When we started to put together material for this presentation we found that although we maintained close contact with many of these patients – those who were still on respirators, and also we knew about a number who, although they had survived for three months, died without leaving hospital within the next few years – there were about 150 cases that we hadn't seen for years. We set about to trace them in order to gain their collaboration for this study. We managed to find all but 13, and all but two agreed to an interview and questionnaire concerning their health and life over the past 25 to 30 years. We have recently completed interviews with 113 ex-patients, and with 25 spouses, or other close family members of ex-patients who had died in the interval after leaving hospital.

We are very grateful for the co-operation received from these 138 people. As you have heard a number of them are here today to listen, and hopefully to comment on this presentation.

Table I

	SPINAL	BULBO-SPINAL	TOTAL
With Tracheostomy	2	81	83
Without Tracheostomy	71	32	103
Total	73	113	186

Table I – The number of patients requiring tracheostomy, spinal vs bulbospinal polio.

Figure 4 shows the age distribution of the 186 patients at the time of onset. They ranged from under one year of age to 66 years, but there appear to be two peaks – one is in the five to nine age group and the second and major peak is made up of young adults between 25 and 30 years old.

Table I shows a simple breakdown of cases by types of polio. I mentioned earlier the distinction between the high spinal type, which generally requires only a respirator, and the bulbospinal type which also requires the operation of tracheostomy to keep the airway open. As you can see in this table, of the 186 respirator cases most of the 113 bulbospinal cases had a tracheostomy, but only a few of the 73 high spinal cases did.

However, there is another difference between these two types. The speed and degree of respiratory recovery are much more favourable in the bulbar cases than in the pure high spinal. I will refer to this again later.

I have already mentioned that the 186 cases presented in this paper excludes the patients who died within the first three months. There were also a number of deaths which occurred after that time and these are shown in Figure 5.

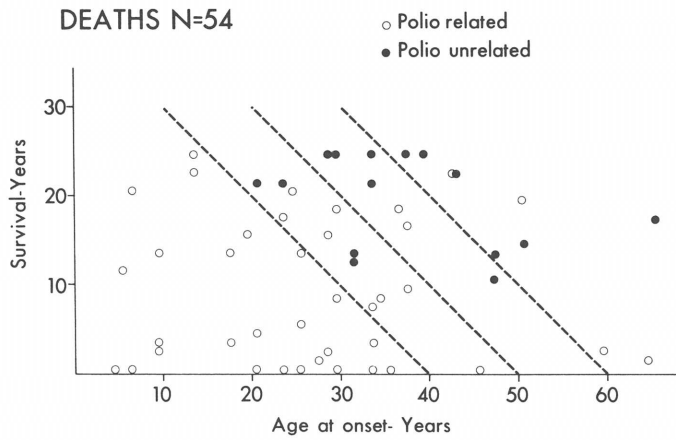


Figure 5 – Distribution of 54 deaths by age at onset & surviving years. Open circles are polio-related deaths. Closed circles are polio-unrelated deaths.

There were 54 such deaths up to 1st of January 1980 and they are plotted on this diagram. On the horizontal axis is the age at onset, and on the vertical axis is the survival time in years. The three dotted lines represent the ages of 40, 50 and 60 years of age. For example, take a patient who was age 40 at the time of onset, lived for another 25 years, and died – at age 65 of arteriosclerotic heart disease which was not related to poliomyelitis. She and the other deaths not related to polio are represented by solid dots. These solid dots tend to cluster in the upper right hand part of the figure, most of them above the lines which represent the age contours of 40, 50 and 60 years. The open circles which are largely clustered to the left and below, represent polio-

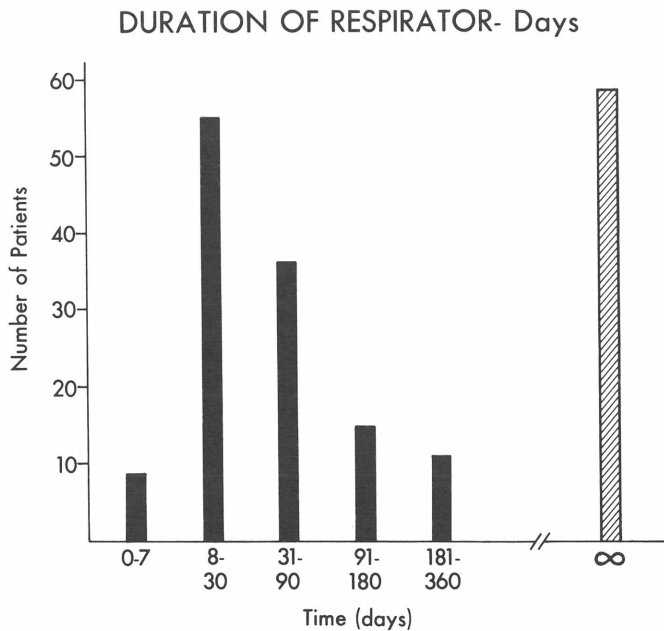


Figure 6 – The duration of time spent in respirators in days

related late deaths, due to respiratory infection, renal failure secondary to stones, or heart failure secondary to chronic respiratory insufficiency.

Not shown on this figure are two of the cohort who died since the 1st of January of this year, 1980.

Next, I will show data which relate to the duration of stay in respirator, the degree of residual respiratory disability and the discharge arrangements.

Figure 6 shows the length of time the 186 patients spent in respirators. On the left part of the diagram are all of those who were eventually able to manage without mechanical respirator assistance. The largest number of patients spent 8 to 30 days in a respirator but the range in time is very wide. The right hand bar on this figure represents those cases who were never able to be free of a respirator.

The few cases at the extreme left, who were in a respirator only for a few days, are paradoxically those who were most at risk of dying during the acute stage, but since they suffered mainly from bulbar paralysis, if they survived the acute stage, they made the best recoveries, sometimes so complete as to be considered almost miraculous.

Table II

POST-ACUTE RESPIRATORY STATUS

N=186

		No.	%
Respirator Free	No Disability	62	33
	Disability	61	33
Respirator Bound	Night Only	20	34
	12-18 hours	14	
	18+ hours	29	

Table II – Post-acute respiratory status.

Table II shows the distribution of cases with regard to their residual respiratory difficulty based on our objective assessment at the time of discharge or one year post polio. One third of the patients became totally free of the respirator and had little or no residual respiratory difficulty. Another third, those who spent a longer time in the respirator were left with more severe problems. Although normally free of the respirator, they had difficulty with respiratory tract infections and they might require to be re-admitted to hospital for short term respirator treatment. The remaining third remained dependent to varying degrees on the continued use of respiratory equipment. Some only needed such aids at night – others had to spend 12 to 18 hours a day in a respirator or on a rocking bed, and others could tolerate being outside the respirator only for very short periods of time. These latter patients could free them-

selves from their respirator only through the technique of frog breathing. This is an acquired skill of pumping air into the lungs with the muscles of the pharynx. It is a handy trick and about one third of our patients learned how to do it.

The 54 deaths shown in Figure 5 occurred throughout these groups but more of the late polio-related deaths occurred in those with the most severe residual respiratory disability.

As well as the risk of dying, the degree of residual respiratory disability has a significant effect on the rehabilitation potential — perhaps even to a greater degree than does residual paralysis of trunk and limbs.

Figure 7 is a summary of the distribution of cases by discharge arrangements. Of the 186 cases, 54% were discharged home in the ordinary way. Those were the ones who had achieved independence easily from their respirators. They were either followed up privately or they came back to our polio follow-up clinic. This left a large number of patients who were either tied to a respirator for part of each day, or so precariously free from the respirator that they required close surveillance and could not be far from a respirator. And yet many of them were anxious to leave hospital and return home and take up their normal lives again.

In order to meet their special needs it was decided to set up a home care programme. This was a very innovative step for the Province of Manitoba at that time, although it seems not unusual today.

