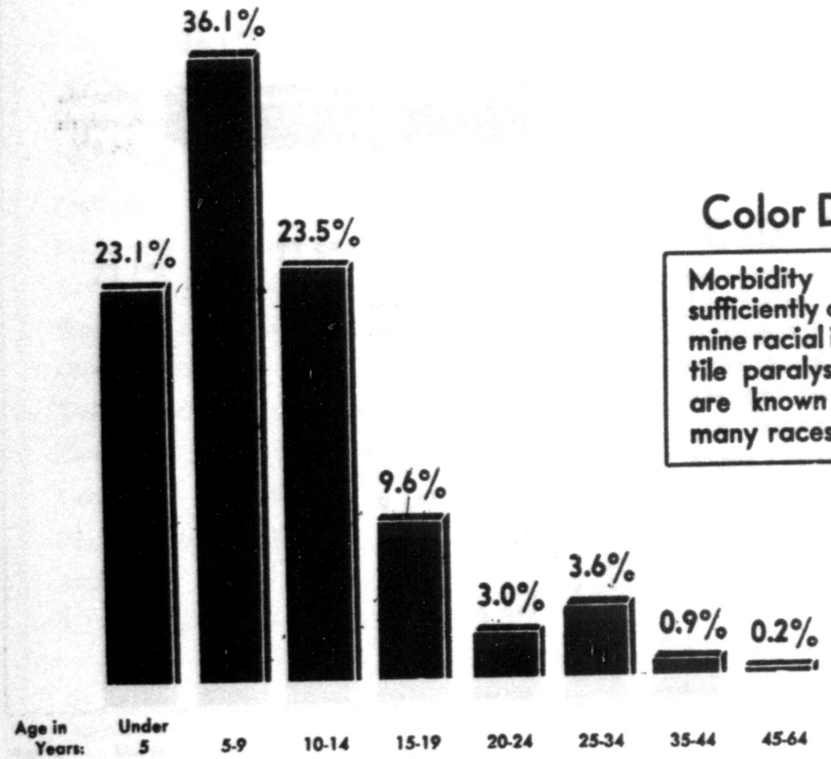
Chart 5—Infantile Paralysis in Two Large Cities Chicago and Detroit, 1939-1944

Age Distribution



Color Distribution

Morbidity reports are not sufficiently complete to determine racial incidence of infantile paralysis although cases are known to exist among many races.

Sex Distribution

Infantile Paralysis Cases Under 25 Years of Age

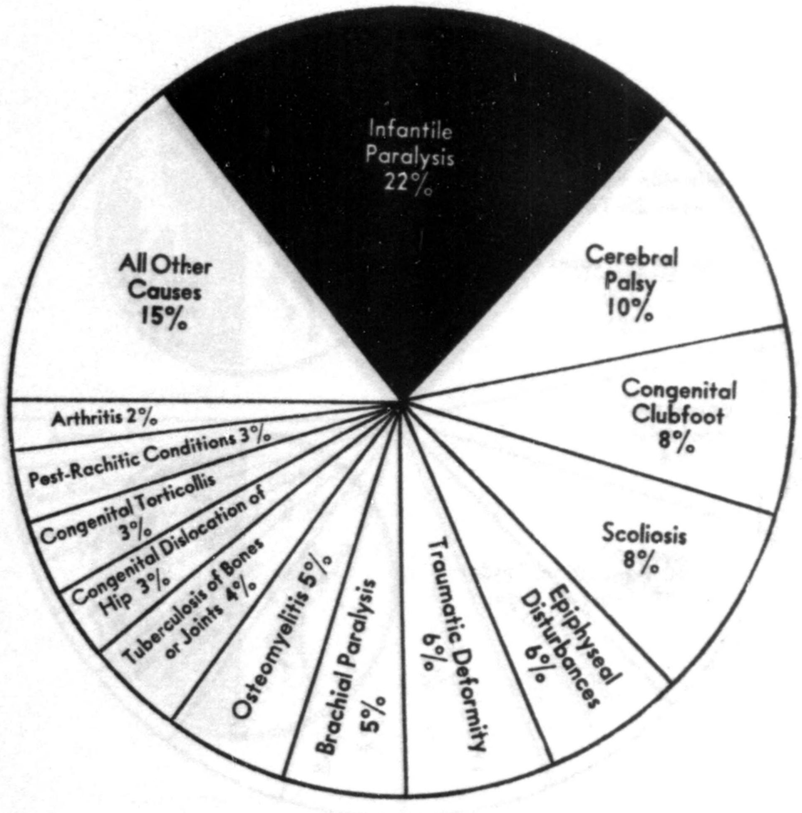
(95% of the cases reported)

1940 Population, Under 25 Years of Age

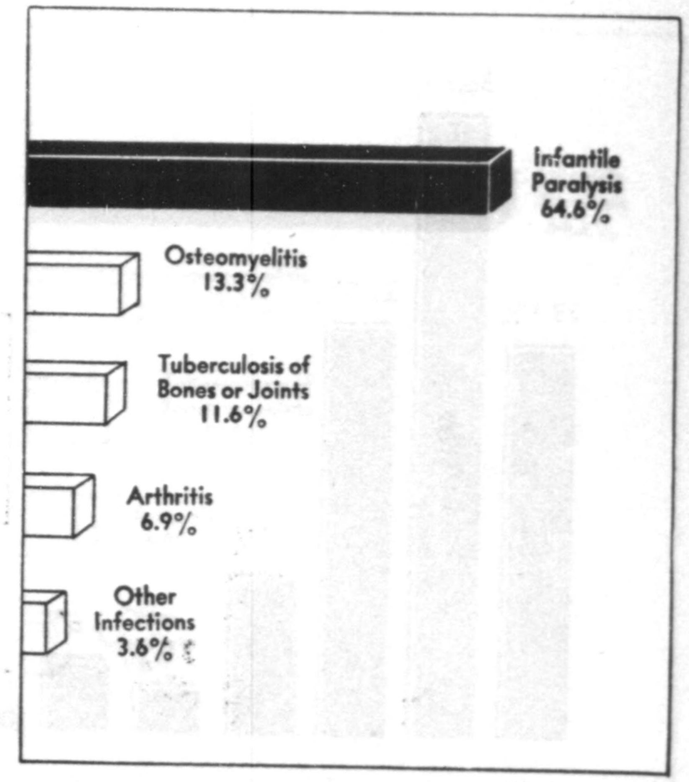
Data from Chicago Board of Health and Detroit Department of Health

Chart 6—Infantile Paralysis Compared with Other Causes of Orthopedic Deformities in Children—New York City, 1944

All Causes



Infectious Causes



Data from the Bureau of Child Hygiene, Department of Health, City of New York: *"Register of Orthopedically Handicapped Children, June 30, 1944"*

Table VI — Infantile Paralysis Compared with Other Causes of Orthopedic Deformities in Children — New York City, June 30, 1944

CAUSE OF DEFORMITY	No. of Cases Registered
Infantile Paralysis	3,914
Cerebral Palsy	1,819
Congenital Clubfoot	1,483
Scoliosis	1,474
Epiphyseal Disturbances	1,080
Traumatic Deformity	996
Brachial Paralysis	809
Osteomyelitis	805
Tuberculosis of Bones or Joints	703
Congenital Dislocation of Hip	488
Congenital Torticollis	487
Post-Rachitic Conditions	447
Arthritis	417
All Other Causes	2,656
TOTAL	17,578

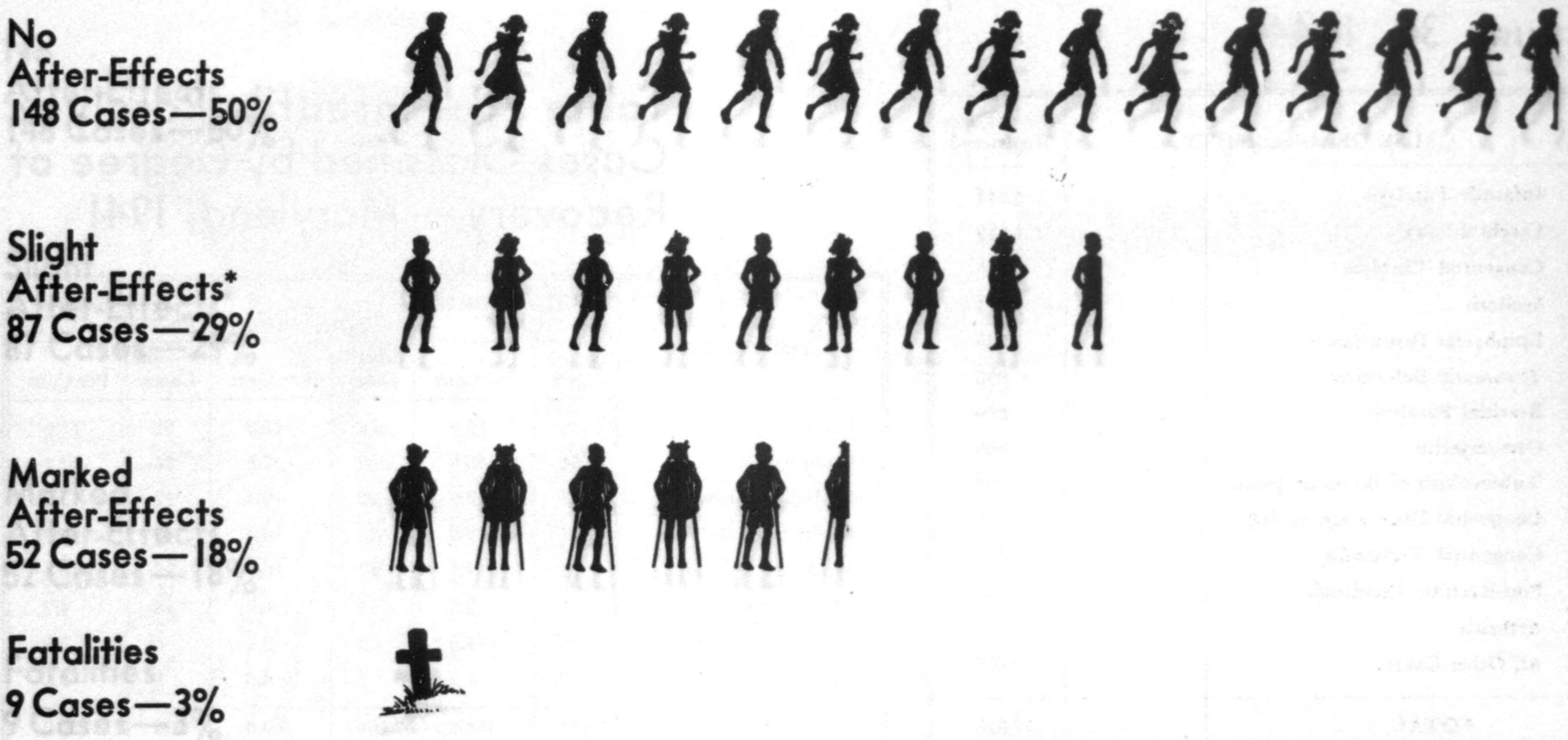
Source: the Bureau of Child Hygiene, Department of Health, City of New York: *"Register of Orthopedically Handicapped Children, June 30, 1944"*

Table VII — Infantile Paralysis Cases Classified by Degree of Recovery — Maryland, 1941

CLASSIFICATION	BALTIMORE CITY		COUNTIES		MARYLAND ENTIRE STATE	
	No. of Cases	Per Cent	No. of Cases	Per Cent	No. of Cases	Per Cent
No Paralysis	34	25.8	18	11.0	52	17.6
Complete Recovery	34	25.8	62	37.8	96	32.4
Probably normal	25	18.9	22	13.4	47	15.9
Slight residual	17	12.9	23	14.0	40	13.5
Moderate residual	15	11.3	17	10.4	32	10.8
Marked residual	3	2.3	11	6.7	14	4.7
Complete residual	2	1.5	4	2.4	6	2.0
Death	2	1.5	7	4.3	9	3.1
TOTALS	132	100.0	164	100.0	296	100.0

Source: Lenhard, Raymond E., M. D.: *"The Results of Poliomyelitis in Baltimore,"* The Journal of Bone and Joint Surgery — January, 1943

Chart 7—Outcome of Infantile Paralysis Epidemic, Maryland, 1941



Each figure equals 10 cases

Data from Lenhard, Raymond E., M.D.: *"The Results of Poliomyelitis in Baltimore"* The Journal of Bone and Joint Surgery — January, 1943

• Practically normal movement

ACKNOWLEDGMENT is made of the cooperation of the Chicago Board of Health, the Detroit Department of Health, the New York City Department of Health, the United States Public Health Service and Dr. C. C. Dauer, in furnishing data, and of the generous assistance of Dr. Louis I. Dublin of the Metropolitan Life Insurance Company in the presentation of statistical material.

This publication made possible through
THE MARCH OF DIMES

POLIOMYELITIS
AND
HOSPITALS

A SPECIAL SECTION

REPRINTED FROM *HOSPITALS* FOR JUNE 1946

Copies of this reprint are available upon request to the National Foundation for Infantile Paralysis, 120 Broadway, New York 5, N.Y.

POLIOMYELITIS AND HOSPITALS: A BURDEN

WHENEVER AND WHEREVER poliomyelitis strikes, a staggering burden confronts one or more hospitals in the community. Frequently, the hospital called upon to open its doors may lack the special facilities and specially trained personnel required. Often it cannot even find enough space for polio patients without crippling its routine but still essential services to other patients. Often its financial resources are strained. Often the community and its hospitals need some outside help. ★ Since its inception several years ago the National Foundation for Infantile Paralysis has been working out procedures designed to supply whatever is needed to minimize the suffering caused by poliomyelitis. On the request of the American Hospital Association, the national foundation has gathered together the instructive material

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Complete Care of Infantile P
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JOSEPH G. MOLNER, M.D., M.P.H.
DEPUTY COMMISSIONER AND MEDICAL DIRECTOR, DETROIT DEPARTMENT OF HEALTH, MEDICAL CONSULTANT, NATIONAL FOUNDATION FOR INFANTILE PARALYSIS

THERE ARE INNUMERABLE problems that may be encountered in the organization of community facilities for the care of infantile paralysis. These may vary in rural and urban areas, with geographic location and with the intensity of epidemics. Such factors represent only the most general variants. A situation may arise, as it has in the past few years, in which there is a shortage of all three basic requirements – bed facilities, equipment and trained personnel.

There are probably no two localities that pose identical problems and, therefore the person charged with the responsibility of organizing facilities must first survey the field. This survey must be carefully planned and executed and all details concerning the situation analyzed. The organizer must know first the intensity of the outbreak, then the proportions of very sick, paralyzed and non-paralyzed patients.

He must have a knowledge of the availability of hospital beds and equipment such as iron lungs, aspirators, hot pack machines, wool and rubber sheeting for hot packing. He must know whether doctors and nurses are available in the area and the medical profession's attitude toward modern methods of therapy. He must know something about the doctors' qualifications in the promotion of these methods of therapy and these same stipulations are applicable to the nurse and physical therapist.