Fifty-three patients (29% of the cohort of 186) were discharged under these special arrangements and shown as the middle bar of the figure. At the bottom are the 17% who were not able to be discharged and are shown here as permanent hospital cases.

The polio home care programme for these 53 cases was designed as a comprehensive package which met many needs of such patients, some of which are shown on the next table.

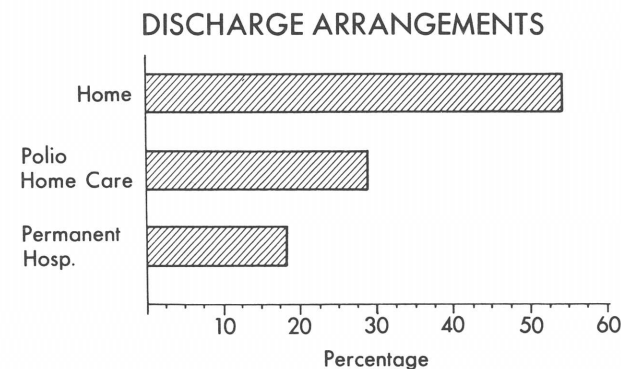


Figure 7 — Percentage of cases discharged to home, polio home care and not discharged.

Table III — Practically all of them required mechanical respirator equipment in the home. Sometimes this equipment was a tank respirator, other times a rocking bed; and chest respirators were also used for mobility. Given the importance of this equipment, meticulous arrangements had to be made to insure the regular inspection, servicing, and repair of that equipment.

Table III

**INITIAL HOME CARE ARRANGEMENTS-
53 PATIENTS**

	No.
Home Respiratory Equipment	50
Hydraulic Hoists	27
Wheel Chair	50
Homemaker or Attendant	
-Hired Attendant	34
-Spouse	10
-Parent	6
-Offspring	1
Home Modifications	

Table III — Initial home care arrangements for 53 patients

Mechanical aids were also supplied for those who were severely immobilized — hoists to get them in and out of bed, in and out of the house, and in and out of a car. This equipment required space and an adequate power supply. Most homes had to be re-wired to accommodate the load. The wheelchairs required that doors be widened, ramps built, and bathrooms and kitchens modified.

The second major component of the home care programme was a full or part-time attendant. There were 34 such attendants hired specially for this purpose and paid for by the programme, but payment was also made in certain cases to a spouse, a parent or a child who acted as a full or part-time attendant.

People who went home under this programme were leaving the medically more protective environment of the hospital. As a response to this risk a commitment was made that, should any health problem arise, respiratory or otherwise, immediate readmission to hospital would be available to them.

The heavy demands on the patient, the family, and the attendant of home care were also recognized and arrangements were made that readmission to hospital was available when the attendant or spouse went on holidays.

Table IV shows what has been achieved quantitatively with this home care programme. This table shows that on the average each of the 53 cases has been readmitted to the Municipal Hospital eight times, mostly for respiratory tract infection, but also for the respite for holidays I mentioned, and for other medical needs. On the average each has been on home care for close to 16 years but during that time has accumulated over a year's readmission time to hospital.

Table IV

POLIO HOME CARE PROGRAMME

N= 53

Mean Number of Readmissions per Patient	8
Mean Number of Readmitted Hospital Days	412
Mean Duration Home Care Program in Years	15.8

Range: 3 mo.-26 yr.

STATUS- JANUARY 1, 1980

Still on Home Care	25
Permanent Hospital Care	7
Deaths after Readmission	4
Died on Home Care	17

Table IV - Polio home care programme

The lower half of the table indicates what has happened to these 53 home care cases over the last 25 years. Half of them are still on home care and enjoying the benefits of that programme. Seventeen of them died while on home care and 11 were readmitted to hospital on a permanent basis, often due to the loss of a spouse, or some other reason important enough to destabilize the family and social arrangements upon which the home care programme was contingent.

I now wish to turn to the data which we obtained from the interviews carried out during the past few weeks to determine the functional state of the patients today and to obtain their perception of the changes which have happened to them in a number of spheres since they developed polio. You will remember that we interviewed 113 directly and we also obtained information from the spouses or other close relatives on 25 of the cohort who had died.

Table V shows their current respiratory status as they perceived it at the time of interview. For this purpose we have used the interview data from the 113 ex-patients who were able to give us direct information. In this table, as well as in subsequent tables, we have divided the 113 into 70 who were discharged home in the ordinary way, 23 who

were discharged home under the home care programme, and 20 who remain in the Municipal Hospital. As is shown to the right of the table the totals for the 113 patients are remarkably similar to those estimates of pulmonary function which we made objectively at the time of discharge or a year post polio; that is approximately one third respirator free and had little or no disability, another third continued to have some respiratory disability but were free of the respirator and one third were using respirators at least some part of each day.

However when we look at these data for the three categories of discharge we see that those who had ordinary discharges and the shorter period of hospitalization were all free of the respirator whereas those who remain in the Municipal Hospital and those who are on home care depend heavily on their respirators at least at night.

Table V

REPORTED RESPIRATORY STATUS TODAY

	% Home N=70	% Home Care N=23	% W.M.H. N=20	% of Total
Respirator Free				
No Disability	54	9	—	35
Disability	44	22	—	32
Respirator				
Night	—	35	—	}-----33
12-18 hours	2	26	35	
18+ hours	—	9	65	

Table V - Reported respiratory status today

So overall it seems that their respiratory status has not changed much. Some patients have improved somewhat in their respiratory function, but others have deteriorated. This is shown in Figure 8. These two graphs show serial readings of the vital capacity - a simple, reliable measurement of how big a breath one can take. The vital capacity for a normal adult is up to four or five litres. The first vital capacity test was taken within a few weeks of coming out of a respirator. Most of these shown here are under one litre. When that value is plotted against a second reading of the vital capacity taken some 10 months later, the second reading is better than the first and all the points fall below the line of identity. If the second reading was identical to the first the point would fall on the line. A few years later when a third reading is taken and then plotted against the fourth reading taken many months later, the situation is a little more complex. Those subjects who had a fair recovery of their respiratory function and had vital capacities of two

VITAL CAPACITY- Changes with Time N=35

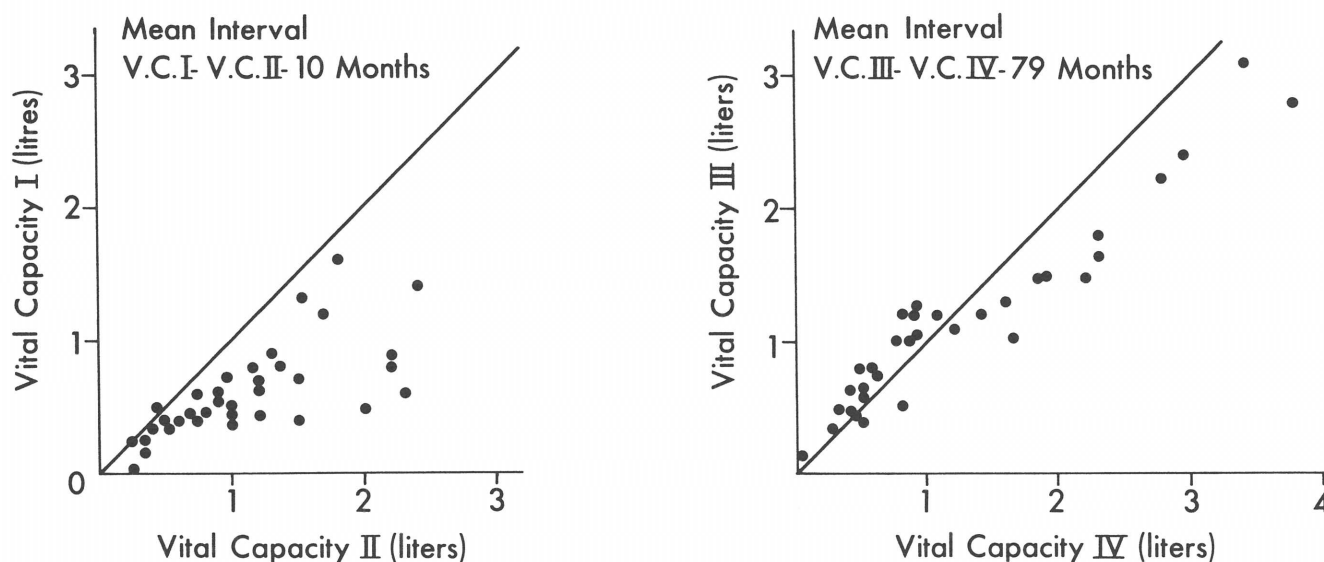


Figure 8 – Changes in vital capacity with time. Left hand graph compares vital capacity test 1 with vital capacity test 2. The right hand graph compares vital capacity test 3 against vital capacity test 4.

litres or more continued to improve in the interval between vital capacity test 3 and test 4 and their points are also below the line of identity. However, at the lower left hand corner of this right hand graph most of the points rise above the line of identity which means that there has been a deterioration in vital capacity between the 3rd and 4th test.

Perhaps Dr. Kirk will comment on ways in which this late deterioration of respiratory function can be avoided or minimized.

I would like to turn now to some functional parameters which are commonly used in rehabilitative medicine as a measure of residual disability. A series of questions were developed for our interview questionnaire which were based on Katz's Activities of Daily Living Index. The subjects could rate themselves for a particular activity at one of five possible levels of performance. They could carry out the activity with ease, level 1; or with difficulty but without equipment or outside help, level 2. The third level would be still without outside help but using equipment. The fourth level is when they required help in spite of the addition of equipment, and the fifth level was when they were totally unable to make any contribution to that particular activity.

For the purpose of the next two tables we have made a cut-off after level 3 (i.e. what a person does without outside help).

Table VI shows the results in terms of mobility – the ability to get around. A number of activities are indicated – getting into bed, sitting down in a chair, level mobility (this includes the use of wheel chairs, including motorized wheel

Table VI
MOBILITY

Individual Activities	% 'DOES NOW' (No Helper)		
	Home N=70	Home Care N=23	W.M.H. N=20
Into Bed	94	30	5
Sit Down in Chair	90	35	5
Level Mobility**	99	78	70
Stairs	71	17	5
Outdoor Mobility			
-Summer	93	65	65
-Winter	70	22	5

SUMMARY

General Mobility	Home N=70	Home Care N=23	W.M.H. N=20
One Year Post Polio	63	17	0
Current	93	61	10

** includes wheel chairs

Table VI – Current level of mobility

chairs), management of stairs; and in our Manitoba situation, we had to look at outdoor mobility and the difference between summer and winter. The columns show the same 113 ex-patients divided into three groups identified by their method of discharge from hospital — 70 discharged home in the ordinary way, 23 discharged to home care and 20 still in the Municipal Hospital.

The differences in mobility which exist between these three groups is very marked. The only dimension of mobility on which the three groups are relatively close is mobility on the level surface when they can use wheel chairs.

One can see how formidable a barrier stairs are even for a quarter of the largest group of 70. Some individuals have told us that they have had to leave a job, or to refuse a promotion because a flight of stairs blocked their access.

One can also see what a barrier to mobility a Manitoba winter can be.

The bottom of the table shows the general improvement in mobility in all three groups comparing one year post-polio with now.

Table VII
ACTIVITIES OF DAILY LIVING

ACTIVITY	% 'DOES NOW' (No Helper)		
	Home	Home Care	W.M.H.
Hand Grip	96	74	20
Hold & Lift	96	74	20
Reach Up	86	17	0
Write/Type	99	91	40
Wash	94	48	0
Bath/Shower	81	13	0
Dress	90	22	0
Toilet	91	30	0
Hair/Shave	96	52	0
Feed	97	78	5

Table VII — Current activities of daily living

Table VII shows a number of activities of daily living. There are a lot of figures on this table but I will lead you through them. These are the same three columns we saw before and the numbers in each are the same totalling 113 who were interviewed directly: 70 individuals who were discharged home in the ordinary way, 23 to home care and 20 still in. The figures in the columns are the percent of

those who actually carry out the activity without help but perhaps using mechanical aids and devices. The descriptions of the activities have been shortened for purposes of presentation on this Table. I am sure many of you are familiar with this type of activity measurement.

The data show again a very marked difference between the three groups. The 70 who were given normal discharges from hospital are almost all regularly doing all of these activities of daily living. Taking a bath or a shower is difficult for some and only 81% carried out this particular activity without the help of an attendant.

Table VIII
MAJOR HEALTH PROBLEMS

	% Home N=70	% Home Care N=23	% W.M.H. N=20
Urinary Tract	26	43	40
Heart	7	17	20
Hypertension	17	22	40
Ulcers & G.I.	16	26	35
Psychiatric	6	9	15
Polio Related Surgery			
Other Surgery	41	35	30
Accidental Injury	47	43	45
Polio Related	19	22	5
Other	7	4	0

Table VIII — Major health problems

In the next column of the 23 discharged to home care, many of them are not able unaided to reach above their head, to wash, bath, dress or go to the toilet whereas most of them are able to manage by themselves to grip the door handle, hold and lift an object, write or type, and feed themselves. Practically all of those still in hospital need help for almost all of the activities of daily living shown on this table.

Table VIII shows the health problems over the intervening 25 years as perceived by the people themselves who were interviewed. In this case the differences between the three sub-groups of subjects is not so marked but some differences remain. You must remember that this is no longer a young population. All of them are at least 30 years of age and a number are in the geriatric age group. Thus, it may not be surprising that a fair number of them report having urinary tract problems, heart disease, or hyperten-

sion. The number with mental health problems are relatively few. Some in each group have had operations which are polio related, as well as other operations. Twenty per cent of them had polio related accidental injuries such as having a heavy fall because their limbs are unstable due to residual paralysis.

Table IX

SELF ASSESSMENT OF CURRENT HEALTH

	% Home & Home Care N=93	% W.M.H. N=20
Excellent	19	5
Good	61	45
Fair	16	35
Poor	2	10
No Answer	0	5

Table IX – Self-assessment of current health

Table IX indicates that their personal assessment of their general health is quite positive, even 50% of those still in hospital say their health is good or better, and only 2% of the 93 in the left hand column and 10% of the 20 on the right, or a total of only four of 113 individuals feel that they are in poor health.

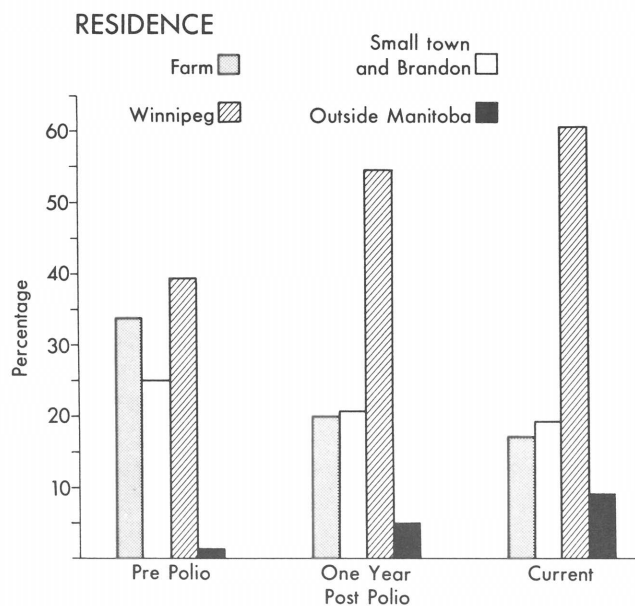


Figure 9 – Change in residence after polio

Figure 9 is a histogram showing that post-polio changes in the place of residence of all the 138 cases on whom we have interview information.

Although there is a secular trend to urbanization, many more of the post-polio patients have left the rural areas for the city than one would expect for the population shifts at large. In fact a number of them have informed us directly that they have moved into the city because of problems in rural areas with mobility, availability of help both domestic and medical, and opportunities for employment.