If the organization of community facilities is delegated to a representative of an unofficial agency—for example, of the National Foundation for Infantile Paralysis—it is important that the person realize he is acting in an unofficial capacity and that the work he is doing can be looked upon as the real and official responsibility of existing official agencies. Acting as an advisor and liaison agent between local official and unofficial agencies represents the best approach to the problem, in my opinion. This may well be referred to as the public and medical relations aspect of the work and certainly it is a phase that cannot be overemphasized.

Although the problems indicated here may vary with each area, there are certain basic problems that a worker must face in virtually any section of the country. These problems enumerated here are based on actual experience in organization and field work; they also represent situations which may have been encountered by a staff of medical, technical and lay persons employed by the National Foundation for Infantile Paralysis, which has been assisting local governmental bodies in meeting epidemic conditions.

The preliminary investigation of problems facing the community should include data on incidence of the disease, potentialities of spread, expediency of handling cases and information concerning the availability of hospital and trained personnel.

It is good procedure to organize a local committee. This committee may be looked upon as an advisory or administrative committee whose principal responsibility would be to help in coordinating all community services and activities, medical and non-medical, for the better care of persons afflicted with infantile paralysis.

SPITALS: A BURDEN THAT CAN BE MINIMIZED IN 19

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lete Care of Infantile Paralysis Patients Demands GANIZATION OF THE COMMUNITY

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It is good procedure to organize a local committee. This committee may be looked upon as an advisory or administrative committee whose principal responsibility would be to help in coordinating all community services and activities, medical and non-medical, for the better care of persons afflicted with infantile paralysis.

On this committee there should be representatives of the medical profession, the local health department, the National Foundation for Infantile Paralysis, the press, radio stations, women's organizations and any other community groups, which may be affiliated with official or unofficial agencies and which might lend support and strength to consummation of plans. Such committees, properly selected, can be extremely helpful to a person charged with the responsibility of organizing community resources for infantile paralysis.

In recent years, the dearth of hospital beds posed one of the important problems of coordinating community resources. There has been a shortage of hospital beds for both general admissions and patients with acute communicable diseases. Authorities have estimated that there is a need for about one hospital bed per 2,000 persons for the care of communicable diseases. The estimated need for the care of persons with general illnesses is four to five hospital beds per 1,000 persons. Actually, these standards are complied with in very few sections of the country. Larger cities may approach or actually meet these standards and usually the availability of hospital facilities for the care of poliomyelitis patients in large cities does not pose a serious problem.

In rural and semi-rural areas, however, there is a definite shortage of general hospital beds and the few communicable disease beds available are being utilized for the care of scarlet fever, diphtheria and other similar acute infectious diseases. Another problem is that many general hospitals still look upon poliomyelitis patients as their forefathers looked upon a leper. Hospital administrators and even physicians and nurses fear that poliomyelitis is a highly communicable disease transmissible from person to person and that the admission of these patients to a general hospital may precipitate an acute outbreak in the institution.

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source of funds. ★ The special section is therefore presented as a guide in preparing hospitals for polio emergencies. It will be invaluable to some communities and some hospitals during the 1946 polio season that was scheduled to open this month. Because of the experience and qualifications of its contributors, it is worth filing for future use in the communities that are untouched this year.—THE EDITORS.

Patients Demands

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Although hospitals and local chapters have purchased large amounts of necessary equipment for the treatment of infantile paralysis in all organizational work of the type described here, there will be some shortage of equipment or at least the discovery of equipment in poor repair. It is essential to know that there is a sufficient number of iron lungs in a community or area for the care of possible emergency cases. These iron lungs should be in good repair; aspirators should be available for use with the respirators and, if such equipment is not available in the community, the organizer should know where it may be procured in neighboring communities or areas.

In the modern method of therapy, hot pack machines are important. The newer type of machine is thermostatically controlled and uses centrifugal force for the drying of wool. These automatic machines materially expedite the hot packing procedure. Virtually the same results, however, can be obtained from the use of washing machines with either manual or electrically operated wringers.

Wool and rubber sheeting for hot packing are commodities which are frequently scarce. The National Foundation for Infantile Paralysis, through its local chapters, is in an excellent position to make such equipment available to the community either on a loan basis or by

purchase of this equipment for institutions caring for infantile paralysis patients. In my opinion, there is no excuse for any reasonably well populated area not having such equipment on hand and available for use on very short notice.

The acute shortage of professional and non-professional personnel in the past few years is probably one of the most important problems encountered in the organization of community resources. It has been predicted by medical and nursing authorities, as well as other persons, that there will be a shortage of professional and non-professional personnel for at least the next five years. It should be assumed, therefore, that this will be a major problem to consider in any organizational work.

Volunteer Corps Helps

The shortage of untrained personnel may be somewhat alleviated by the work of corps of Poliomyelitis Emergency Volunteers. During the past few years, invaluable assistance has been given by them. In the epidemic of 1944, for example, when the United States had the second largest epidemic of infantile paralysis in history, mothers, sisters, aunts and uncles of the patients, neighbors and friends helped. These volunteers placed themselves at the command of overburdened hospital staffs and assumed countless jobs in hospitals, ranging from feeding and bathing patients, cleaning the rooms and applying hot packs, to many other jobs for which they could be trained.

This volunteer assistance was so significant that the National Foundation for Infantile Paralysis is now recommending the organization of a regular corps of Poliomyelitis Emergency Volunteers. The organization of such units is delegated to the individual chapters and more specifically to the Women's Division of such units. These volunteers should be organized prior to the actual outbreak of an epidemic, or at least there should exist in all sections of the country a nucleus around which an active operating corps of volunteers may be organized.

These volunteers must be trained and the curriculum for them has been formulated by a staff of technical advisers of the National Foundation for Infantile Paralysis. Information on organization and training are available to chapter chairmen and other interested persons.

Frequently, available medical and nursing personnel, through no neglect of their own, have only a very superficial knowledge of methods of treatment of infantile paralysis. In any organizational work, therefore, it is important that some training facilities be made available for these persons. For example, an available respirator represents only a piece of intricate mechanical equipment. It is essential that the physician or physicians who intend to use this equipment know how the equipment should be operated and how patients should be selected for this type of therapy. It may be necessary to select one or several physicians for an intensive course on the use of the respirator.

The hot pack method of therapy, frequently looked upon as a rather simple procedure, requires special training. Usually a simple solution to this problem is found by bringing a well-trained physical therapist into the area primarily for training purposes.

The physical therapist can be of invaluable assistance to physicians and nurses and in the training of Poliomyelitis Emergency Volunteers. Specially trained personnel, particularly physical therapists, can be made available to areas by the National Foundation for Infantile Paralysis.

It has often been said that the national foundation is dedicated to the better care of persons afflicted with infantile paralysis, regardless of race, color or creed. The financing of hospital and medical care of patients afflicted with the disease represents a major problem in almost any section of the country. It is now recommended that all cases of poliomyelitis be hospitalized and treated under hospital conditions.

Modern methods of therapy require that patients be hospitalized for much longer periods than under those therapeutic regimes formerly used. The cost of caring for poliomyelitis patients is enormous and only a small fraction of the population can stand the expense involved. Local chapters, in addition to their many responsibilities mentioned here, can and do assume the responsibilities of paying the hospital and medical bills of needy patients. Certainly, it is not necessary that selection of these patients be based upon actual indigence. Lack of personal or community funds must not prevent the adequate care of any person afflicted with infantile paralysis.

Attack Rates Vary

In urban areas, epidemics of infantile paralysis and the incidence of the disease seldom exceed an attack rate of one case per 1,000 persons. In rural areas attack rates of three per 1,000 are considered very severe epidemics. It is conceivable that the medical and allied professions will have but a limited experience with the disease. In the event of an outbreak, therefore, it has been found expeditious to conduct postgraduate conferences for physicians, nurses and other interested groups. Conferences of this type, if well planned, have been exceptionally well attended.

Another indication for the need of such conferences is the fact that recognition and treatment of the disease and the handling of cases change constantly. These newer ideas should be called to the attention of interested groups. No other single point should be emphasized more than this particular aspect of community organization for poliomyelitis.

CONCLUSION

Briefly, the organization of community resources for the care of infantile paralysis may be summarized as follows:

1. Importance of public and medical relationships.

2. Availability of hospital facilities.

3. Availability of equipment.

4. Availability of personnel – professional, non-professional and volunteers.

5. Financing of medical and hospital services.

6. Refresher courses for the medical profession and related groups.

From a General Hospital That Admitted POLIOMYELITIS PATIENTS

MOIR P. TANNER, FACHA
SUPERINTENDENT, CHILDREN'S HOSPITAL, BUFFALO, NEW YORK

COMMUNITIES LOOK to their hospitals for help in matters of health. Most hospitals serving a community accept this responsibility, but they often deny admission to the possible contagious case especially poliomyelitis.

When this disease breaks out, the community needs its hospital more than ever before. Poliomyelitis can be taken care of in general hospitals. Many institutions have opened their doors to these patients without endangering others and have properly discharged their responsibilities. It is a dereliction of duty for the general hospital to deny admittance to suspicious or positive polio cases.

It is not easy to change a hospital's regular routine of caring for medical and surgical cases to a routine in which a large part of the facilities are devoted to the care of poliomyelitis. The problem is not so great when a hospital is asked to admit a few cases. These can be taken care of in one or two private rooms or in a wing that can be closed off. It is an enormous problem when an epidemic spreads and a large part of the hospital has to be converted to the care of polio cases.

The community must be prepared. This means pre-epidemic planning by all interested volunteer and official agencies. Then, when an epidemic does occur, a plan will be ready. Daily the hospital must watch the spread of the disease. The institution may find that one floor devoted to polio cases is sufficient. If a severe epidemic is expected, it may be necessary for most of the hospitals to be devoted to this purpose.

The procedure in caring for these patients is aseptic technique, such as that employed in handling typhoid and pneumonia patients. For more than 20 years many general hospitals throughout the United States have cared for infantile paralysis patients. These hospitals have yet to report a single case of cross-infection to doctor, nurse, aide or another patient. The fears upon which many hospitals still bar polio patients are without justification. Properly handled, the infantile paralysis patient presents no more hazard than a pneumonia patient and far less than a typhoid patient.

If the hospital has an outpatient department, a portion of this may be used as an admission unit, otherwise some part of the hospital should be set aside for this purpose. A doctor and nurse should be in attendance, so that patients may go through diagnostic procedures before being admitted to the hospital. A complete physical examination, including a lumbar puncture, is required. The hospital's laboratory must cooperate in these diagnostic measures.

When a positive or suspicious diagnosis has been established, the patient is immediately sent to the unit set aside for polio cases. Treatment is started and the same aseptic technique is followed as in all contagious diseases. Muscle grading should be recorded by the physical therapist within the first 24 hours. For the patient with respiratory involvement, provision must be made in the isolation unit for respirator cases. These iron lungs should not be in open wards with other patients but in separate units, so that other patients are not disturbed.

Here the general hospital has another responsibility. It has provided one or more contagious units for the isolation period; it must also provide a post-polio unit in some other part of the hospital.

Patients should remain in the isolation unit during the febrile period. Many physicians may want their patients in this unit for as long as two weeks. It is important that treatment be continued beyond the acute stage by qualified physical therapists under supervision of the physician. Physical therapists can provide better care and more of it when patients are confined to a post-polio unit rather than spread through the community in their respective homes.

Many hospitals have found that it is impossible to use their regular facilities for this purpose, particularly when case loads are heavy. Some set up convalescent or rehabilitation units in rooms not ordinarily used for patients.

One hospital with a modest number of cases established a polio unit in a ward, where rigid isolation technique was carried out. During the convalescent period, patients were transferred to other wards for rehabilitation. There was little confusion. The rest of the hospital facilities cared for the general medical and surgical patients without difficulty.

Trained personnel is essential. The poliomyelitis patient requires care by many persons with special skills. In addition to the medical and nursing care usually afforded an acutely ill person, the polio patient must have the continuous care of orthopedists, internists and pediatricians trained in polio technics, as well as the services of physical therapists.

Scarce as these trained persons are, they can be provided. The general hospital will receive real help

A CUBICLED ward is transferred easily and quickly into an ideal precaution unit where strict isolation technique can be practiced.

in these matters from the local chapters and national headquarters.

Nurses and physical therapists trained in polio care will be recruited for the hospital. If necessary, the local chapters of the foundation will pay the salaries of these persons in order to relieve the financial burden on the hospital. In addition, under the Poliomyelitis Emergency Volunteer program of the foundation, training courses can be initiated. This will provide skilled volunteers to help nurses during the epidemic. If time permits, doctors and nurses can receive refresher courses in polio care in approved schools through educational programs financed by the foundation and its chapters. Early cooperation with the local chapter of the foundation, will solve the problem of recruiting an adequately trained staff.

Some hospitals, with chapter cooperation, have successfully formed volunteer groups from the parents of small patients. They have been taught the routine of hot packs and nursing care for polio patients. These volunteers help nurses and physical therapists to care, not only for their own children, but also for others who have been stricken.

In one city, 48 senior student nurses were asked by their director to help a neighboring hospital with polio patients. The entire class volunteered and made it possible for critically ill respirator cases to have special nursing.

It is important, if possible, to have patients separated by age groups. One hospital reports that convalescent adult patients were cared for in the nurses' demonstration room, while the children, a much larger group, were hospitalized in other lecture rooms. Here it was possible to provide school through the cooperation of the local department of education. This is important during the long period of convalescence, which often extends through many months. The hospital must feel a definite responsibility for these patients, not only during their acute illness, but also throughout the long period of hospitalization.

Equipment must be obtained—cribs, beds, bedside tables, respirators, suction machines, treatment tables, bakers, bradford frames, bed boards, foot boards, pack material—all are necessary. Here again the national foundation may obtain these necessary items for use by the hospital.

When polio strikes, a community realizes more than ever the value of its hospital. It also realizes the hospital's inadequacy if these cases are denied admission. Any hospital has to consider its obligation to the community. If there is more than one hospital, it can easily be determined which one is to accept this obligation. There is little necessity for all hospitals to devote their facilities, in whole or in part, to the care of polio patients unless they are absolutely needed. One hospital, with the cooperation of all others in the area, can do a much better job.

Every department of the hospital must cooperate if these patients are to be cared for adequately. With help from the local chapter of the National Foundation for Infantile Paralysis and the many other agencies of the community, the job is made much easier. It must be realized that with this cooperation, hospitals can do today what would have been considered impossible previously.

Poliomyelitis cases can and should be cared for in a general hospital. The job is not an easy one, but hospitals have never looked for this. No general hospital can rightly disregard this responsibility; no real hospital will disregard it. Many have already demonstrated completely that they can accept this difficult task.

A hospital which has experienced a polio epidemic always stands ready to help another community and another hospital. Key persons in that organization could be sent to the area to help. This has been done successfully in several cities. A hospital faces not only a terrific physical hardship, but a financial one, when it is required to take care of an epidemic. Again, the national foundation has relieved this situation. There is hardly a reason for the general hospital to deny admission to polio patients.

Essential Services Are Assured by the NATIONAL FOUNDATION

HART E. VAN RIPER, M.D.
ACTING MEDICAL DIRECTOR, NATIONAL FOUNDATION FOR INFANTILE PARALYSIS

UNTIL RESEARCH STUDIES reveal the prevention or cure for infantile paralysis, efforts must be increased to improve treatment and minimize crippling. Infantile paralysis patients must not be deprived of the full benefits possible under modern treatment methods. Evidence is accumulating to justify the belief that 75 per cent of those stricken with the disease can recover without serious after effects.