Table X shows data we have extracted to date from our 138 interviews on employment. Sixty-four of the 138 or approximately half of them had been wage earners before they got polio. Twenty-four of those or 40% of them went back to their old jobs post-polio. A total of 85 of the 138 were employed at sometime post-polio. This included some of those who were children when they got polio.

Table X

EMPLOYMENT EXPERIENCE

PRE POLIO	Nos.
Wage Employment	64*
Children	41
Homemaker	31
Other	2
POST POLIO	
Wage Earners* Returning to Pre Polio Jobs	24
Employed Some Time Since Polio	85

Table X – Employment experience

May I draw your attention to the category listed here of homemaker. The number shown here had that occupation before polio. We have responses on 38 female individuals who regard themselves as homemakers now. Half of them claim they manage to do all their housework; a quarter of them do some housework but not all of it; and a quarter of them can do very little actual work but still do the planning and supervision required to run their homes.

Table XI considers some personal and family events which occurred post-polio and which have considerable impact on the care and support available in the home.

Twenty-six or half of the eligible single adults including the children now grown up got married in the post-polio years. Half of those eligible (married) have had children.

But most of the children that the polio patients had (93% of them) became married and 12% of those married

children begat children of their own, shown here as grandchildren.

Time also takes its toll and 71 (63%) of the 113 post-polio suffered the loss of parents and eight of the 83 married ones suffered the death of their spouse. Eighteen were divorced or separated.

Table XI

FAMILY EVENTS OF POLIO PATIENTS

	N=113		
	No.	%	No. Eligible
Marriage	26	48	54
Birth of Children	42	50	83
Children Married	53	93	57
Grandchildren Born	10	12	83
Death of Parent(s)	71	63	113
Death of Spouse	8	10	83
Divorced/Separated	18	22	83

Table XI - Family events

Table XII - The final table depicts the responses of our 113 interviewed subjects when shown the ladder of events which you see at the left side of the table and asked to indicate where on that ladder of personal stresses ranging from traffic ticket to the death of a spouse they would place polio.

The question posed so much difficulty that 20% of them could not, or did not want to answer.

Not surprisingly, 15 of the 16 still in hospital who did answer (75% of this group) felt that polio was as stressful, or more so, than the death of a spouse. However almost one quarter of the patients who went home as ordinary discharges thought that polio was not more stressful than getting married or having a spat with the relatives.

This wide range of responses is contributed to by a number of factors. At one extreme we have those who have been left completely paralysed and dependent on a machine for breathing and an attendant for all their daily needs. At the other extreme are the people who, although they spent time in a respirator, had mainly bulbar involvement and made quick and good recoveries and are now leading a normal life with no or minimal disability.

To sum up, we have reviewed those polio patients from the epidemics of the 50's who required respirator treatment and who survived the acute stage of the disease. There were 196 of them and they spent widely varying times in hospi-

tal and in respirators. Some of them never left the hospital or the respirator even to the present, some 27 years later.

Table XII

IMPACT OF POLIO VS. OTHER LIFE STRESSES

	% Home N=70	% Home Care N=23	% W.M.H. N=20
_____24	19	35	40
Death of Spouse _____22	13	4	35
_____20			
Divorce _____18	27	26	0
_____16			
_____14			
_____12			
Marriage _____10	23	13	5
_____8			
Trouble with _____6			
Relatives _____4			
Traffic Ticket _____2	19	22	20
_____0			
No Answer/ Refused			

Table XII - Ladder demonstrating the perceived effect of polio compared to other life stresses.

The majority were discharged home including a group of 53 for whom a special home care programme was developed and tailored to their individual needs for equipment and attendants. Many are still home in that programme 25 years later. In the intervening years 30% of the original cohort have died - many from polio-related conditions but also several from advancing years and conditions which are common causes of death for adults in our society.

We have traced over 85% of the original cohort and with their co-operation and the co-operation of the surviving relatives of those who died, we have obtained and presented information on their current level of functioning in matters of health, activities of daily living, employment and personal and family life.

Although we have been obliged to present a rather brief overview of our findings I think we have shown you sufficient data to support the following concluding statements:

1. Many patients with respiratory polio are left with considerable disability; and, in spite of new

equipment and new treatments, the human, social and economic costs of polio are devastating.

2. Therefore our aim must be to extend the use of already available methods – vaccines – to prevent the disease.
3. We should acknowledge a silver lining to the polio cloud. In a way similar to thalidomide, and to some extent comparable to war injuries, polio has spawned, or at least contributed to, many innovations which have enhanced the quality of life for the physically handicapped, including the elimination of barriers both architectural and social. A related concern was eloquently expressed on Tuesday when Dr. Chigier was speaking about severely disabled Israeli veterans. They, like our polio cases, became disabled as young healthy people, but as the years pass they become older, and intercurrent disease and changing social and family affairs compound their original disability.
4. In our re-examination of the long-term results of polio we have noted some areas where vigilance must be maintained against routine complacency. The long-term course of respiratory function is one such concern. Another is the changing needs of a group of aging people disabled by what was once called Infan-

tile Paralysis. These concerns should stimulate us to a renewed dedication to maintain active and imaginative rehabilitation for the polio patients of the 1950's and for others with severe long-term disabilities.

COMMENTS

Dr. J. Alcock

We started somewhat late and if there are no burning questions to put to Dr. Hildes, I would like at this time to move on to the next presentation.

The third paper is by Bryan Kirk, who has been actively involved with us in the management of late respiratory problems faced by some of the long-term respirator patients. He is an honours graduate of The University of Manitoba, a respirologist of some renown, and for the past 14 years has been Director of the Intensive Care Unit at the Health Sciences Centre. He is also Associate Dean of Post-graduate Medical Education at the Medical School, and he is currently President of the Canadian Society of Critical Care Medicine. His paper is entitled, "Modern Methods of Long Term Artificial Respiration".

Modern Methods of Long Term Artificial Respiration

Dr. Bryan W. Kirk, Director, Intensive Care Unit, Health Sciences Centre, Winnipeg

I am going to talk about a very small number of patients. If you considered the number of patients that we have been involved with, and the duration of that involvement it would look like a very small dot in the very large poliomyelitis pyramid that Dr. Hildes presented to you at the beginning of his talk.

I first found out about poliomyelitis in 1961 when I was an intern. I was introduced to patients who were in old-fashioned devices called iron lungs and rocking beds that we don't use much any more.

The people who introduced me to them (and some of those people are sitting here now), were pioneers in the development of respiratory and intensive care in this province, at a time that was fully a decade ahead of comparable developments in other parts of North America. Those older devices, iron lungs for example, (Figure 1) are devices which assist ventilation by coupling negative and positive pressure changes inside the tank ventilator with the

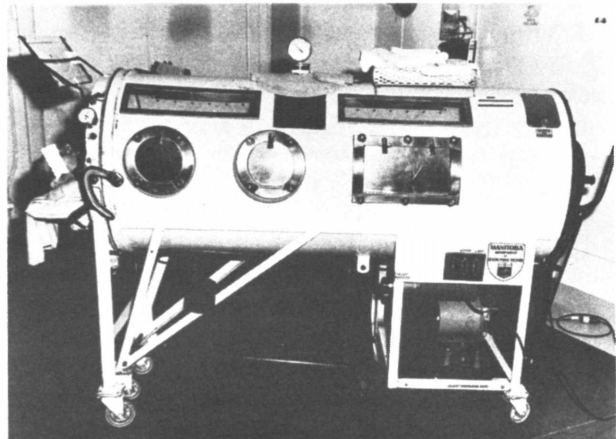


Figure 1

patient's body. Through moving the chest wall and the abdomen – and by moving the abdomen thereby moving the diaphragm – air is moved in and out of the lungs. This coupling is loose, and it is not direct; but polio-paralysis is a