The paralysis, commonly regarded in the past as an integral part of the disease process, has been shown to be the comparatively rare sequel of a widespread innocuous ailment. Such recovery, however, is predicated upon accurate diagnosis, adequate medical and nursing care with early physical therapy and immediate hospitalization. This is important, for without hospitalization the entire treatment structure collapses. Unless the patient can be cared for in a hospital, none of the other essential services is possible.

Sufficient hospital facilities to assure proper care for those stricken with the disease are needed. To build special hospitals in each community fully staffed and equipped for infantile paralysis care would be uneconomical. Epidemics of infantile paralysis seldom strike a community year after year. It is possible that an area suffering an attack of infantile paralysis this year may not be visited again for three, four, or even more years.

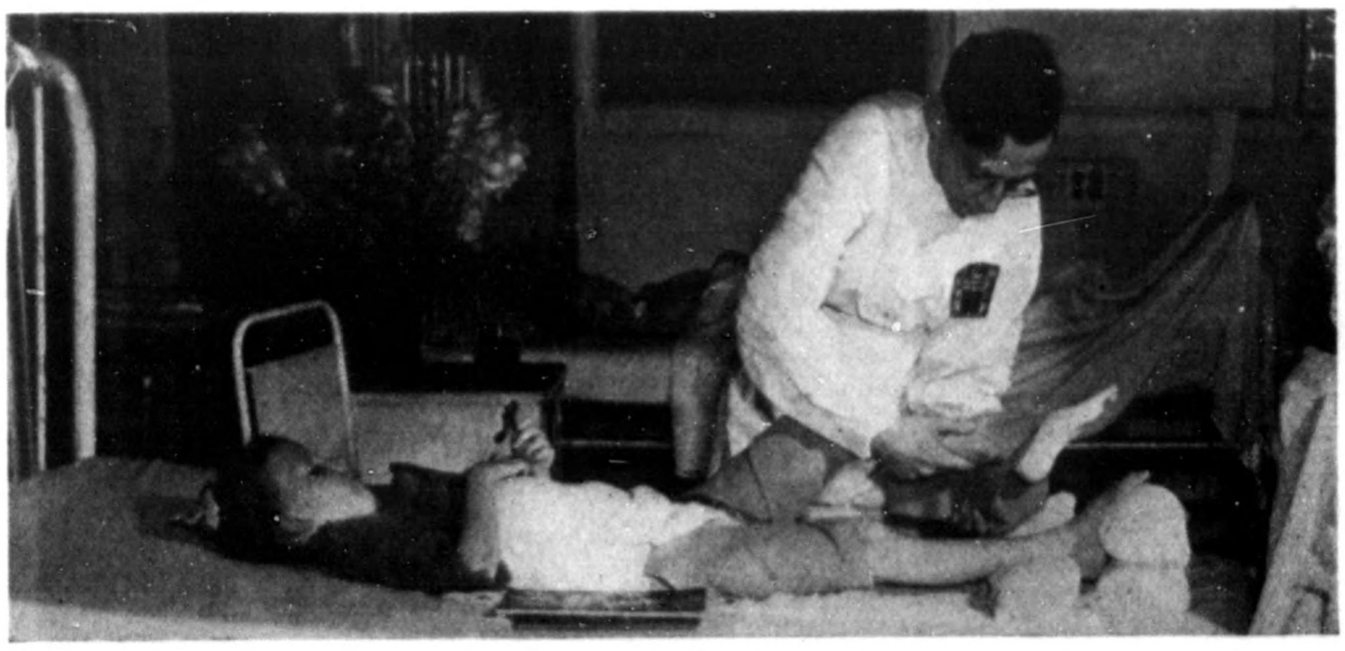
A special hospital in such an area would be idle much of the time. The expense of building, staffing and equipping these institutions would be out of proportion to the limited services they could provide.

Far better economy would be practiced by making use of existing facilities and providing them where necessary with special personnel and equipment required for the poliomyelitis patient. The general hospital is ideally suitable for the care of these patients. The infantile paralysis patient represents an acutely ill patient; general medical and nursing care are prime requisites. Recovery is enhanced when the many consultative services of the general hospital are available. Internists, pediatricians, orthopedists—all provided on a general hospital's staff—are essential to the infantile paralysis patient's recovery.

Many infantile paralysis patients are recovered and can be discharged at the end of the isolation period, which ranges from two to four weeks. Some, however, require protracted and continuous treatments for much longer periods of time. Continuity of care is essential for optimum recovery of those who have been left with residual after effects. To shift the patient from one hospital to another and to other doctors and physical therapists, seriously interrupts the continuity of the treatment regime and definitely hinders the patient's recovery. General hospitals, through their orthopedic departments and clinics, can furnish continuous treatment. Under such conditions, the patient's recovery will not be jeopardized.

The National Foundation for Infantile Paralysis has assumed many responsibilities in the fight against this disease. Adequate medical care for every infantile paralysis patient, regardless of age, race, creed or color, is one responsibility no less important than the support of research programs. Any hospital attempting to provide care for such cases will find a real ally in the foundation. All the resources of the national foundation and its local chapters are ready to aid the general hospital in solving its problems.

Staff and equipment usually present the greatest problem to hospitals contemplating the care of poliomyelitis cases. Nurses and physical therapists will be recruited by the foundation. Although such personnel officially will be employees of the hospital, their salaries and transportation costs can be paid for by the chapter.



ALTHOUGH he had two other jobs, this volunteer spent long hours administering hot packs.

Physical therapy equipment such as hot pack machines, tanks, walkers, infra-red and diathermy cabinets need not be a financial burden to a hospital administrator restricted by a limited budget. This necessary equipment can be purchased by chapters for the use of hospitals.

During epidemics, the number of trained staff personnel may be insufficient to handle an increased case load. Here again the hospital will not be left alone to work out the problem. The national foundation or its chapters will procure and pay for these essential workers. Even unskilled and semi-skilled help, such as orderlies, telephone operators, kitchen workers and clerks can be provided for by the local chapter.

Through the Polio Emergency Volunteer program of the national foundation, volunteer nurses aides can be trained in advance of an epidemic. When and if increased incidence of cases occur, the hospital will have a capable and trained auxiliary corps to help an otherwise overworked nursing staff.

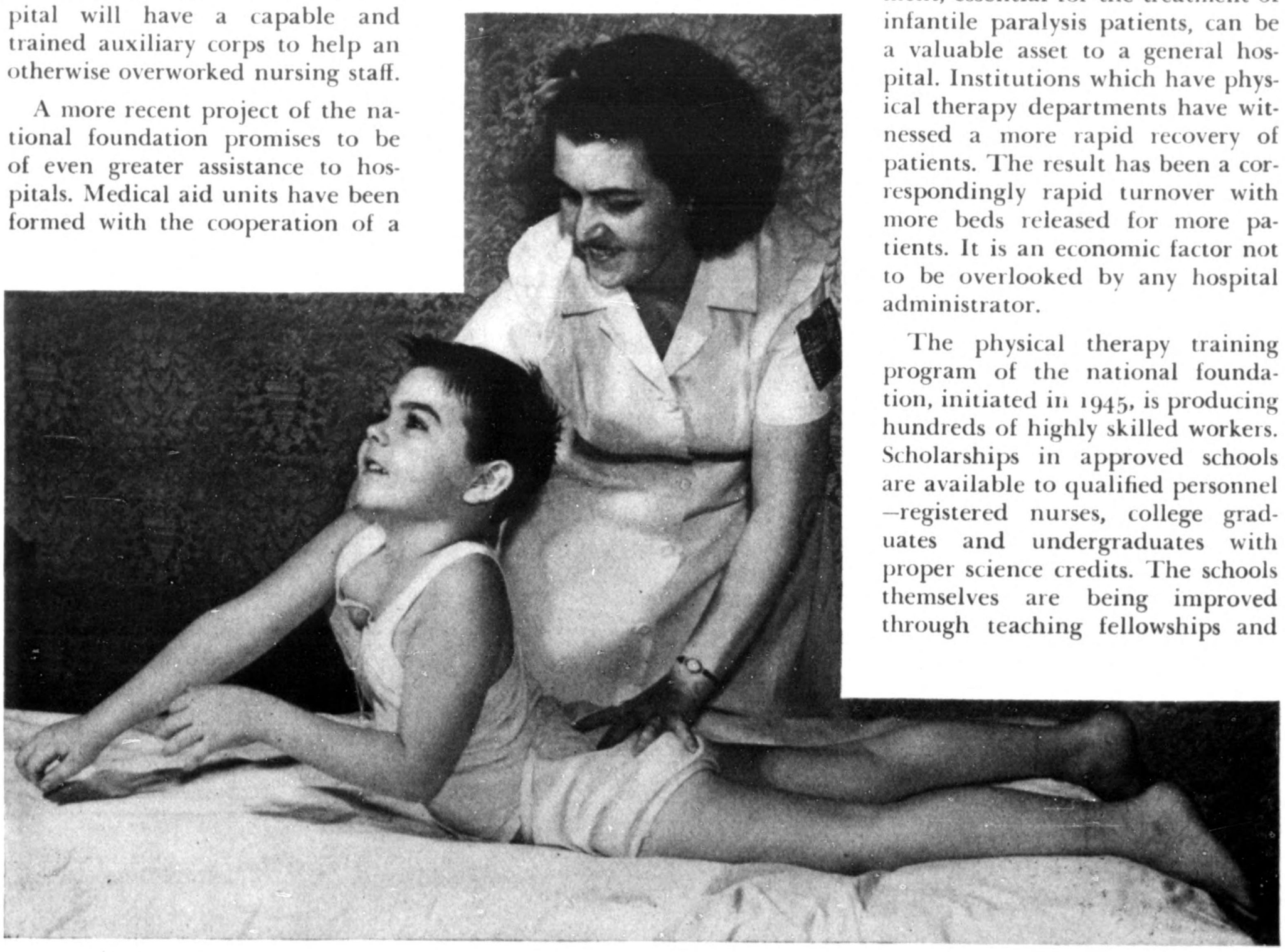
A more recent project of the national foundation promises to be of even greater assistance to hospitals. Medical aid units have been formed with the cooperation of a number of universities. These units are teams of highly skilled persons trained in many aspects of poliomyelitis care. A unit consists of a pediatrician, orthopedic surgeon, doctor of physical medicine, physical therapist and an epidemiologist. At present four such teams are functioning. One is located at Northwestern University, another at Stanford University, a third at the D. T. Watson School of Physical Therapy at the University of Pittsburgh and the fourth at Harvard University.

At the request of the health authorities of a community, the unit comes into an area as a consultant to the medical profession. Its prime purpose is to organize treatment and develop standards of care. The unit prepares the hospitals in the affected area to carry out the modern therapeutic regimen without disrupting the hospital's duties and services to other patients. The entire expense for the unit is borne by the national foundation and is not a drain upon any hospital or community. This is a service gladly furnished by the foundation to a community unable to cope with an epidemic situation.

During the epidemic of 1945, the first year of service for these medical aid units, a number of requests were received for their help. The unit stationed at Northwestern University was called to Rockford, Ill., to assist that community during its epidemic. Similarly, the D. T. Watson unit went to Birmingham, Ala., to aid that area in organizing for the care of poliomyelitis patients. Training programs for hospital nurses were established and a home care program was developed with the cooperation of the Visiting Nurse Association. While the experience of these units in field work has been limited, the preliminary reports indicate their value.

The physical therapy department, essential for the treatment of infantile paralysis patients, can be a valuable asset to a general hospital. Institutions which have physical therapy departments have witnessed a more rapid recovery of patients. The result has been a correspondingly rapid turnover with more beds released for more patients. It is an economic factor not to be overlooked by any hospital administrator.

The physical therapy training program of the national foundation, initiated in 1945, is producing hundreds of highly skilled workers. Scholarships in approved schools are available to qualified personnel —registered nurses, college graduates and undergraduates with proper science credits. The schools themselves are being improved through teaching fellowships and



GRADUATE of the Polio Emergency Volunteer instruction program, this mother gives her five-year-old son excellent care at home.

preparation of teaching material. While the national foundation is primarily interested in increasing the pool of workers for the treatment of infantile paralysis patients, this program will benefit everyone. These therapists are not restricted solely to the treatment of infantile paralysis patients; their services will be available for the management of a score of disease conditions and injuries. As the training program expands, there will be more physical therapists available for staffing physical therapy departments in general hospitals.

The general hospital should not hesitate, from a financial viewpoint, to admit infantile paralysis cases. If no person or agency is responsible for the payment of hospital care, the local chapter of the national foundation will assume that responsibility. This procedure can be worked out in advance by the local chapters and hospital authorities. A schedule of fees on a cost basis can be established for patients receiving hospitalization, medical and nursing care.

It is possible that specific problems will arise in certain localities. Hospital administrators will find local chapters and national headquarters of the foundation eager to cooperate in making possible adequate medical care under proper hospital conditions for the infantile paralysis patient.

General Hospitals Have the Responsibility

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DIRECTOR, MASSACHUSETTS GENERAL HOSPITAL, BOSTON

FEAR OF THE UNKNOWN distorts our judgment and results in irrational acts. For too long, needless misapprehensions have influenced many general hospitals to refuse admittance to acutely ill infantile paralysis cases. The specter of contagion, cross-infection and the fear of other patients have all had their part in closing hospital doors. Where these considerations were not permitted to influence the judgment of hospital administrators, experience proved how unfounded such fears were.

Experience, although it may not solve a problem, may help in handling it. For this reason the experience and policies of Massachusetts General Hospital in caring for patients with poliomyelitis are described here.

Acute, adult polio cases admitted to the general hospital are sent to White-12, a unit composed of single rooms, equipped and staffed for the care of communicable diseases. Children up to 12 years of age go to single rooms or one of the children's wards. Private patients who would ordinarily go to Phillips House or Baker Memorial are admitted there only when they can pay for special nurses during the febrile stage and provided the nurses can be obtained. Otherwise they also are sent to White-12.

Patients with fever are considered as acutely contagious and are isolated on strict communicable disease precautions until 48 hours after becoming afebrile. The usual disinfection of all excreta, nose secretions and sputum is required and communicable mask, hand and gown technic (as for intestinal and respiratory diseases) is followed. Dishes are sterilized after each meal. Every room is equipped with bedpan, urinal basins and other utensils which are sterilized when isolation is ended.

No instance of infection of another patient, doctor, nurse, or any hospital employee has been recorded here.

Hot packs are used for the relief of pain and muscle spasm during the acute stage. Packs must be all wool, boiled in a sterilizer or suitable piece of apparatus, the excess water to be expressed either by passing through a wringer or by use of a small centrifugal extractor built for this use expressly.

Passive motion should be started as soon as pain and general condition permit, especially as regards the respiratory muscles. Respirator cases should be aided by respirator until the test of vital capacity by a spirometer shows that all muscles are functioning adequately.

After the acute symptoms have subsided and the patient has become afebrile he is kept in bed for a variable period, depending on the amount of paralysis and muscles involved. Those with back and leg paralysis obviously must receive longer bed care than others. This may vary from three weeks to six months. During this period treatment consists of active voluntary exercise of the involved muscles with supplementary baking, massage and other physical therapy procedures to improve the diseased muscle.

If splints are needed, they should be made promptly after subsidence of acute symptoms, so that they may be fitted and completed before the patient gets up or leaves.

A general hospital is the ideal place to care for polio patients because it offers all of the various medical groups and hospital facilities necessary for complete care of the patient. During the first stage medical care and skilled nursing are most important. During the succeeding stages physical medicine and therapy, under direction of an orthopedist, play the most important role. If contractures or deformities result, or extensive paralysis remains, orthopedic surgery or treatment is necessary.

Our experience leads us to believe that general hospitals should admit and care for patients with acute poliomyelitis. We believe this can be done without danger to other patients or hospital personnel; we believe this is a proper and necessary service to the community.

Utah Now Knows How To Cope with a SIEGE OF POLIOMYELITIS

FRANK S. EMERY
STATE REPRESENTATIVE FOR UTAH
NATIONAL FOUNDATION FOR
INFANTILE PARALYSIS

AND

EMILY SMITH STEWART
STATE ADVISOR ON WOMEN'S
ACTIVITIES FOR UTAH

LOCAL CHAPTERS OF the National Foundation for Infantile Paralysis have a direct responsibility to the people of the communities they serve. In their hands is the duty of making available adequate medical care for every infantile paralysis patient. While the national foundation was organized to lead, direct and unify the fight against the disease, the problems of providing medical care to all victims require direct contact with patients and their families. The local chapters have been given this responsibility, aided whenever necessary by the national headquarters.

The infantile paralysis epidemic in Utah last summer might have resulted in a major disaster. It was met intelligently, without fear or panic, through careful plans made before the epidemic began.

Utah has one of the smallest populations in the United States—less than 600,000 persons; there are few large centers of population and for the most part the country is sparsely settled. Hospital facilities, sufficient for normal needs, are necessarily limited. Yet the outbreak was met efficiently by the hospital and health officials of the state. Public fear and panic were at a minimum. Suspicious and positively diagnosed cases were hospitalized immediately. Nurses, doctors and physical therapists provided modern treatment. Proudly, Utah can say that no patient went without adequate care.

The official tabulation of the 1943 epidemic in Utah is not yet compiled. But more than 300 poliomyelitis patients received treatment at Salt Lake General Hospital. This was possible because responsible authorities recognized early the need for cooperative planning. Utah learned its lesson well from the disastrous epidemic of 1943, which caught the state without preparation.

Early in the spring of 1945 representatives of the chapters of the national foundation in Utah proposed a meeting of the heads of hospital, health, medical and nursing groups.

The discussions led to plans for the care of infantile paralysis patients. The chapters that initiated the conferences pledged full support.

Hospital facilities were the first and most important need. It is recognized today that hospital care is essential for the optimum recovery of these patients. Where in Utah was there a hospital large enough to provide beds for a hundred or more potential cases?

Salt Lake General Hospital with its excellent staff of doctors and nurses was the ideal institution. It lacked bed facilities to provide care for a large number of infantile paralysis patients in addition to maintaining necessary services for routine medical and surgical patients.

Although the problem was difficult, joint plans and action solved it. A rapid treatment center had been erected on the hospital grounds shortly before. With some physical alterations and additional staffing this building would be completely suitable.

Early in May, County Health Commissioner Roscoe Boden officially turned the building over for the care of poliomyelitis patients. By increasing the staff and purchasing additional beds, fixtures and other equipment, the hospital was able to handle more than 100 patients.

The 29 chapters of the national foundation in Utah made good their promise of help. The chapters contributed a central fund to pay for salaries, equipment and the cost of hospital care. This pool amounted to $20,000.

The epidemic started slowly in early summer. At the onset it was apparent that the $20,000 fund was insufficient to meet the cost of equipment, personnel and hospital and medical care. National headquarters of the foundation was notified; a check for $25,000 was sent promptly to help the community. As the weeks passed and the outbreaks grew more intense, additional financial help was needed urgently. Regularly more money came from national headquarters, until a total of $160,000 had been sent.

At the early spring conference, the chapters had obtained the cooperation of many agencies. Present were representatives of the state and county health departments, medical societies, social agencies, Crippled Children's Division, and the Red Cross.

The active participation of all these groups simplified Utah's problems as the epidemic intensified. Hot pack machines and other special equipment were purchased by the chapters. Through the national foundation, the chapters supplied essential woolen used in the hot packs. Water repellent material was located and purchased. All respirators in the area were reconditioned by the chapters. Skilled personnel was obtained from many sources. The Red Cross, through its Disaster Service, provided addi-

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tional nursing help. Badly needed physical therapists were obtained by the foundation from other areas which were not under epidemic attack.

Despite these aids, additional help was necessary. Nurses, hospital attendants and orderlies needed assistance. To meet this emergency the Polio Emergency Volunteers (PEV), a program planned in advance, went into operation. The purpose of the program was to train women in the basic principles of bedside nursing care. They were to help nurses and physical therapists in applying hot packs, assist in routine nursing procedures, and expedite the work of an overtaxed nursing staff.

A call for volunteers was made and the response was tremendous. A hundred and fifty-eight women from many sections of the state volunteered to take the six-day intensive training course and to care for poliomyelitis patients under proper supervision. It was essential to find a place large enough so these women could receive proper instruction. Through the cooperation of the president of the Church of Jesus Christ of the Latter Day Saints, Pinecrest Inn was made available. There, in the state's most picturesque and scenic areas, a half hour from Salt Lake City, the volunteers were housed, trained and fed. Sponsored by the chapters of the national foundation, the PEV program received the enthusiastic support of many agencies. The Visiting Nurse Association, Crippled Children's service, state and county health departments and the faculty of the University of Utah contributed to the PEV program's success.

Seven doctors, experts in infantile paralysis, lectured to the group. Practical demonstrations in the treatment of the disease were given by nurses and physical therapists from the Visiting Nurse Association, Salt Lake General Hospital and the Crippled Children's Division of the state board of health. One day was spent at Salt Lake General Hospital observing techniques of hospital care of infantile paralysis.

Immediately after the completion of the course many of the volunteers went into Salt Lake General Hospital to assist the nursing staff. Together these women contributed more than 10,000 hours in caring for infantile paralysis patients. The volunteers relieved nurses of the common bedside requirements of the patients. They prepared and applied hot packs. During meal periods they carried trays and spent many hours entertaining the children.

The women went into the kitchens and helped prepare food. They washed dishes and made beds. When the orderlies were too busy, the volunteers helped keep the hospital clean and neat. Without these women Utah could not have met the epidemic as successfully as it did.

Stimulated by what occurred in 1945, Utah is even now making improved plans for the future. Blueprints have been drawn for new, modern hospitals of 110 beds, designed specifically for the treatment of poliomyelitis and other crippling diseases of children. The legislature has appropriated $450,000 to cover construction costs. Ever eager to serve the community, the Utah chapters of foundation have pledged $75,000 to purchase equipment. Utah will be prepared.

What happened in Utah can occur anywhere in the United States. Similar facilities are available to any community. There are approximately 3,000 chapters of the national foundation serving every county in the country. These chapters cooperate with responsible agencies in the area to plan and provide medical care for infantile paralysis patients. Chapters never make an attempt to direct treatment or to interfere in any way with the medical management of the patient. Chapters help to provide treatment and to pay for it if necessary.

An epidemic of poliomyelitis can be a catastrophe, but it need not be. Plans can be made in advance; treatment facilities provided; PEV training programs initiated; and hospitalization costs can be met. Thus a chapter can fulfill its obligations to the people it serves.

Polio Emergency Brings Nursing Service

SPECIAL RESPONSIBILITIES

LOIS OLMSTED
CONSULTANT IN ORTHOPEDIC NURSING, NATIONAL LEAGUE OF NURSING EDUCATION

NURSING CARE for the patient with poliomyelitis is not routine. Certain symptoms are common to many of these patients and certain nursing procedures are required for them. It is hoped nurses will not become so engrossed with technique as to forget the patient is an individual.

Early symptoms of poliomyelitis are not specific. But evidence of muscle tenderness, nuchal rigidity and muscle spasm aggravated by movement are usually present when the patient is admitted to the hospital. He is frequently apprehensive and irritable. This may be due partly to pain and discomfort, but largely because of fear of permanent crippling and deformity. If paralysis has occurred prior to hospital admission, apprehension will be more deep-seated. For the small child, separation from the family without proper preparation causes fear and insecurity.

The nurse who first sees the patient upon admission can do much to reassure him. A calm, cheerful manner, patient explanation of any necessary preliminary procedures and skillful, gentle handling are essential. If an admission bath is given, care must be taken to avoid chilling, unnecessary turning of the patient and any pressure over the tender muscles. The patient should be blotted dry with a soft towel rather than rubbed. Extremities may be lifted with little aggravation of pain and spasm, if supported at the joints and moved slowly. The patient should be turned as a unit with a minimum of movement of any of the segments of the spine.

When the patient is taken to the ward he should be placed on a firm bed. A sagging mattress interferes with the maintenance of good body alignment. A board extending under the entire mattress will insure this desired condition. Where hot foments are likely to be prescribed, the bed should be made up with a full-length rubber sheet and wool or part wool blankets instead of sheets.

A foot board, the width of the bed, 18 inches high and equipped with 3 or 4 inch blocks between the end of the mattress and the board, should be available for each patient. The space at the end of the mattress is necessary to prevent pressure on the patient's heels when he is in the supine position and to allow his feet to remain in a right angle position when he is lying prone. If extra protection from chilling is desired, a blanket may be placed under the end of the mattress and brought under the footboard. The patient is allowed only a very small pillow, or none at all. When considerable spasm is present in the posterior neck muscles, a roll or a soft rubber air cushion, under the cervical spine, gives comfort.

Introducing the patient to the word routine offers opportunity for the nurse to gain his confidence. Explanation as to the use of the bedpan, a word about restricted visiting and information regarding his own condition and treatment help him in making this difficult adjustment. The patient usually gets along better in a ward. Seeing other poliomyelitis patients receiving the same care has a good effect on the acutely ill patient. As his condition improves he appreciates the opportunity of talking and comparing notes with others who are convalescing. The ward should be warm, well ventilated and free from drafts.

Bladder and bowel disfunction are often present in poliomyelitis. From admission of the patient all through the acutely ill stage, the nurse should keep track of intake and elimination. Where bladder paralysis prevents normal voiding of urine, catheterization may be necessary. Bowel disfunction may result in diarrhea or constipation. Ordinary enemata may be ineffective if there is any paralysis or spasm of intestines, diaphragm or abdominal muscles. For these patients the doctor may prescribe special medication. The nurse should prepare the patient both mentally and physically for such treatment. She should have all equipment ready to give the enema at the optimum time—when peristalsis has been noticeably increased. This may be from 10 to 20 minutes after administration of the drug.

Hypertonic fluids to reduce edema may be ordered by the doctor. A liquid diet may be given the patient during the first day or so in the hospital, but he is usually ready for a soft or regular diet very soon. Pressure of work or priority of other nursing procedures should not interfere with feeding the patient while the food is fresh and appetizing.

The position of the poliomyelitis patient is important at all times. Through consultation with the doctor or physical therapist the nurse learns what positions he may safely assume at tray time. For some patients a back rest may be desirable; others may lie prone with the tray on the bed; while others must be kept in the supine position and fed by the nurse.

Hot fomentations are often prescribed for alleviation of pain and

spasm. The frequency and site of application will be prescribed by the doctor. Manipulation during the acute stage of spasm is avoided. The doctor bases his decision as to parts needing packs on his inspection of the patient and gentle palpation to discover spasm. Nurses have the opportunity of seeing the patient for long periods of time and can assist the doctor by reporting unusual positions assumed in exact detail.

For example, tilting of the pelvis or elevation of the shoulders may be caused by muscle spasm and may indicate need for extra packs or more frequent application of packs already being applied.

Details as to preparation of material and methods of application are available to help the nurse in this procedure.* It is well to keep in mind that a very hot pack applied to a patient at the beginning of his course of treatment may aggravate spasm and increase his fear. Start with packs that are comfortably hot and build up his tolerance to heat. The pack should completely cover the muscles involved, but should not give a feeling of constriction.

During the early period when acute pain and spasm are present, lay-on packs rather than the usual pinned-on type are often preferred. These can be changed frequently without turning or moving the patient. The outer covering may be eliminated, thus reducing the weight over painful muscles. The patient may be either supine or prone depending upon the muscles needing intensive treatment. In many hospitals, prone packs covering the back of the neck, entire back, buttocks and thighs have been found useful even after the early stage of acute pain. These packs can be changed as frequently as desired without expenditure of time in pinning on coverings. Whatever type of packs are used, the nurse must never allow the urgency of work to interfere with careful, gentle handling of the patient.

The position of the patient is extremely important in all stages of his illness. Even though he is not restrained in any certain position, it is important to maintain good body alignment. When packs are being applied regularly the nurse should be sure that as each pack is placed the patient is in good bed position. When supine, this means that his feet will rest against the foot board, toes and patella pointing toward the ceiling and arms lying at his side. A small roll under the knees prevents hyperextension. A thigh roll is sometime necessary to prevent outward rotation of the hip.

In the prone position the feet are over the end of the mattress with a small roll above the ankle. For many patients a pad or small pillow under the abdomen and a small roll in front of the shoulder is helpful. Change of position is essential. Turning the patient in the prone position regularly accomplishes this necessary change while maintaining good alignment. When spasm is present it is often not possible to place the patient in good anatomical position. As spasm is relieved by hot applications the nurse should consder it an important part of nursing care to return the patient to good alignment.

Passive movement within a painless arc to maintain normal range of joint motion is necessary for optimum recovering. This is not to be confused with muscle reeducation nor with the tendon stimulation which are done by the physical therapist. In giving such passive exercises the nurse can tell by the slight feeling of resistance when the joint motion has been carried as far as possible without causing pain or aggravating spasm. Since many nurses have not had prolonged preparation in the care of acute poliomyelitis patients, it is desirable for the physical therapist to instruct the nurses in this procedure and to supervise them for a short period.

After the first few days, poliomyelitis patients do not feel ill. They long for normal activity. If this activity is not guided, some of the good results of previous care may be counteracted. The child who lies on his abdomen propped on his elbows to read a comic book, or who works a jigsaw puzzle on his bedside table may be quiet and contented. But he may also be stretching weakened muscles and promoting contractures in others.

Consultation with the doctor and the physical therapist as to desirable positions and movements will help the nurse plan for the patient's functional and recreational activities. These are necessary to maintain muscle tone in normal muscles, protect weak muscles or those still in spasm, and promote the patient's morale. If the services of an occupational therapist are available she can help in planning diversional therapy for these patients.

The nursing care discussed thus far is that required by the patient with spinal cord involvement. Patients with involvement in the cer-

*A Guide for Nurses, Revised 1945. National Foundation for Infantile Paralysis, Publication No. 45.