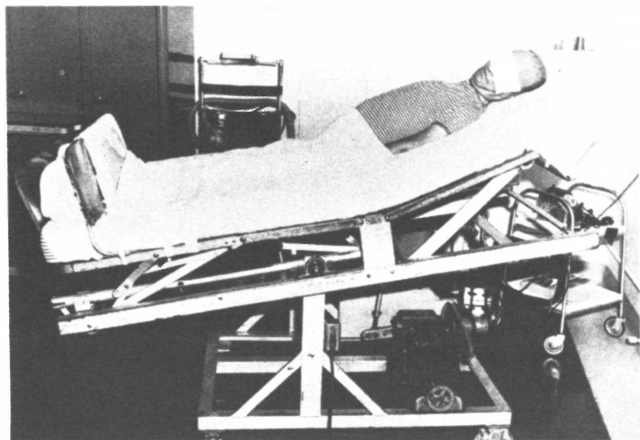


Figure 2

particularly suitable condition in which to use this sort of coupling, because high spinal polio results in flaccid paralysis of the muscles of the trunk and respiration. Therefore, it is easy to move air in and out of the patient's lungs by coupling to the negative and positive pressures in the tank. Similarly, in the rocking bed (Figure 2) the cyclic movement of the bed, through the effects of gravity on the abdominal contents, causes the diaphragm to move up and down which moves air in and out of the lungs.

Because polio-paralyzed muscles are flaccid, they do not resist these pressure changes. The lungs themselves are usually normal. Thus, the amount of force required to move sufficient air in and out is relatively small and can be accomplished by the modest pressures developed by these devices. Also these devices did not require a tracheostomy to overcome respiratory paralysis; this allowed the patient to speak and eat and live in a normal manner aside from the limitations of his paralysis.

However, during the early 1960's the devices such as iron lungs or rocking beds were abandoned for most cases seen in Intensive Care Units who required assisted respira-



Figure 3

tion because we were dealing with abnormal lungs which required more power and higher concentrations of oxygen. We frequently found that we had trouble to meet the patients physiological requirements with the old types of ventilators that had survived from the 1950's.

Ten years ago we were introduced to the problem of long-term mechanical ventilation in the following way. A little boy presented with tetraplegia not caused by polio, but resulting from an automobile accident. (Figure 3). His vital capacity, flat out and downhill with the wind behind him, was 25 ml. which was about 10% of that required to keep him alive. So it was necessary to provide long-term ventilation for this young fellow, and we did this with a tracheostomy and a small positive pressure respirator which can be battery operated and is therefore portable.



Figure 4

He had his 18th birthday recently and I was there. It was not a completely dry occasion which should surprise no one when a young fellow has his 18th birthday. Figure 4 is a picture of our young friend taken on that birthday occasion. Up to the present time we have been able to provide him with ten years of mechanical ventilation.

In solving some of the problems with this patient, we developed solutions that we would soon come to apply to other patients who had polio in the early 50's and who had begun to get into difficulties in the middle 1960's.

The first one was a patient who had been on long-term ventilation at night in an iron lung (one of the Home Care patients), but because of age and bouts of infection, developed increasing resistance in the chest wall and lung. It became impossible for the iron lung to maintain adequate gas exchange; this patient was getting too little oxygen even when spending the whole day in the iron lung. It became a life-saving necessity on several occasions to put a tube into her trachea and to ventilate her with a positive pressure type of machine.

So you see we got into the business initially with a patient with traumatic quadriplegia and transferred the

skills we had learned to another patient who originally had had polio paralysis but who got into trouble and could not be properly ventilated with an iron lung. Figure 5 shows the setup we developed — a system involving a tracheostomy, a tube, (shown with the one way valve which I will talk about later), and a relatively small battery-powered ventilator. In both the cases I have mentioned, this has provided excellent and adequate long-term mechanical ventilation with the added feature of mobility since this machine and the battery easily fit into a wheelchair.

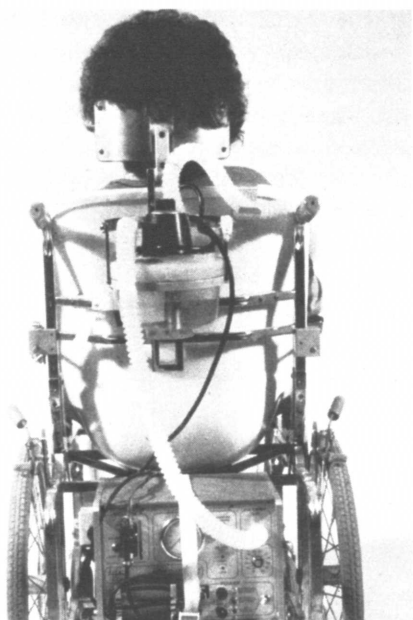


Figure 5

Over the last ten years we have applied the solution of long term mechanical ventilation (LMV) to a growing number of patients. Table I shows the types of problems that have been referred for LMV.

TABLE I

	Referred	Started	Alive
Spinal Poliomyelitis	8	7	7
Traumatic Quadriplegia	5	2	2
Motor Neuron Diseases	2	2	1
Restrictive Lung Disease	1	1	0
Obstructive Lung Disease	3	2	1
Nocturnal Hypoventilation	1	1	1

The biggest group are people who had spinal poliomyelitis in the early 1950's. A few, like the one mentioned previously, have had spinal cord injuries, but the majority of such cases recover enough to breathe on their own. These people will become the "polios" of the future since they don't have a progressive illness. At the North Western Spinal Injuries Referral Centre in Denver, Colorado, there are usually six patients with spinal injuries on ventilators at

any one time. Other groups of patients with progressive diseases present some difficult moral and ethical issues but all have had an apparently useful and happy extension of life.

The medical indications for LMV initially were inability of an iron lung or rocking bed to sustain life or to maintain health. As we gained experience, and as the polio patients had an opportunity to assess the system, the indications have broadened to include considerations of life style such as mobility.

In selecting equipment for a patient who has respiratory insufficiency, there are a number of considerations. One that I mentioned previously was the trade-offs between a rocking bed or an iron lung, and the more modern ventilators which I showed you. With the rocking bed and the iron lung, in most cases there is no tracheostomy required, talking is possible, but the big drawback is no mobility unless you can get off or out of the device for a period of time. With the positive pressure mechanical ventilator, the patient requires a tracheostomy but talking is still possible if an uncuffed tube is used. The big plus value to this machine is that it allows mobility since the ventilator can fit into a wheelchair.

One of the technical problems that had to be overcome in the development of the ventilators was the power required. Initially, car batteries were used and they weren't very satisfactory. Lazy golfers brought us the deep discharge golf cart battery, which is much better for both battery operated wheelchairs and for ventilators, and these are what we now use. The respirators are now devised so they may be operated either by a domestic electrical outlet or by the wheelchair battery. Sometimes a separate additional battery is used for the respirator.

As far as I know we in Manitoba have pioneered the use of uncuffed tracheostomy tubes for patients on long-term artificial respiration with positive pressure respirators. This is shown in Figure 6. This has a couple of major advantages. One of the great fears of patients with long-standing polio paralysis is that they will no longer be able to talk. But we soon found that talking is easy with an uncuffed tube. Another advantage is that if the respirator fails, an uncuffed tube allows air to enter around the tube through the larynx and the patient can breathe on his own to the extent of his muscle power. When the machine is blowing air in, the larynx remains closed and air enters the lungs through the tracheostomy tube. Since there is a one way valve in the system only letting air in, air must escape through the larynx which the patient controls. This allows the patient to save up a couple of breaths for a good effective cough.