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vical spine or bulbar region have other symptoms which offer a real challenge to the nurses. Nasal speech and difficulty with swallowing due to paralysis of the soft palate, and change in respiration may indicate bulbar paralysis. Elevation of the foot of the bed to encourage drainage, and use of a syphon to remove collection of mucus from the throat are usually prescribed. In some cases doctors wish patients to be given fluids in small quantities to encourage swallowing.

Other doctors give fluids as necessary, intravenously. These patients are often restless and very apprehensive. Constant care and close observation are essential. The patient with bulbar paralysis may be given hot packs to the post cervical region. Usually other packs are discontinued in the face of this more critical involvement. Although those with bulbar involvement constitute but a small fraction of the total number of poliomyelitis patients, their need for immediate attention is critical. Any hospital admitting poliomyelitis patients should have a suction apparatus. It is the duty of the nurse on the ward to make sure that it is in good working order at all times.

Patients with weakness of intercostal muscles or diaphragm may need respirator care either to preserve life or to allow much needed rest. While there is nothing technically difficult about caring for a patient in a respirator, it often seems so to nurses who have had little or no experience. Respirator drill, using a nurse as a patient, will prevent unskilled handling and resulting panic on the part of the patient. The nurse's lack of assurance regarding this treatment may have such a profound effect on the patient that it will add to the difficulty in making him independent of this prop when it is no longer needed. Details of management of the machine, care of the patient, as well as location of available machines may be secured from the National Foundation for Infantile Paralysis.*

*The Nursing Care of the Patient in the Respirator. Carmelite Calderwood. The National Foundation for Infantile Paralysis Publication No. 49.
Respirators—Locations and Owners—1945. The National Foundation for Infantile Paralysis, Publication No. 24C.

Long Range Insurance for All
THE DEPARTMENT of PH

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THE AVERAGE GENERAL hospital of 50 or more beds may add to its efficiency in caring for patients and decrease operating expenses by establishing a department of physical medicine. Too many hospital administrators and staffs have the mistaken idea that an imposing outlay of expensive equipment is necessary before a department for physical treatment may be planned.

In a small hospital the best initial investment is a registered physical therapist who may start in a small department advantageously located. Under an alert, openminded medical director such a basic organization could carry out most useful physical measures with a treatment table, an infra-red lamp, a posture mirror and pails for contrast baths.

When the hospital staff sees the result of simple hydrotherapy, heat, massage and exercise, the director of physical medicine should have no trouble convincing the hospital management that expansion of quarters is logical. It will justify addition of such equipment as intermittent venous compression apparatus used in peripheral vascular disease, electrical machines for nerve-muscle testing or stimulation, short-wave diathermy for deep heat and other equipment according to the type of work done in the individual hospital. Fever therapy units may be added if there is a definite need. Equipment not specifically required is in the way and deteriorates when not used.

In these days of prepaid hospitalization plans, anything that shortens the period of convalescence and makes beds available for new patients is to the advantage of the patient and the hospital. Physical therapy may be ordered by the physician in selected cases and for proper stages of cerebral, spinal, and peripheral lesions of the nervous system; neurasthenia and chorea. It is also valuable in dislocations, sprains, adhesions, fractures, arthritis, bursitis, synovitis tenosynovitis, fibrositis, myositis, and ischaemic paralysis.

Physical therapy has proved its value in postural affections and static strains of the trunk and lower extremities, in scoliosis, and in traumatic and post-septic conditions. It is employed in treatment of many bone and joint diseases, as well as in peripheral vascular diseases. Finally, physical therapy is useful in vasomotor and trophic disturbances and in many deformities both acquired and congenital.

Physical medicine should be prescribed with the same thought and precision as when selecting drugs. Much misconception and confusion have arisen in the past because physical treatment has not been prescribed according to age, individual tolerance and general or local pathologic changes. Too often physical therapy is prescribed when it is contraindicated or not specifically needed, resulting in the treatment falling into disrepute.

In other instances spectacular cures are attributed to treatment by physical measures when perhaps the program had reached a place where improvement could be expected anyway; in this manner physicians and patients are led to expect too much from such therapy. If used when indicated and transitions in treatment keep pace with the changes in pathology, then a scientific rational system may be

Range Insurance for All General Hospitals— DEPARTMENT of PHYSICAL MEDICINE

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In other instances spectacular cures are attributed to treatment by physical measures when perhaps the program had reached a place where improvement could be expected anyway; in this manner physicians and patients are led to expect too much from such therapy. If used when indicated and transitions in treatment keep pace with the changes in pathology, then a scientific rational system may be followed and reasonable results anticipated.

In prescribing physical therapy for any type of medical or surgical patient for whom it is indicated, it is well to consider all possible methods in a regular order, always giving preference to the simplest measures that will accomplish the purpose.

One bears in mind the subdivisions of physical therapy in the order of practical usefulness. These include physiologic relaxation; massage; exercise; manipulation; various forms of heat included under thermotherapy; cryotherapy or treatment by cold applications; hydrotherapy; light or phototherapy; electrotherapy and mechanotherapy (including use of stall bars, rings, wands, spirometers, respirators, alternate suction-pressure devices, intermittent venous occlusion machines and other therapeutic apparatus).

Before choosing any of these forms of therapy, one should consider carefully the age and tolerance, as well as general and local variations from normal. Then the dosage is planned on a graduated constructive schedule best suited to the individual case.

The prescription should be specific in limiting time of treatment by designating "daily for six days" or for an out-patient "three times a week for three weeks" or whatever the physician wishes. This plan sets a time for the patient to report to his attending physician unless the physician is seeing him on daily hospital rounds. If this is not done, the convalescent may assume that he is a patient of the department and may return later for a new ailment without a fresh prescription—a circumstance that should never be permitted.

An approved department for physical therapy, reconditioning, and occupational therapy needs medical direction by someone who has made a special study of this field and has a keen interest in current advances in diagnostic procedures and treatment. The physician directing the department of physical medicine should be responsible for keeping members of the hospital staff up to date on the prescription for physical therapy. He should be available for consultation on subsequent related reconditioning, occupational and work therapy as needed and adapted to the individual patient for rehabilitation.

By this cooperation, time is saved for physicians and patients while the hospital benefits. Experience has shown that such a united effort may create a department which will more than pay for itself and under certain conditions may be a source of additional revenue. The physical therapist administering the various measures should be graduated from a school approved by the Council on Education of the American Medical Association, affiliated with the National Registry or the American Physiotherapy Association and licensed to practice in states that require a separate examination for local registration.

A department of physical medicine will differ in requirements for staff and equipment according to the community the institution serves. If mills or other industries are nearby and if transportation facilities are present with their attendant hazards, then physical treatment will demand professional personnel conversant with post-traumatic problems and equipment which will expedite care of such a group of patients.

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A psychiatric hospital should have a well balanced physical therapy department but will find hydrotherapy particularly useful. A children's hospital or convalescent home may call for emphasis on treatment of infantile paralysis, cerebral palsy, congenital affections, post-traumatic, sequelae, postural and static strains or perhaps a combination of several or all of these disabilities.

Treatment of infantile paralysis in the acute stage involves the following essentials:

1. Careful diagnostic study.
2. Mental and physical rest, with constructive psychotherapy.
3. Adequate liquid nourishment.
4. Elimination of body wastes.
5. Bed positions to favor circulation in the back and the region of the spinal cord, plus change of position to prevent passive congestion in dependent body parts.
6. Sedative physiotherapy, often in the form of fomentations.
7. Physiologic movement of affected parts as soon as body temperature is normal and a painless arc of motion is present.
8. Accurate, localized muscle reeducation as soon as active motion is possible without pain of muscle irritation.
9. Frequent alignment of affected parts to limit tendencies to deformity.
10. Removable light casts or splints especially for night use in small children who do not hold prescribed positions.

These points are enumerated to call attention to the importance of cooperation and teamwork among physician, nurse and physical therapist. The National Foundation for Infantile Paralysis as been instrumental in encouraging organization of units composed of professional personnel accustomed to working together. The physician is responsible for making the diagnostic study and ordering any of the other points listed as they are indicated in each case.

The nurse with special training in care of acute poliomyelitis will execute orders related to points 2, 3, 4 and 5. She may take an active part in application of fomentations or she may supervise this work done by aides who have received careful instruction in details of technique and have shown aptitude for accurate, conscientious performance under supervision.

When the physician has decided that discomfort and tenderness have diminished so as to allow gentle passive motion through a painless arc, the movements may be carried

out by the physical therapist if her schedule of work permits or by the nurse who has taken instruction in this phase of treatment.

No matter who executes these physiologic movements, the chief concern should be that the individual has a keen sense of perception which will recognize the slight reflex resistance to movement which occurs just before the patient experiences pain and before the muscle goes into protective spasm. Movement is stopped short of the point of pain. The affected part should be lifted carefully and moved gently, avoiding contact or tension on muscle bellies or nerve trunks which may be sensitive.

The physical therapist, with a comprehensive foundation in anatomy and physiology related to circulation, nervous and muscular systems and joints, should be given the responsibility for arousing position or muscle sense (proprioceptive or kinesthetic stimulation) in patients and for teaching muscle reeducation. A physical therapist experienced in neuromuscular problems can combine use of opposing muscles (reciprocal action of agonist and antagonist) with individual muscle training.

The physical therapist has education and practice in individual muscle examination and will record grades of power on a chart specially arranged for simplicity and clearness. The physician may see changes noted on this sheet and order further steps in treatment accordingly.

Active use of a muscle will be ordered when voluntary muscle contraction does not cause pain or quivering of muscle fibers. A physician who is sure of his prestige will not resent observations or constructive suggestions by a nurse or a physical therapist who is a veteran in handling such cases.

In a case of acute neuromuscular disability as seen in poliomyelitis, examination, treatment, and routine handling must be limited to small doses or the illness is aggravated. The considerate physician will take advantage of reports and records as well as his own observations to help his analysis of the case and will assist in limiting repetition of examination which may disturb the patient.

Physician, nurse, physical therapist and mature patients should all be alert to assure protective alignment of body parts. Small children cannot be expected, in most instances, to stay in a prescribed position and may need light, removable supports.

After the acute stage, the physician continues to be responsible for transitions in treatment at appropriate times. Packs may be detrimental if used after pain and limitation of motion have disappeared, since the moisture may then dull perception of the skin over the course of a muscle as it is pointed out to the patient. In addition, activity may be postponed beyond the need for therapeutic rest causing undue delay in restoration of muscle tone and power. The physician will order trial of sitting and later standing and walking when he has studied muscle recovery in the light of influence of gravity, weight of the part, stature of the patient and possible static strain.

Hospital administrators are confronted with the problem of having families of patients with infantile paralysis request treatment according to methods described in newspaper or magazine articles. The public and relatives of patients should be educated to know that the possibility of recovery or eventual paralysis is determined largely at the onset of the disease. If anterior horn cells of lower motor neurons are destroyed during the acute stage, no treatment will restore power to related muscle fibers.

On the other hand, by early judicious care, surrounding nerve cells may be saved from permanent damage due to congestion and circulatory stasis and muscles in affected parts may be saved from unnecessary atrophy or fibrosis. The only way that paralysis may be prevented is by controlling the disease at its source which is at present unknown.

In late convalescent and chronic cases, we continue to have the same problems which have arisen through the years for improvement of function or correction of deformity and which must be met by appropriate braces or operations. Even patients who have achieved a good recovery of muscles and restoration of normal body mechanics must maintain a protective balance between rest and activity through life if regression is to be avoided.

Principles of good posture and proper body mechanics are as important to the well as to the sick and are a protection to professional personnel handling patients. The physical therapist, in cooperation with the nursing school staff, may make all of those dealing with patients, as well as the patients themselves, aware of the value of comfortable but correct positions when lying, sitting, standing and walking. The department of physical medicine should be instrumental in helping many convalescents make the transition from illness to health, avoiding annoying and unnecessary pitfalls on the road to recovery.

Lasting Deformity Can Be Minimized by MUSCLE CONSERVATION

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IMPROVED METHODS OF CARE have come as a result of a better understanding of the basic pathology producing the variable symptoms of poliomyelitis. This clarification of symptomatology has been most important. When paralysis was considered only as a result of anterior horn cell death, there was no prospect of satisfactory therapy. Muscles were permitted to remain inactive and uncared for. Thus was added the atrophy and disintegration of disuse to the weakness produced by the disease itself. A frequent result was a permanent deformity and loss of function that might have been prevented.

Through exhaustive studies it is now realized that paralysis is rarely complete. By early and appropriate physical therapy many things can be accomplished. Proper muscle reeducation can overcome loss of muscle function due to disturbances of nerve impulses from damage of lower motor neurons.

The objective treatment of infantile paralysis is to conserve muscle function and this can be accomplished by conserving the muscles themselves. There are many means to accomplish this: artificially or naturally contracting the weakened muscle; dilating capillaries and maintaining circulation through physical therapy; active and passive motion; superficial and deep massage; hot packs, infra-red therapy and manipulations. This regimen usually is started as soon as the gastro-intestinal tract has been emptied and the temperature of the patient has become normal.

Much has been written concerning the difference between the modern methods of treatment employing physical therapy and the so-called orthodox method of fixed immobilization. The impression has been given that the orthodox method was universally applied and that the employment of early physical therapy is entirely new in the treatment of the disease.

Such a belief is not justified. While prolonged immobilization was frequently employed, not all physicians treating poliomyelitis used this method. For over 23 years I have used infra-red heat pads under the mattress, measures to combat foot drop and sand bags to keep the patients in a neutral position. Neither I, nor Feiss, 10 years before me, felt that we needed fixed immobilization in the treatment of infantile paralysis patients.

Fixed immobilization of weakened muscles leads to muscle atrophy. This is well brought out by experimental and clinical studies. The permanent casting of normal muscles of experimental animals leads to permanent atrophy. As early as 1907 Ransom showed that retrograde wallerian degeneration results from such practice. The nonuse of muscles subjected to long casting, produces an obvious atrophy and complete ankylosis.

There are many individual variations in the general treatment of poliomyelitis. Some physicians prefer placing their patients in a cast, simultaneously applying physical therapy. Others splint or cast weakened muscles, remove the immobilization daily and use physical therapy. Still other doctors permit their patients to lie in bed and do nothing until all pain has disappeared. Then therapy is used.

While it is generally agreed that prolonged immobilization is unwise, no one has yet demonstrated that immobilization for short periods of time is harmful to the patient. Nor has anyone demonstrated that a patient, who has been placed in a cast and taken out daily for physical therapy, does not do well.

Although poliomyelitis is not primarily a disease of the muscles, secondary changes occur in them as a result of the disease. The affected muscle must be kept in as good condition as possible to await the time when impulses again will traverse the axis cylinders of the nerve cells which have been impaired by the disease. These objectives are accomplished by maintaining a good vascular supply. Certain research studies have shown that muscles whose nerve impulses have been impaired can be kept indefinitely in a state of good health awaiting the time when nerve cells will recover and once more innervate muscle fibers. Deformities of weakened muscles can be prevented by not overstretching or fatiguing them, by maintaining their circulation and reeducating them through physical therapy.

There is no set time when a patient is permitted to get out of bed. In general, the criterion for removing patients from bed is if gravity is not an adverse factor. Complete recovery exists only if the patient can use his muscles as he did before contracting the disease. This does not mean acrobatic litheness nor the ability to double himself into a knot.

There is no reason why infantile paralysis patients should not be admitted to a general hospital, especially if these institutions have physical therapy and orthopedic departments. The possibility of cross infections from one patient to another is not a cause for worry.

Cleveland's City Hospital has been accepting poliomyelitis pa-

tients since 1922 without any untoward incident.

Infantile paralysis patients can be handled in the same manner as typhoid fever cases. All general hospitals admit patients with typhoid fever, a disease which is a dozen times more infectious and dangerous for those who come in contact with it. A hospital administrator could not refuse admission on the basis of contagion, inasmuch as contagion can easily be controlled.

The care of these patients usually falls to the pediatrician, although an orthopedist or one especially interested in the disease may handle the case. After the diagnosis has been made with the aid of the pediatrician, internist or orthopedist, the patient should be carried through the acute or sub-acute stages by a competent physical therapist under the direction of a pediatrician, orthopedist, internist, or doctor of physical medicine.

It is better for the patient to receive competent supervised physical therapy over a long period of time than to have the services of famous specialists who can see him only occasionally.

Reeducation must be employed until it is evident that no further progress is possible. Then the patient becomes an orthopedic problem. The attention of the orthopedist, however, is required early in the disease so that he can advise during the entire course of treatment. If, during the sub-acute stage when he is receiving physical therapy, the patient insists on moving against gravity while some muscles are still weak, the orthopedist will have to splint them.

The ideal place to care for these patients is one where they obtain the many and varied required services. Patients recover when they have the advantage of continuity of intelligence and skilled treatment. With the aid of the National Foundation for Infantile Paralysis, general hospitals can be staffed and equipped to provide optimum care for the infantile paralysis patient.

What Research Teaches So Far About INFANTILE PARALYSIS

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IN SPITE OF the fact that some of our best scientific effort has been focused on poliomyelitis for years, it remains one of the most elusive problems of modern medicine.

Poliomyelitis is almost the only common infectious disease whose exact mode of transmission is not surely known. No one has the vaguest idea how to stop poliomyelitis in its acute state; about the only thing that can be done is to let it run its course and then try to patch up the damage. On the other hand, even in epidemics the chances are that only about three children in a thousand will suffer a recognizable attack. And of these three only one is likely to be permanently crippled.

The disease is so obscure that it was not until 1907 that the Swedish investigator, Wickman, produced convincing evidence that it was infectious by observing its spread from one individual to another in small villages. Another landmark was reached in 1909, when Landsteiner and Popper first transmitted it to a monkey in the laboratory. Even this did not open up the field of research as much as such a discovery would have done in many other diseases, because there were still many things which made poliomyelitis extraordinarily difficult to study.

Polio is caused by a virus, a much more elusive kind of organism than the bacteria which cause so many common infectious diseases. Bacteria can generally be seen under the microscope; viruses cannot. Although some of the larger viruses recently have been photographed through the new electron microscope, poliomyelitis is so small that it has not yet been visually identified. Nor has it been grown in a test tube.

Bacteria for the most part exist *between* the body cells of their host, drawing sustenance from the body fluids which also nourish the host cells. Laboratory media can provide a satisfactory substitute for these body fluids, so that cultures of the bacteria can be made for study. Viruses, on the other hand, must tap the vital processes of the cell itself; they can grow only *inside* the body cells of a living animal or human being. Consequently, the usual procedure of making a culture for laboratory study cannot be used in work with viruses.

But the greatest obstacle of all to the laboratory study of poliomyelitis was the fact that—aside from man—the only living creature susceptible to poliomyelitis apparently was the monkey. Until recently, the monkey was such a rare and expensive animal in the laboratory that experiment on an adequate scale was impossible. The investigator working on typhoid, dysentery or diphtheria could make a hundred cultures where the poliomyelitis worker could inoculate only one monkey—and often learn nothing.

Only since the beginning of the "March of Dimes" campaigns in the past few years have funds and organization been available to provide monkeys in numbers really adequate for research. Other special difficulties still remain, however; for example, one man can inoculate and care for 100 mice in a few glass jars, but he can provide similar services for only half a dozen monkeys which have to be kept in clean, roomy cages. The resulting problems of manpower, skill and housing still are not entirely solved.

Many laboratories now are making efforts to find methods for growing poliomyelitis virus outside the body and for detecting its presence in infected material without having to inoculate a living animal. So far, all such efforts have been unavailing. A considerable advance was made when it was discovered—by the tedious process of trying out many different kinds of animals—that some types of poliomyelitis virus which had been accustomed to growing in the monkey brain also could be made to live and multiply in the brain of a certain little-known wild rat; and that from the rat the virus could then be "adapted" to the brain of the ordinary laboratory mouse.

This finding has made possible various kinds of large-scale experimentation relating to immunity, though there are many workers who feel that the jump from mouse to man is too great to be made with safety and that it is unwise to attempt to apply what it learned from mice directly to human problems. In our own laboratory we are now using chimpanzees to make a final check of results obtained from work with mice and monkeys before applying them to human beings. For the chimpanzee not only is susceptible to poliomyelitis, but is the closest substitute for man which will ever be available for free experimentation.

Why is so much experimentation necessary? Why cannot researchers depend to a greater extent on the data they obtain from clinical observations? The answer lies in the peculiar nature of poliomyelitis as a disease.

It is difficult obviously to find out the means by which a disease is

MANY laboratories are experimenting on methods of growing polio virus outside the body.

transmitted from one individual to another unless one can identify those who are infected. Strange as it may seem, most cases of poliomyelitis are not permanent. It was noted by early observers that when one case occurred in a family, minor illnesses were common in the household, especially among the other children. It was concluded, on meager evidence to be sure, that these illnesses were also poliomyelitis. Just how frequent these mild nonparalytic episodes were could only be inferred, because most of them were never brought to the physician's attention.

If it had been possible to make a culture from any suspected illness—a routine procedure where bacterial diseases are concerned—it would have been relatively simple not only to determine the true nature of these nonapparent cases, but also to form some idea of their prevalence in the community. Since no ordinary culture can be made of a virus, epidemiologists were forced to indirect reasoning to obtain such information.

A disease which attacks primarily children may do so because they are more frequently exposed than their elders. A more frequent explanation, however, is that adults have already had the infection and are immune—as is true of measles and other childhood diseases—or that they become more resistant with age. It was observed that the average age of children afflicted by poliomyelitis was slightly lower in large cities than in country districts. This certainly indicated that merely growing older could hardly be the cause of this increased resistance, since people grow up at pretty much the same rate in city or country.

It was argued strongly that the relative immunity of adults was acquired through actual contact with the virus, since opportunity for contact comes earlier in crowded cities than in sparsely settled rural districts. Since even during epidemics rarely more than three children per thousand are afflicted with clinically demonstrable poliomyelitis, it seems quite clear that the vast majority of people must have had infantile paralysis and gained a practical immunity without ever being aware of it.

Poliomyelitis is, therefore, quite like measles in being a common malady; but it is also very different, since virtually everyone remembers whether he had measles, while few are conscious of infection with poliomyelitis. Since monkeys have become easier to obtain for experimental purposes, it has been possible, by inoculating them, to test secretions from considerable numbers of adults and children in the immediate environment of a case of poliomyelitis; thus, many are shown to be infected although they may have no symptoms of illness.

It seems clear that these virus-carrier states have an important bearing upon the means by which the individual develops immunity or conveys the virus to the next person.

Naturally the next question is: How does a human being harbor the virus? Since the early days of research on poliomyelitis, it has been recognized that the virus was likely to be present in both the throats and stools of cases and also of certain well individuals who had usually been in contact with a case. A few years ago it was shown that virtually *all* cases and many contacts had virus in their stools. At the same time virus was also isolated from flies trapped in epidemic areas. To many researchers, this seemed virtually to prove that poliomyelitis was transmitted in much the same fashion as typhoid or dysentery. The incidence of epidemics in the late summer also fitted in with such a hypothesis, since all diseases acquired from human excrement are favored by warm weather.

Cold Weather No Bar

But many epidemics of poliomyelitis continue into the cold weather, when flies are not active. Furthermore, if fecal contamination of food or water were responsible for the disease, one would expect mass outbreaks traceable to a single source. Such group infections have been frequently recorded for diseases such as typhoid, which are definitely known to be fecally transmitted. In the case of poliomyelitis, however, outbreaks of this sort are conspicuously absent; it is notable that only three have been recorded, and that all of them were traced to contaminated raw milk.

Sanitary improvements in this country during the past generation have greatly reduced the incidence of typhoid, dysentery, and other enteric diseases, yet poliomyelitis has remained unaffected. Poliomyelitis is not a disease of filth and is common in the homes of the well-to-do. It would seem, therefore, that poliomyelitis does not fit perfectly the pattern of a fecally transmitted disease.

Mosquitoes and other blood-sucking insects have been studied as possible transmitters. Since lower animals apparently do not harbor the virus and it is very infrequently found in the blood of human beings, there is no means by which such insects could become infected. Consequently, they have been virtually eliminated from consideration.

Only within the past year an improvement in the technique of recovering virus from the throat has shown that it is probably present in the throats of at least half of the paralytic patients for about three days after the onset of their symptoms. As even this technique is relatively crude, however, it seems probable that considerably more than half of the patients harbor virus in the pharynx and respiratory passages. It is also possible that, as in the case of measles and other virus diseases of respiratory origin, the virus may be present in the throat before the patient is aware of being sick. Yet poliomyelitis does not fit the pattern of most air borne diseases, since its greatest incidence comes in the summer, whereas such ailments usually reach a peak during the winter.

While the exact way in which poliomyelitis spreads is still subject to debate, there is very little doubt that it is transmitted through human contact. Regardless of whether the virus comes from fecal or pharyngeal sources, it probably enters the body through the nose or mouth and from there reaches the pharynx and gastro-intestinal tract. Then, apparently, it passes through the lining of these structures and follows their nerves back to the brain and spinal cord, where it may strike with deadly force. (Some widely published accounts have suggested that the virus invades the nervous system along the nerves of smell, but there is proof that this is not the case.)

Parents should note particularly that since the virus is often present in the pharynx during epidemic periods, operations for the removal of tonsils are definitely dangerous, for they provide an opportunity for the virus to reach freshly cut nerves. Medical literature contains some dramatic and tragic stories of polio following tonsil operations.

It is important, from a general scientific point of view, to know how long persons who have had nonparalytic poliomyelitis or are unrecognized virus carriers may harbor the infection in their throats or eliminate it in their stools. There is doubt, however, whether this information, when it is finally accumulated, will have any practical bearing upon the problem of how to avoid contact. To most investigators it is fairly obvious that during epidemic periods—in cities, at least—the virus is probably so widespread that it is virtually impossible to avoid contact with it, since most of the infected persons cannot be identified and isolated. This furnishes a strong argument against bringing children into epidemic areas. Probably in every case, despite our best efforts to check it, the virus goes through a community until it has reached the number of susceptible individuals to a point where the disease can no longer maintain itself. For this reason, there is almost always a period of several years between epidemics in a given area, while a new group of potential victims grows up.

May Not Be Noted

Although it is difficult, if not impossible, to escape contact with poliomyelitis virus, there is some comfort in the fact that, viewed in the large, polio is really a mild disease. It seems certain that a large proportion of cases are so light as never to be recognized at all. Disregarding these, we find that during epidemics, attack rates for children one to 10 years old are at most from two to four cases a thousand. Usually they are much lower and during non-epidemic times they are virtually negligible. Among children above 10 years of age attack rates decline sharply and at 20 years and over they are not more than about one in 100,000, even in epidemic times.

Poliomyelitis attacks primarily the groups of nerve cells in the spinal cord which control the use of the voluntary muscles in the head, trunk and limbs. Deprived of impulses from these nerve cells, the muscles are limp and useless. The damage sustained by the nerve cen-

ters may range from temporary suspension of function to complete destruction. Fortunately the former is the more common. (No matter how severe the paralysis, the mental capacity of the patient is never affected.)

If the nerve cells are really wiped out, then nothing can replace them. During embryonic growth, the individual develops the nerve cells which must serve him his entire lifetime, and there is no known means of bringing back those that are lost along the way. Poliomyelitis patients do well or badly in proportion to the number of motor cells which the disease has spared. Every patient has some nerve cells to spare and can get along quite satisfactorily with considerably less than the normal number—especially if his losses are rather evenly distributed within the nerve centers.

Although the average child under 10 years risks only three chances in a thousand of suffering a severe attack of poliomyelitis, even during an epidemic, and only one chance in a thousand of being crippled for life, I am well aware of the limitations of this kind of statistical comfort. For that one child in a thousand, poliomyelitis still is a great tragedy. In 1944, the severe polio epidemic permanently handicapped some 5,000 American children—too large a number for any nation to regard complacently.

The ideal answer, of course, would be to find a good, safe vaccine or a magic bullet like penicillin. Today many laboratories are reconsidering the problem of finding a vaccine, which was regarded as hopeless a few years ago. Virus diseases are tricky things from this standpoint, since the best vaccines contain live virus and there is the risk of occasional infection from the vaccine itself.

In the case of such dreaded diseases as smallpox and yellow fever, which have been known to wipe out whole communities, this risk is something most people are willing to assume. Few scientists have been convinced, however, that the chance of an individual's being stricken with paralytic poliomyelitis is great enough to justify the use of a vaccine which threatens the slightest danger; so far no one has produced a safe vaccine which gives any promise of being effective. But recent discoveries in other fields have indicated methods which promise to inactivate the virus and make it safe without destroying its value as a vaccine.

ALTHOUGH poliomyelitis virus has been isolated from flies trapped in epidemic areas, scientists have not definitely incriminated these and other insects as possible transmitters.

The other road—the finding of a drug which will arrest the progress of polio—is one of the toughest problems in medical research. It, too, is bound up with the question of the treatment of virus diseases in general. Since a virus lives inside the body cells rather than in the fluids between them, any drug or serum which is to affect it must pass beyond the tissue fluids, in which it would be effective against most bacteria, and enter the cells themselves. All drugs known to destroy the virus also kill the cells, so this has not been a practical approach.

It is now suspected that viruses do not flourish in cells which themselves are not flourishing. The problem then becomes one of finding how to alter the vital activities of the cell in such a way that it no longer furnishes a suitable medium for the virus, without at the same time endangering the cell's own life. Such a treatment must be capable of producing rather far-reaching effects upon the economy of the cell, but at the same time must be benign and easily reversible. The nervous system is so vital that the price of a misstep here would be as great as that exacted by the disease itself.

It is clear that in order to control polio, a great deal of methodical, painstaking research will be necessary. In the past the temptation had been great to try for a lucky shot, but it must honestly be admitted that we probably would have been much farther along today if there had been more intensive effort to understand how poliomyelitis virus behaves in the body, rather than so much emphasis on empirical methods of treatment or cure.

Popular interest in polio has been so intense that for a number of years the annual fund raising drives of the National Foundation for Infantile Paralysis have met with great success. The result is much more extensive research than ever before was possible. In universities all over the country groups are now at work on various aspects of the poliomyelitis problem. This has been going on for nearly 10 years, and the work is beginning to show some results.