It is rather spooky to think that the set-up we are using is just the opposite to the normal use of the larynx in breathing. When the ventilator is blowing air into the lungs the glottis is closed. Then when the ventilator cycles and stops blowing, the larynx opens to let the air escape. Since

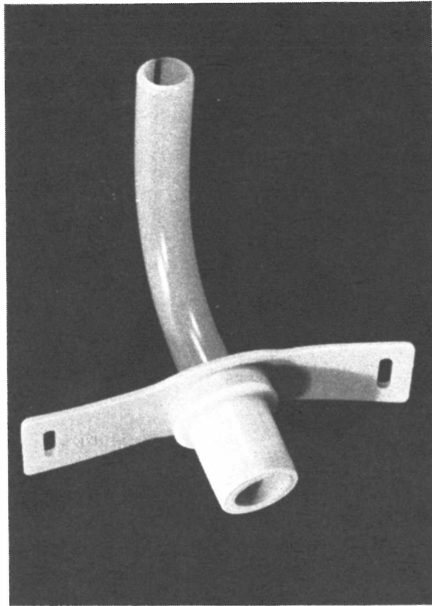


Figure 6

we have been breathing in just the opposite way for all of our lives you would think it would be hard to adjust, but polio patients, particularly those who are adept at frog-breathing, take to the new set-up in an amazingly short time. At first they adjust to it in a conscious voluntary way, but it soon becomes automatic and finally the function of the larynx is maintained even in sleep.

However, it appears that sometimes in very deep sleep the larynx may relax and leak air when the machine is blowing in air meant to inflate the lungs.

If you analyze the system from an engineering point of view, the ventilator is blowing air into a system that has two resistances: a resistance in the upper airway, or more correctly an impedance in the upper airway — the glottis; and an impedance in the lower airway which consists of the smaller airways and the lung itself. During the "awake" state, the resistance in the upper airways closes completely and the air then flows into the lungs, inflating the patient's lungs and providing adequate ventilation. During sleep, this upper resistance gets less and so some air escapes out through the nose and mouth. The trick is to provide a high enough flow so that there is enough impedance in the upper part that air will still go down into the lungs. This is a particularly important safety factor in patients with quadriplegia. This is something we do not know enough about.

For patients who have minimal respiratory function, alarms are important. Most of the alarm systems we have used have been of the pressure type because they are the easiest to adapt to this type of system: a low pressure alarm indicates a disconnect and a high pressure alarm indicates some form of obstruction — somebody standing on your tube, or a plug in the airway, or things of this sort. One of

the needed features is that the alarm be fail-safe — that is, that the battery on the alarm and the wheelchair shouldn't be the same or connect together, because if the battery fails then the alarm won't go off. For some of our younger patients, or for patients who are on Home Care (about half of these patients are on Home Care at the present time), we have made provision for remote alarms. This is usually done just by running the alarm wires from the patient's bedside to the parents' bedroom. But in one, the problem was solved by mounting a gigantic firebell, 12 inches in diameter, under the seat of the wheelchair, and providing a patient-operated switch. When the switch is turned on, everybody within 400 yards, whether the doors are closed or not, knows that he is having a problem. This was his alarm system when he was at school. It was crude, but very effective.

Humidification has been a major problem with these ventilators. It takes more than 500 calories to turn a gram of liquid water into a gram of water vapour and those high power requirements are just not available in a battery, so that providing heat for humidification has been a problem that we have not as yet completely solved. We think we can probably get there by using a spinning disk humidifier, and that is currently under development. We haven't had any episodes of serious obstruction due to lack of humidification in the polio patients that I am aware of, but in one of our traumatic quadriplegics we have had an obstruction from a mucous plug due to lack of adequate humidification.

We have about a dozen patients on long-term mechanical ventilation, either at King George Hospital or living at home. No formal assessment of any benefits has been done. We believe that in a number of cases we have added a minimum of two more years to their lives. We appear to have improved the quality of life for most, mainly through increased mobility but also by removing breathlessness that made even eating an ordeal. We think that there has been a decrease in need for medical and nursing care for patients out of hospital. We don't know if the higher capital cost of equipment is offset by cost savings in other areas.

In summary I have described a small but growing programme of long-term mechanical ventilation that has been applied to the most disabled survivors of our great poliomyelitis epidemic in Manitoba.

COMMENTS

Dr. J. Alcock

Thank you Dr. Kirk. Any questions?

A Person in the Audience

How effective are these respirators in a condition which is "progressive"? Does the respirator keep the lungs going while the rest of the body is deteriorating?

Dr. Kirk

Obviously the ventilator will not do anything for the primary problem — as for example in certain types of neurological illnesses where there is a gradual deterioration in muscle strength including the respiratory muscles — but the ventilator will ensure adequate respiration.

Regarding “progressive” deterioration in respiratory function, this may happen to people with severe long-term polio paralysis. We have seen, as recently as the past two weeks two of the patients who were presented today as polio respirator cases 25 years ago and who have just recently developed respiratory failure because they are not being adequately ventilated with methods that have been adequate up to now. That is one principal reason why we convert polio patients from tanks to positive pressure ventilators, and this may be a life saving measure. The other reason is that they may want to be converted for increased mobility and independence.

Another rather indefinite factor of change over the years as far as polio patients are concerned is just that — the passage of years. As people get older their lungs get stiffer, their chest wall gets stiffer and their muscles are not quite as strong as at the age of 50 as they were when they were 20. We should try to get more precise answers to some of these questions with the co-operation of the patients themselves who have a lot at stake in this knowledge.

COMMENTS*Dr. J. Alcock*

Does anyone have any further questions for Dr. Kirk?

We have heard in the foregoing papers indications of what polio may mean to individuals. Now we have three people who will speak to you about their individual circumstances. All three are from the group of patients with persisting respiratory difficulty. Mrs. Martha Smith is one of these referred to earlier as those who could not be discharged from hospital. Martha will speak to you now.

Commentaries by Ex-Patients

I Mrs. Martha Smith

Thank you Mr. Chairman.

Distinguished guests, ladies and gentlemen; in the year of 1953 it was a beautiful summer. I was in the prime of my life — I had a loving husband and a beautiful baby boy. We were living in the City of Winnipeg with all it had to offer. This was the year of Manitoba's worst polio epidemic. Little did I know that my son and I would be victims of this disease. Like everyone else, I thought “it couldn't happen to me”, but it did. I contracted polio September 26. Three days later, my physician sent me to the King George Hospital, much against my wishes. Late that evening I was placed in an iron lung. I didn't know then that this machine would be with me the rest of my life. Up to that time I had no idea what polio was all about. The medical and nursing staff were very kind and explained what was happening to me. Here I was in an iron lung, scared stiff, unable to breathe, and thankful that like so many others, I did not have to have a tracheotomy. I kept saying to myself, “why me again?” I was a victim of Infantile Paralysis in 1940.

At first I really didn't care about my own life. My main concern was my son. Who was going to look after him? How badly was he affected with polio? Fortunately it was only one leg, which was later successfully corrected by surgery.

After re-learning to breathe for about five months, I finally was able to breathe unassisted for ten hours a day, and then I was on my own. A year later, I was up in a wheelchair, was going home on weekend days with my husband and my son — even though I was completely paralyzed. I was determined to make another life. Before polio, I was a very active person, and had continued to be that way in spite of a few ups and downs.

Both medically and physically the life in hospital is not hard to take. Naturally we have to follow the rules and there are certain routines. We are well cared for and we still have our freedom and our rights. Most of us in hospital are not living there by choice. For some it's a family situation, and for others, there is no way out.

Because of my polio my husband divorced me. This was a very trying time for me. It was only fair that my husband make another life for himself. In spite of this, we parted as friends.

I am very active in hospital activities. I have learned to paint and type with my headstick. I drive my motorized wheelchair with my head, and I also am into arts and crafts and other social gatherings. Three years ago I joined Toastmasters' International which gave me a chance to get out and speak as a public speaker. I recently have tried my hand at merchandising for a T-shirt company.

My son is now married and I have a grandson three months old. My son completed four years University in Agriculture, but seeing there was no position open he chose to be a fireman for the City of Winnipeg. To say the least, I am proud of him.

From the little I have told you about my 27 years as a polio patient and living in hospital, you can see I have not been deprived of the beauties of life. How many people can say they have lived two lives in one lifetime? I can, and I hope the next 27 years are as good to me as the last 27. If so I'll be thankful, Mr. Chairman.