Years more of research will be required to solve some of the complex problems involved. The crucial test of popular support for such a research program will come in the degree of trust and patience which the public is able to show. Will the people continue to support a cause where real progress is slow? If they do, there is at least a reasonable hope that poliomyelitis—like many another diseases once thought insuperable—may some day be conquered.

ters may range from temporary suspension of function to complete destruction. Fortunately the former is the more common. (No matter how severe the paralysis, the mental capacity of the patient is never affected.)

If the nerve cells are really wiped out, then nothing can replace them. During embryonic growth, the individual develops the nerve cells which must serve him his entire lifetime, and there is no known means of bringing back those that are lost along the way. Poliomyelitis patients do well or badly in proportion to the number of motor cells which the disease has spared. Every patient has some nerve cells to spare and can get along quite satisfactorily with considerably less than the normal number—especially if his losses are rather evenly distributed within the nerve centers.

Although the average child under 10 years risks only three chances in a thousand of suffering a severe attack of poliomyelitis, even during an epidemic, and only one chance in a thousand of being crippled for life, I am well aware of the limitations of this kind of statistical comfort. For that one child in a thousand, poliomyelitis still is a great tragedy. In 1944, the severe polio epidemic permanently handicapped some 5,000 American children—too large a number for any nation to regard complacently.

The ideal answer, of course, would be to find a good, safe vaccine or a magic bullet like penicillin. Today many laboratories are reconsidering the problem of finding a vaccine, which was regarded as hopeless a few years ago. Virus diseases are tricky things from this standpoint, since the best vaccines contain live virus and there is the risk of occasional infection from the vaccine itself.

In the case of such dreaded diseases as smallpox and yellow fever, which have been known to wipe out whole communities, this risk is something most people are willing to assume. Few scientists have been convinced, however, that the chance of an individual's being stricken with paralytic poliomyelitis is great enough to justify the use of a vaccine which threatens the slightest danger; so far no one has produced a safe vaccine which gives any promise of being effective. But recent discoveries in other fields have indicated methods which promise to inactivate the virus and make it safe without destroying its value as a vaccine.

ALTHOUGH poliomyelitis virus has been isolated from flies trapped in epidemic areas, scientists have not definitely incriminated these and other insects as possible transmitters.

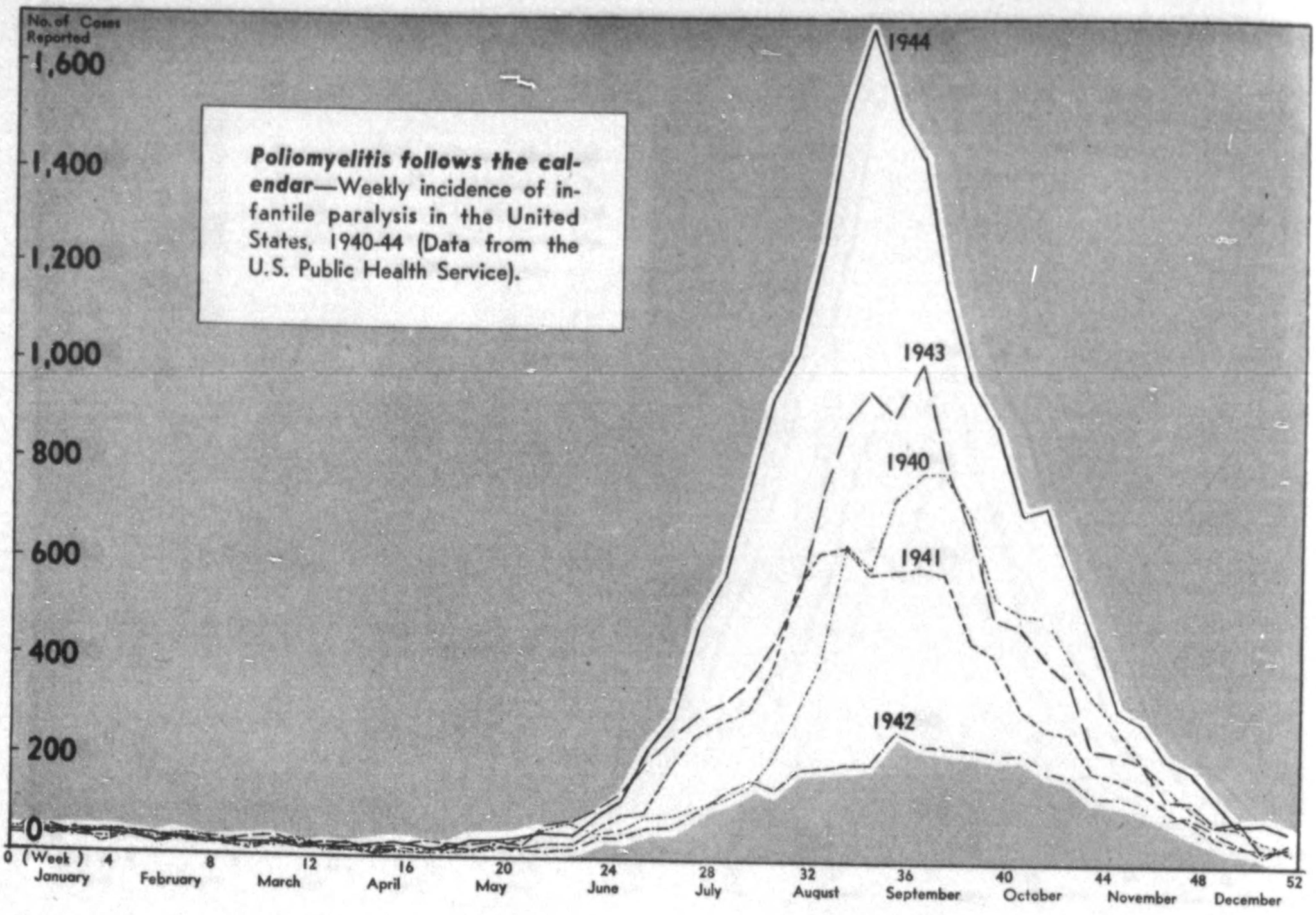
The other road—the finding of a drug which will arrest the progress of polio—is one of the toughest problems in medical research. It, too, is bound up with the question of the treatment of virus diseases in general. Since a virus lives inside the body cells rather than in the fluids between them, any drug or serum which is to affect it must pass beyond the tissue fluids, in which it would be effective against most bacteria, and enter the cells themselves. All drugs known to destroy the virus also kill the cells, so this has not been a practical approach.

It is now suspected that viruses do not flourish in cells which themselves are not flourishing. The problem then becomes one of finding how to alter the vital activities of the cell in such a way that it no longer furnishes a suitable medium for the virus, without at the same time endangering the cell's own life. Such a treatment must be capable of producing rather far-reaching effects upon the economy of the cell, but at the same time must be benign and easily reversible. The nervous system is so vital that the price of a misstep here would be as great as that exacted by the disease itself.

It is clear that in order to control polio, a great deal of methodical, painstaking research will be necessary. In the past the temptation had been great to try for a lucky shot, but it must honestly be admitted that we probably would have been much farther along today if there had been more intensive effort to understand how poliomyelitis virus behaves in the body, rather than so much emphasis on empirical methods of treatment or cure.

Popular interest in polio has been so intense that for a number of years the annual fund raising drives of the National Foundation for Infantile Paralysis have met with great success. The result is much more extensive research than ever before was possible. In universities all over the country groups are now at work on various aspects of the poliomyelitis problem. This has been going on for nearly 10 years, and the work is beginning to show some results.

Years more of research will be required to solve some of the complex problems involved. The crucial test of popular support for such a research program will come in the degree of trust and patience which the public is able to show. Will the people continue to support a cause where real progress is slow? If they do, there is at least a reasonable hope that poliomyelitis—like many another diseases once thought insuperable—may some day be conquered.



Poliomyelitis follows the calendar—Weekly incidence of infantile paralysis in the United States, 1940-44 (Data from the U.S. Public Health Service).

SEASONAL BEHAVIOR OF POLIO

THOMAS PARRAN, M.D.
SURGEON GENERAL, UNITED STATES PUBLIC HEALTH SERVICE

AT THIS TIME of the year, a frequent question is, "Where will infantile paralysis strike this summer?" To that pertinent question, there can be but one answer: "No one knows."

There is no scientific method of forecasting where future outbreaks of poliomyelitis will occur. Medical science, despite its many achievements, is unable to prevent the occurrence of an epidemic. This lack of specific control methods makes poliomyelitis a major public health problem.

So far, the most hopeful development in our fight against infantile paralysis is the knowledge of how to care for victims, of minimizing its crippling effects, and of rehabilitating those already disabled. Today, many victims will recover completely and a majority of them will suffer no serious disability.

In addition we have made some progress in research. Several strains of the poliomyelitis virus have been isolated and identified. The virus has been found in the intestines, the upper respiratory tract, in sewage, in stools and in or on flies. These discoveries have opened up new lines of research which may have an important bearing on the public health control of the disease.

The effect of chemotherapeutic substances on the virus is under investigation, as is the effect of different diets in relation to poliomyelitis. The work of the Public Health Service in transmitting certain strains of the virus to laboratory animals such as the cotton rat and common house mouse, has been confirmed by other agencies. This will reduce the expense of extensive investigation and negates the relative rarity of monkeys which heretofore had been the only animal suitable for laboratory work in polio research.

However, research has not yet given us means of preventing outbreaks of poliomyelitis. In fact, the outbreaks appear to be even more extensive geographically—and more intensive within the stricken community—today than in the past. No epidemic of the disease was recognized anywhere in the world prior to 1890, and none in this country prior to 1894. Yet, there is evidence that poliomyelitis occurred sporadically as far back as the Egyptian civilization.

Statistical data on infantile paralysis are of somewhat doubtful value. Lack of uniformity in reporting these cases is one prime flaw. Unlike pneumonia, diphthe-

ria, or influenza there is discrepancy in diagnostic criteria. Poliomyelitis as a reportable disease has no uniform definition. There is no set of standards to be applied universally throughout the country. The various states through their regular health officers set up their own regulations governing the reporting of infantile paralysis. Some states report cases with paralytic symptoms and others report cases without paralytic symptoms. Scientists are striving to develop a laboratory diagnostic test for this disease but so far have not been successful.

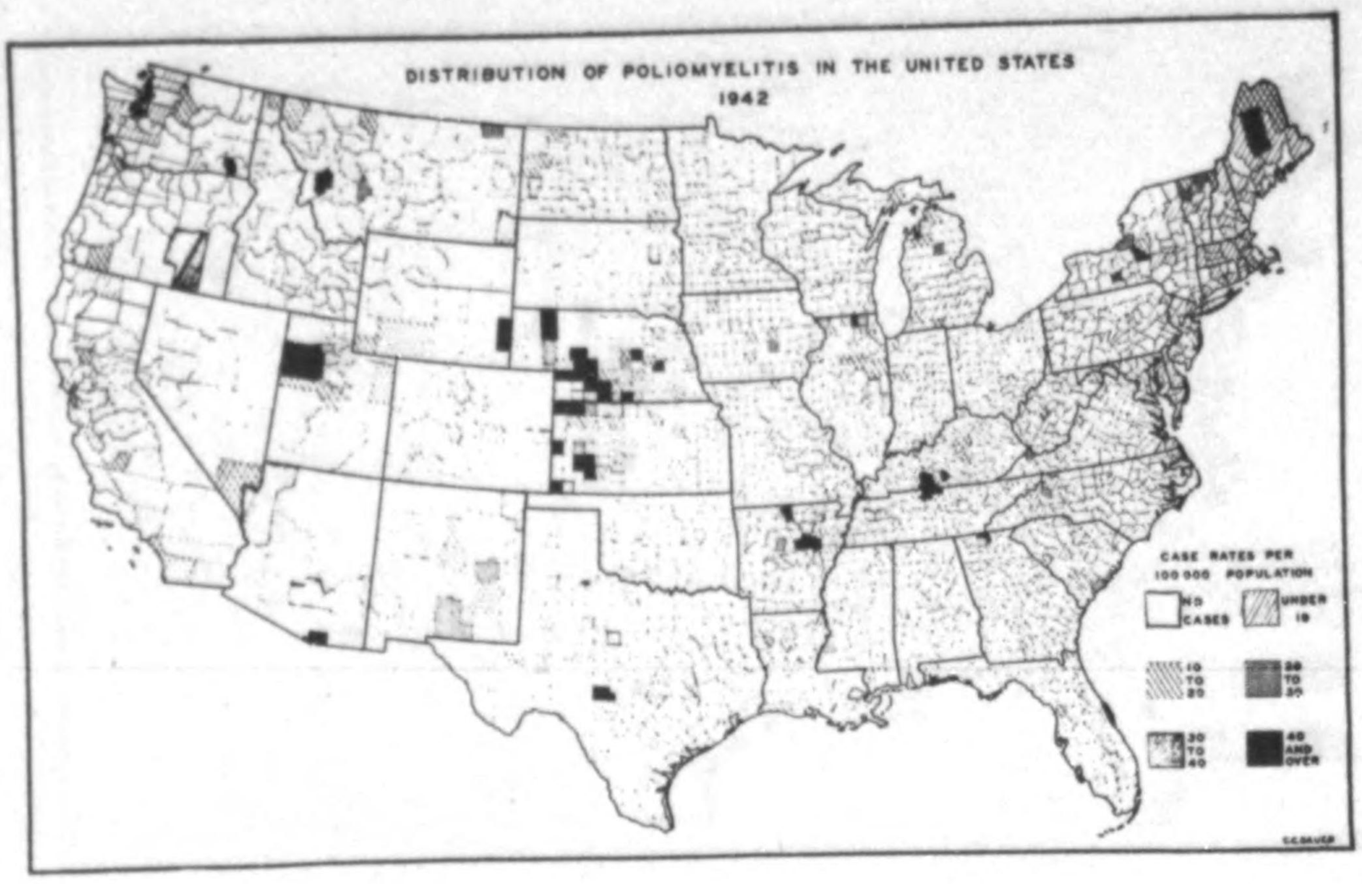
Bizarre as the disease is, there is uniformity in the seasonal pattern. With but slight variation, epidemics begin in the Northern Hemisphere late in May or early June and reach their peak in mid-September.