COMMENT

Dr. J. Alcock

Thank you Martha. Martha has rarely been at a loss for words and I don't think that Toastmasters has really made much difference. Martha, thank you very much again for your presentation.

Mr. Paul Sigurdson has been a Home Care participant since his discharge from hospital in 1955. He had already completed his education and was himself an educator. He was married with a family at the time he was stricken. He will speak now.

II *Mr. Paul A. Sigurdson*

Mr. Chairman, Ladies and Gentlemen, and Fellow Underfolk; what I am going to say will be primarily about polio, but I hope it can be applied in some ways to all the Underfolk who are gathered here for this Symposium. I am choosing polio because it has been my private field of study for the past twenty-seven years. I didn't join the course, it was foisted on me. That's why I am here today. Of course, as you heard Martha say, polio causes a sudden and dramatic change in your life. When you are young and healthy as I was, you are invincible, youth is eternal, death is something that happens to somebody else, and the physical life is wonderful. I taught school for twenty years after I had polio, and before I got this little friend here,* there was one thing that occurred to me over and over again as I faced my students — that no matter how you goaded them, no matter how you prodded them, no matter how you thought you were one up on them, they were always one up on you, because they had the invincibility of youth, and the carefreeness and belief that youth is eternal.

There is a great change in your life when you wake up out of a fever, out of the fog. You see the sun is shining — then you look out the window through the mirror of your respirator and you see there are people walking on the street putting one foot in front of the other, and swinging their arms — and life is actually going on without you, and

you believed that you had been an essential part of it. You see these people with a sense of outrage and hurt, and by the time the nurses have washed you and changed your diapers, and fed you, and brushed your teeth, and shaved you and combed your hair and literally gone over every inch of your body, you decide it is time to throw dignity into the basket and leave it there. You have been pretty well humbled.

If I may borrow from the language of my forefathers, there is an old saying "Enginn Vait Kvath Hann Att Hefur, Fyrr En Hann Misst Hefur", which means "No one knows what he has owned until he has lost it". We have lost the preciousness of life, that cell-tingling animality which we have when we are young, that great physical strength. And there are many things that we can't do. We can't have the joy of running in the wind, and feeling it kissing our face. And we can't walk through the heavily-scented pine forest and drink in a stream, and feel the wet seeping through our trousers and cooling the knee. And we can't take a child in our arms and bury our face in its stomach, and wiggle it, and hear its ecstatic shrieks of joy. And we can't get down on our hands and knees and play "bear" like a child with our own children. These are life's essences — these simple, precious pleasures which defy all sophistication, and all hypocrisy. These are the greatest losses for the Underfolk.

However, we go through a period of acceptance and I think we learn to face the truth with clear eyes. We accept the perishability of life and we recognize the great power beyond ourselves, and we recognize that in the great scheme of things, we are not as grand and great as each of us would like to be. There is a great shattering of vanity — but then perhaps that is our gain. I suppose there are a few who refuse to submit, and currently there is a Broadway play, starring that personable and exciting actress, Mary Tyler Moore, "Whose Life Is This, Anyway?". In the play, she wants to take her own life because she is paralyzed completely. But although a physical handicap certainly does not guarantee happiness it does not necessarily mean that a physical handicap causes unhappiness, as our previous speaker demonstrated earlier today. We are not just flesh and blood as the character in that play wants us to believe, we are also spirit. When we recognize this truth, life can take on a new meaning. Youth is not eternal, we have our allotted span, we have our journey of joys and sorrows, of frustrations and ecstasy, but we learn to accept the gravity of life, and we learn to make the most of what we have. We learn to appreciate the preciousness of people. The spirit endures although the flesh may pass. And if you want to find that spirit, go to the Polio wards sometimes, where some of my friends are, and have been for some twenty-seven or twenty-eight years. Then I think you will come away uplifted by their humour, by their gallantry and by their goodwill. A polio patient was asked one day "What's it like having polio?", and he said "The novelty is

*Reference to Mini-Lung.

wearing off". This ability to laugh at oneself, this courage and tenacity of spirit is what the Underfolk have.

We have problems, of course. Everybody has problems, and there is one thing I'd like to speak about when we talk of problems. That is about the nurses who say sometimes we are spoiled. "Don't spoil the polio patients", they say. Well, man has whims and man has needs. And you ought to picture yourselves, you people who are normal, in your room at night. Suppose there is a TV programme on (you have chosen it, and turned it on yourself) — and there is a draft from the window, and you close the window — and a fly is on your nose and you wipe it off. You decide you want an olive from the fridge and so you go and get it. And there's a bit of meat left in your teeth from the steak you ate, so you take it out. Your hair is in your eyes and you brush it away. When you are reading a book you have to turn the page you know, and there is a bit of lint on your new suit which you'd like to pick off, and you do. Then when you eat, how do you eat? Do you pick up the meat first, and then the potatoes, and then the peas, or do you like to swish them all around like Huckleberry Finn? Now what about the polio patient who is handicapped and can't move? His whims don't stop just because he's had polio. He still has those whims, he is not a vegetable. Yet when the draft is at the window, he can't close it. When there is a fly on his nose he cannot wipe it away. And he might want an olive but he doesn't want to ask the nurse to go up and get it because that would be just a little too much. He's got to have his hair combed and he has to turn those pages, (but he can't turn the pages very well when he can't move his arms). He can't do either. Also, he can't ask the nurse to pick the lint off his pants because that would be expecting too much.

There is a bit of the sadist in me. I would like to be in charge of training the nurses. I would put twenty in a room and bind them hand and foot to a chair for a day, and leave three nurses' aides to care for them. Then for the ultimate test, I would catch a fly, tear off its wings, and I'd put it on their nose — just for a little while. Don't get me wrong — nurses are wonderful people, doctors are wonderful people, they are our saviours; but sometimes, a little more understanding and a little more awareness would make life just a little easier or lighter for those who spend long hours longing to have their lives eased by those around them.

We have our frustrations, depending on the amount we are handicapped. When we do things on our own, sometimes we can't do them too well. I can recall one time just for a personal experience, I had a top button on my shirt which I wanted to do up — that was before I had this little necktie I am wearing today*, and it was a loose button. As I used my polio'ed fingers to do it up, it kept rolling away.

*Reference to a tracheostomy and the tube attachment to a Mini-Lung.

I tried again and it kept rolling away. I decided this was one time I wasn't going to give up and ask my wife to do it. I'd probably asked her for too many things already (I had run out of my ration), so I thought I'd time myself. It took me five minutes, but I got the bloody button done up! While I am on that subject, those of you who have not had polio, take a look at your hands. Take a look at that fat, plump muscle at the base of your thumb. Then say a little prayer that you still have it. Then say another prayer that the Creator gave it to us, because it is that muscle that does all the refined movements of your fingers, that enables the surgeons to suture, and enables all of you to do fine work with your hands. I think we could call that muscle the "lynch pin of civilization".

As a conclusion — there are positive and negative things about having polio. Perhaps the most, the one positive thing, is that you learn to appreciate the common things in life, you learn to appreciate the help of others, to become thankful for what others do for you. I was fortunate enough to have a wife who stuck with me, and who never felt sorry for me, and never treated me as if I was anything less than whole, and yet was always there when the need arose.

I only have one more thing to say and that is my peeve about Jonas Salk. I can't imagine his bungling. I can't forgive him for the mismanagement of his birth. Because if he had been born a year before, he would have saved me a year in an iron lung, two years in the hospital, another two years getting rehabilitated, and another twenty-five years puffing like somebody who's played out from a Marathon run. But on second thought, I had better blame his father.

COMMENTS

Dr. J. Alcock

We have now heard another statement of what polio means to one person, although he did talk ten minutes more than I had allotted him. Thank you very much Paul, it was most impressive.

Our third speaker is a person that I don't think I've laid eyes on for 27 years. David Steen was only six at the time he went into a respirator. He had virtually his whole life ahead of him and was confronted not only with the ordinary problems of daily living, but had the added challenges of gaining an education and acceptance in the work force. It is a pleasure to have David Steen speak to us.

III David Steen

Mr. Minister, Dr. Alcock, Distinguished Guests, Ladies and Gentlemen; I think by the time the three of us have finished our brief talks it will sound like one big horror story. However I would like to thank Dr. Alcock and Dr. Hildes for the opportunity to speak to you today about my experience as a polio victim.

I have discovered that many of my experiences and problems were and are similar to those of other handicapped. Some recent events have confirmed this in my mind. Through the Children's Aid Society of Eastern Manitoba, I recently assumed week-end responsibilities for a young fellow, 15 years of age, who is handicapped with cerebral palsy. Our association has been an interesting learning experience for both of us. We both have difficulties in preparing meals, eating, riding a bus, and overcoming the architectural obstacle course in which we live. However, we also have one problem in common which is far more significant to our lives and our happiness than such problems as eating peas with a fork. That major problem is to overcome, accept and live with an overwhelming sense of rejection by society, and the resulting feelings of alienation and loneliness that accompany it. I am not referring here to the rejection implied by architectural barriers or technological inadequacies; but rather, the much more personal rejection by classmates in school, neighbors on the block, or people on the street. To a foster child, particularly, the pains of rejection must be indescribably acute. I and many other handicapped have difficulty understanding the basis for this rejection. We do not perceive ourselves to be any more handicapped than the severely arthritic, the obese, the elderly, those with heart pacers, or those with multiple allergies. Similarly, we do not perceive ourselves to be any more or less visually attractive than some of those walking our beaches. Yet, negative attitudes and rejection of the handicapped continues to persist.

Some of you recall a CBC production with Roy Bonnysteel which I believe was called "I am not the person that you see". That really struck home to me. It was a good message and I wish more people could see it.

I was admitted to the King George Hospital on November 10, 1953. I was six years old at the time but I can still recall some scenes of the 320 mile race from Swan River. A striking memory from my first hospital days was the realization that I was in an iron lung and not decapitated. I can also recall wheelchair races down hallways and ramps, spit-ball fights in the rooms, turtles in the bathtub. I also recall being force-fed by a prison camp nurse. I remember some of the names of my partners in crime. Some of the people here today should be on that list but I haven't included them: Amesiah McKay, Eddie Oolooyak, Raymond Flanders, Raymond Mazur and Raymond Sanford.

We were too young, and too busy having fun to realize the problems that confronted us. To an extent however, the hospital recognized those problems and arranged for Mrs. Smith to give us some schooling. When I finally did break out in 1957, I was prepared for grade school, but I had no experience in relating to able-bodied kids my own age, or in generally relating politely to adult authority figures. My school at home was a small-town four-room school. Its very exceptional teachers recognized the need for main-

streaming long before it was generally recognized as a social and political issue in Manitoba. Initially, I only attended school on a half-day basis. Teachers prepared special homework assignments for me which I finished at home under the unceasing supervision and encouragement of my mother. Gradually, however, my stamina increased and I began attending school on a full-time basis. But there were difficulties. My writing speed was so slow that I could not complete many of the exams and assignments in the allowable time. I remember one spelling exam in particular, that literally caused tears of frustration because I knew the answers but couldn't keep up. Other students were required to assist me with books, turning pages and so on, as Joan Bickford is helping me here today. Invariably they would use the occasion to copy answers from my work. In terms of class-room discipline, this was a teacher's nightmare.

I was excluded from sports and most games, rarely invited to social functions, and in later years fellow students took to locking my arms inside my belt for extended periods of time. I couldn't appreciate the humour which they derived from that situation.

Despite the difficulties, and much to the credit of my teachers and parents, I did graduate from Grade XII, in 1966; and without really knowing why, I decided to enroll in university. After two I.Q. tests arranged by the Society for Crippled Children to confirm that I had the ability, the Society arranged a bursary, found special housing for me in Winnipeg, and assisted me in enrollment procedures at the University of Winnipeg. But I didn't know anyone in the city and was unable to arrange a car pool; buses were impossible, so that left the very great expense of taxis. I was unable to carry books, to take notes in class, or even raise my arms to ask a simple question. This meant a great deal of additional studying at home. The University, however, was extremely helpful. They found me a car pool, arranged for separate rooms and for extra time for me to write the exams.

My housing situation was a disaster. Let me remind you that this housing was arranged by the Society for Crippled Children. Despite assurances from the Society that it was the best housing-with-care situation in town, the boarders ate leftovers and the landlady's dogs ate spareribs. One boarder attempted suicide; and another resident was arrested for gross indecency. But I did graduate in 1969, and then proceeded to some years of miscellaneous post-graduate work which I would rather forget. In 1970, after four years in this housing situation, I moved into an apartment with a friend, despite the lack of security implicit in such an arrangement. But my problems with housing continued: friends got married, and moved on to their own situations. Finally I was living in a basement suite on my own using the Home Orderly Service which had just recently been established in the city. I was also paying for an orderly from my own pocket. A number of problems

arose in that situation. I was locked in my iron lung at night, and I was alone. A few occurrences forced a decision upon me — specifically, after a big rainfall the river backed up and the basement suite started to flood. I couldn't turn the light on. I couldn't see what was going on. My cat was crying for help, and I was stuck. As a result of a lot of yelling and screaming, the caretaker came in and freed me from my water-bound prison. But that decided me to start taking a few initiatives. One initiative specifically was the installation of a telephone in the iron lung with the dial mounted inside within reach of my feet, and the headpiece on the outside where I could talk into it easily. It was difficult. It is hard enough to dial with the phone at your feet when you can see the dial, but to do so when you cannot see the dial is almost impossible. There are a lot of operators in the city who retired early on my account! It was following that, that I approached the Rehab Hospital, and the Rehabilitation Engineering Section, to start examining a few alternatives for me. They finally put together a set of special foot controls similar to bicycle pedals inside the iron lung. This means that I can now open and close that iron lung myself. It also means that I can go to bed when I want and get up when I want, something that was impossible before.

Up to 1973 I had been unsuccessful in finding any regular employment. I had the occasional bit of work that the University threw my way. The Society for Crippled Children had been unsuccessful in helping me to find any employment, particularly as I wanted employment opportunities which were not exploitive like so many of the available ones are. Finally, thanks to the efforts of the Manpower Officer at the University of Winnipeg, I did land a job with the Provincial Government, and in 1975 the crowning moment in my employment career occurred when I successfully competed for the position of Director of Public Library Services for the Province of Manitoba. The position entails responsibility for 21 staff and a two million dollar budget. Since achieving that position, and with the specially

adapted iron lung, I have been able to move into a house which I live in on my own. I must also say that I was able to do the job only because Rehab Engineering had been able to modify and equip a car with foot controls which has enabled me to travel to many communities throughout Manitoba. Hopefully I will continue to do so.

In conclusion I would like to stress a few things which, in my experience I feel are crucial to the on-going happiness of many polio victims and handicapped people generally. I would suggest that there has to be, by both government and other agencies, a very strong public relations programme to generate public acceptance of the handicapped. I would also suggest, that many more of the handicapped in our society should be able to benefit from modern technology. As an aside here, I suggest that this technology not only be available on a "request" basis but that the agencies and/or the government should be seeking to identify areas in which technology can assist us. I would also suggest that the Home Care Programme should continue and be expanded. As a last and major item I suggest that our society generate non-exploitive employment opportunities. Thank you very much.

Concluding Remarks — Dr. J. Alcock

Thank you David.

I think I will close the formal proceedings now with an apology to any of you who were inconvenienced by the short delay in starting. We also ran a little overtime but I do not apologize for that; the presentations, and particularly the last three were very vivid accounts of the havoc of polio and the struggles and achievements of personal rehabilitation.

Instead of a formal discussion at this time I welcome you all to stay. The room is available; coffee is being brought in; and I think many of you want to talk to old friends as well as exchange views on the rehabilitation of polio.

This symposium stands adjourned.