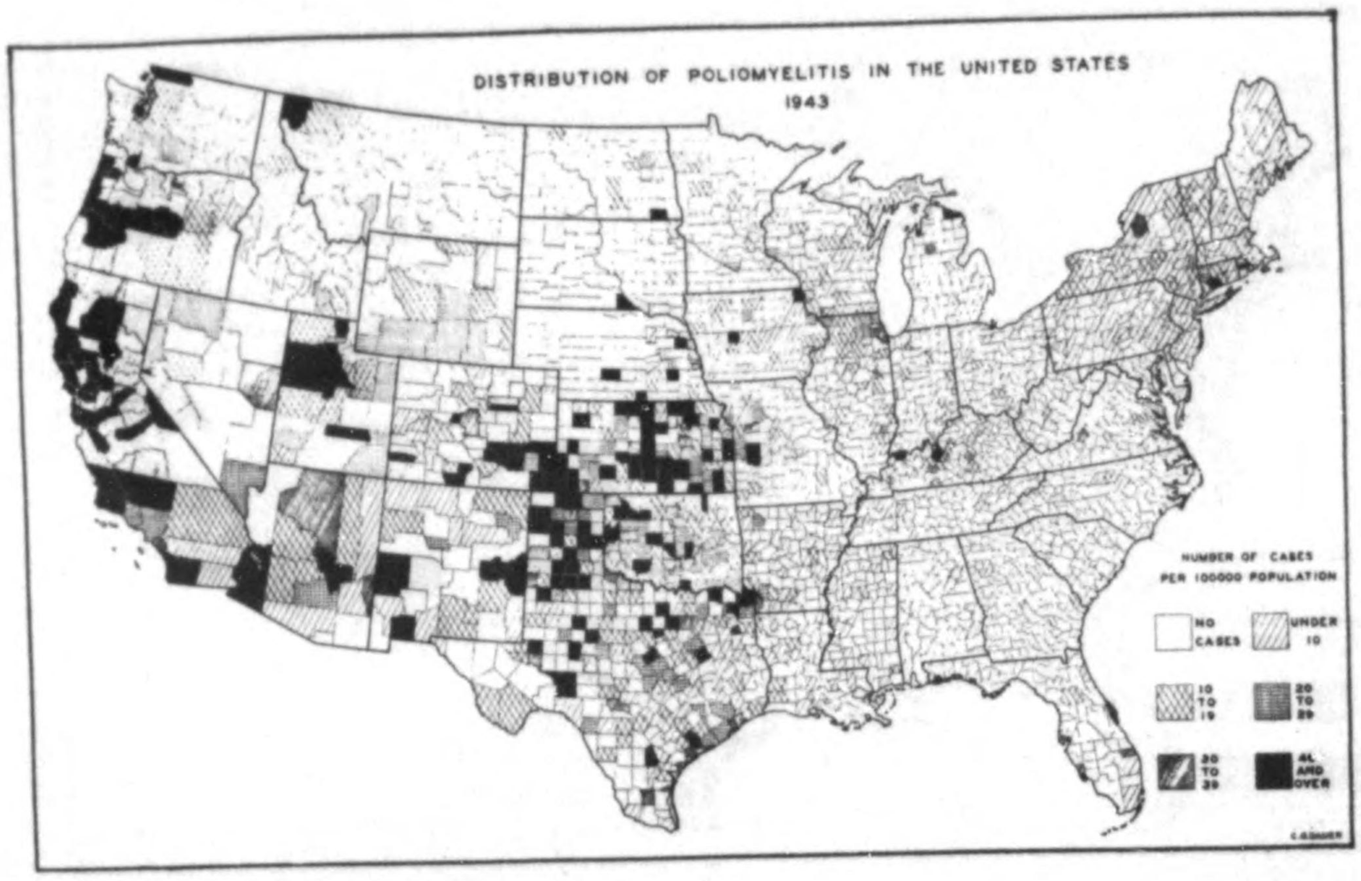
The factors that set off an epidemic are still obscure, nor has it been established why epidemics cease as they do. Careful analysis of available data fails to reveal any regular cyclic trend. The *periodicity* of infantile paralysis is still a matter of conjecture.

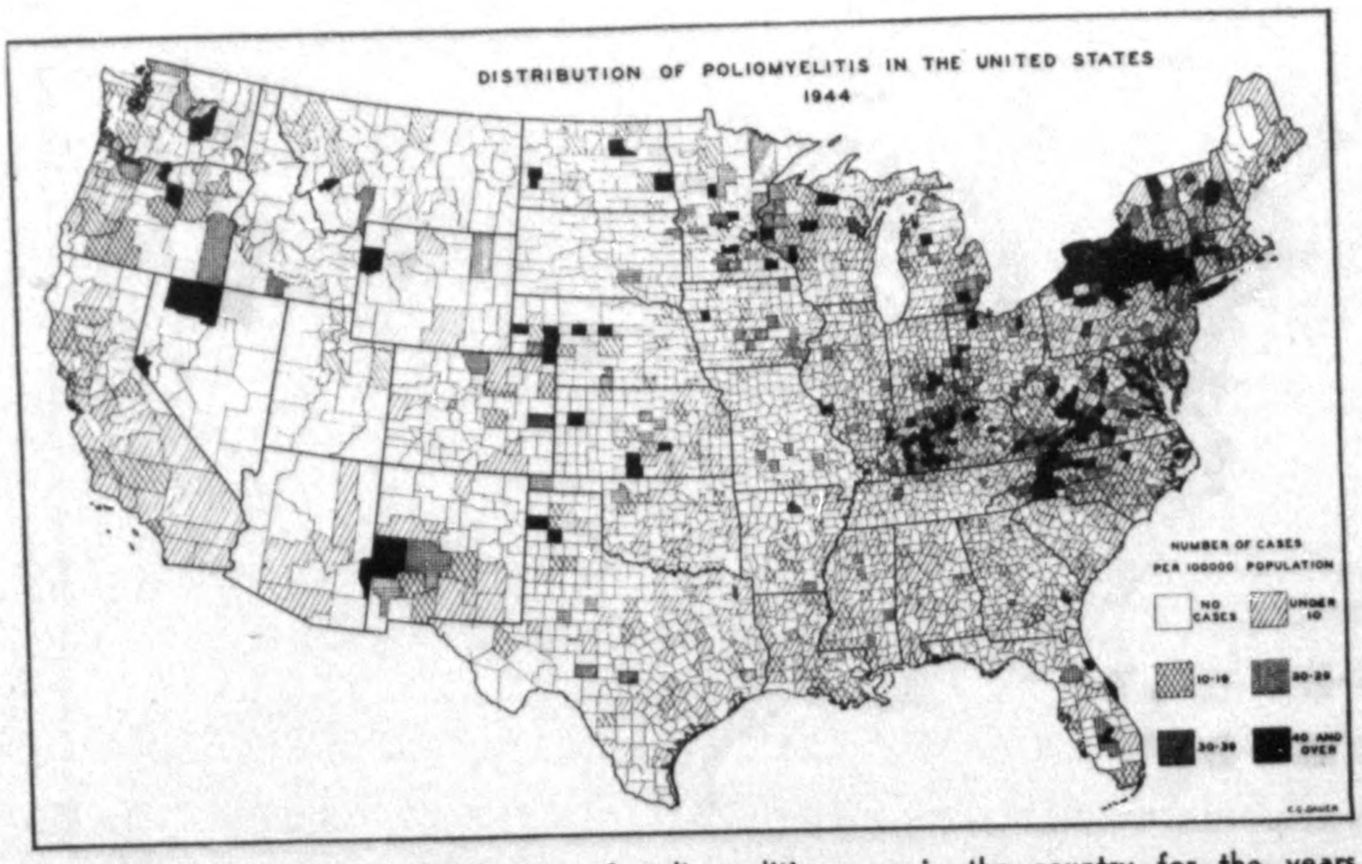
Although we still lack scientific methods of determining the locale of future epidemics, we do have some interesting presumptive evidence. Many observers have theorized that as an epidemic spreads throughout the community, it reduces the number of susceptible individuals to a point where the epidemic can no longer maintain itself. Until a new group of potential victims grow up, which may be from four to six years, that community should be less vulnerable.

Such theorizing is largely conjecture. On the assumption that such reasoning might be correct, however, it would follow that those areas which have not suffered epidemic attacks for a number of years are more vulnerable to disease than those which have had recent epidemics.

There is danger of relying too strongly on this theory. A recently exposed area may be lulled into a feeling of false security. Other areas which have been free from the disease for several years may become unduly alarmed. The safest procedure by far, is for all communities to prepare for epidemics.







THESE MAPS show the distribution of poliomyelitis cases in the country for the years 1942-44. Official figures for 1945 have not been compiled, but 13,514 cases have been recorded provisionally. Rates were highest in eight states and the District of Columbia.

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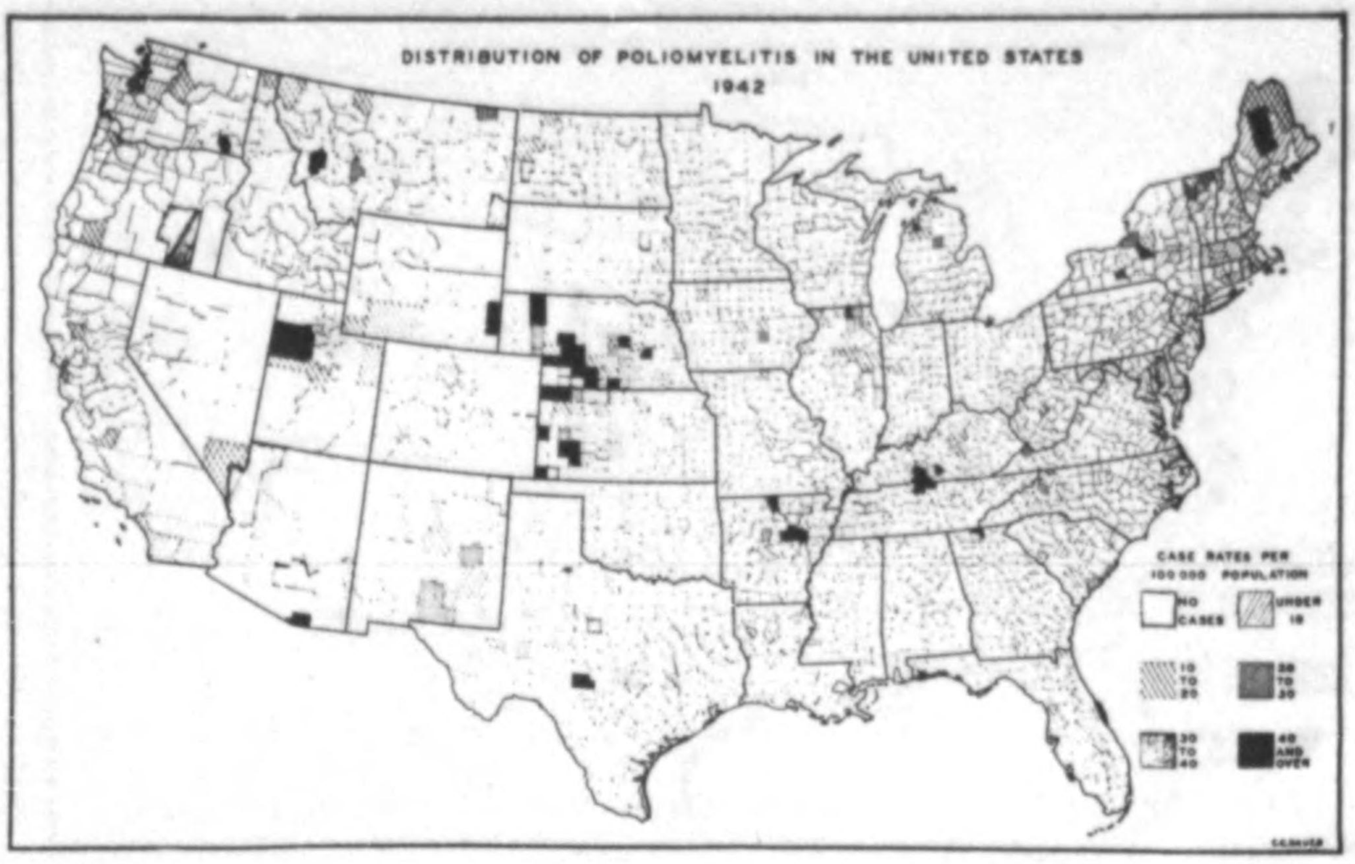

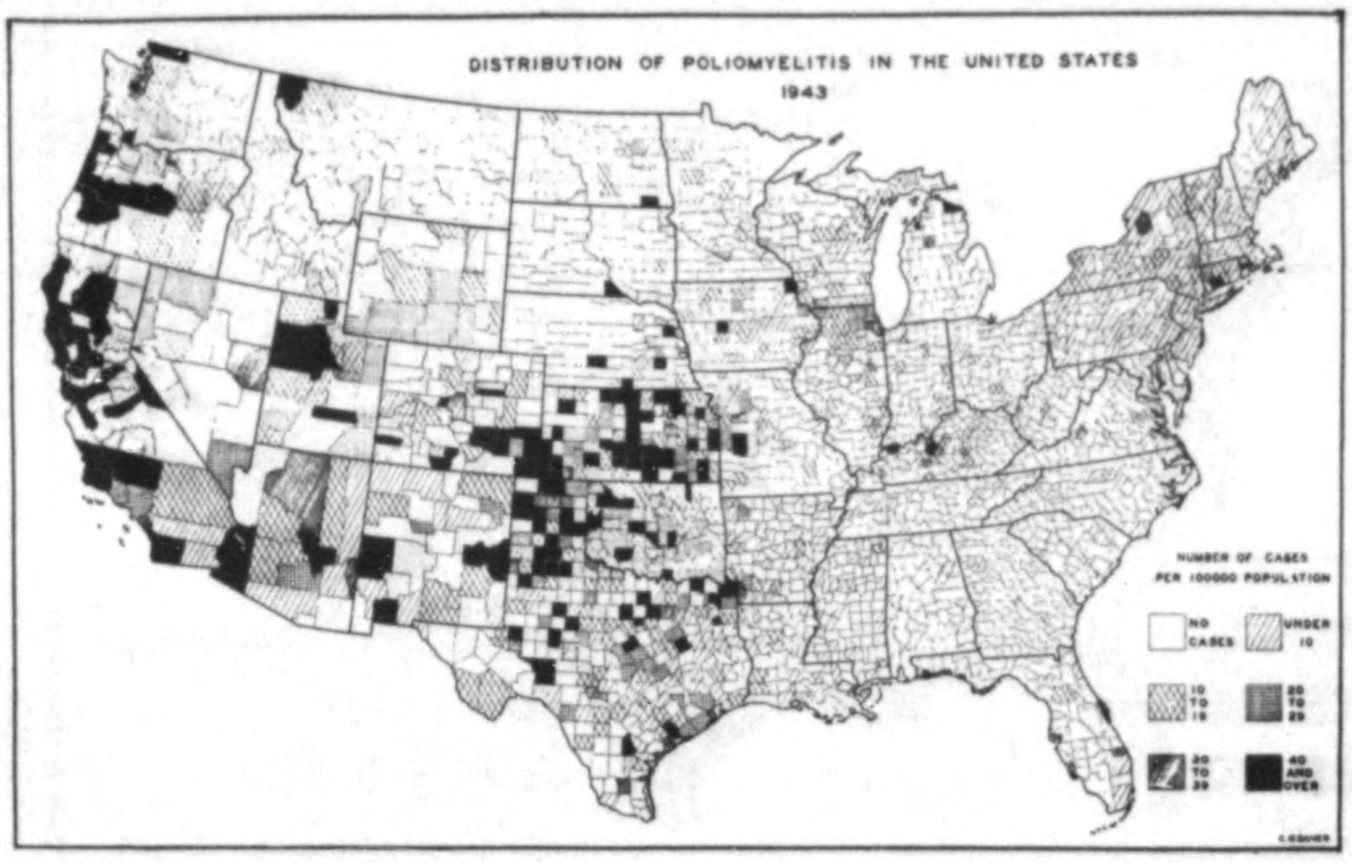

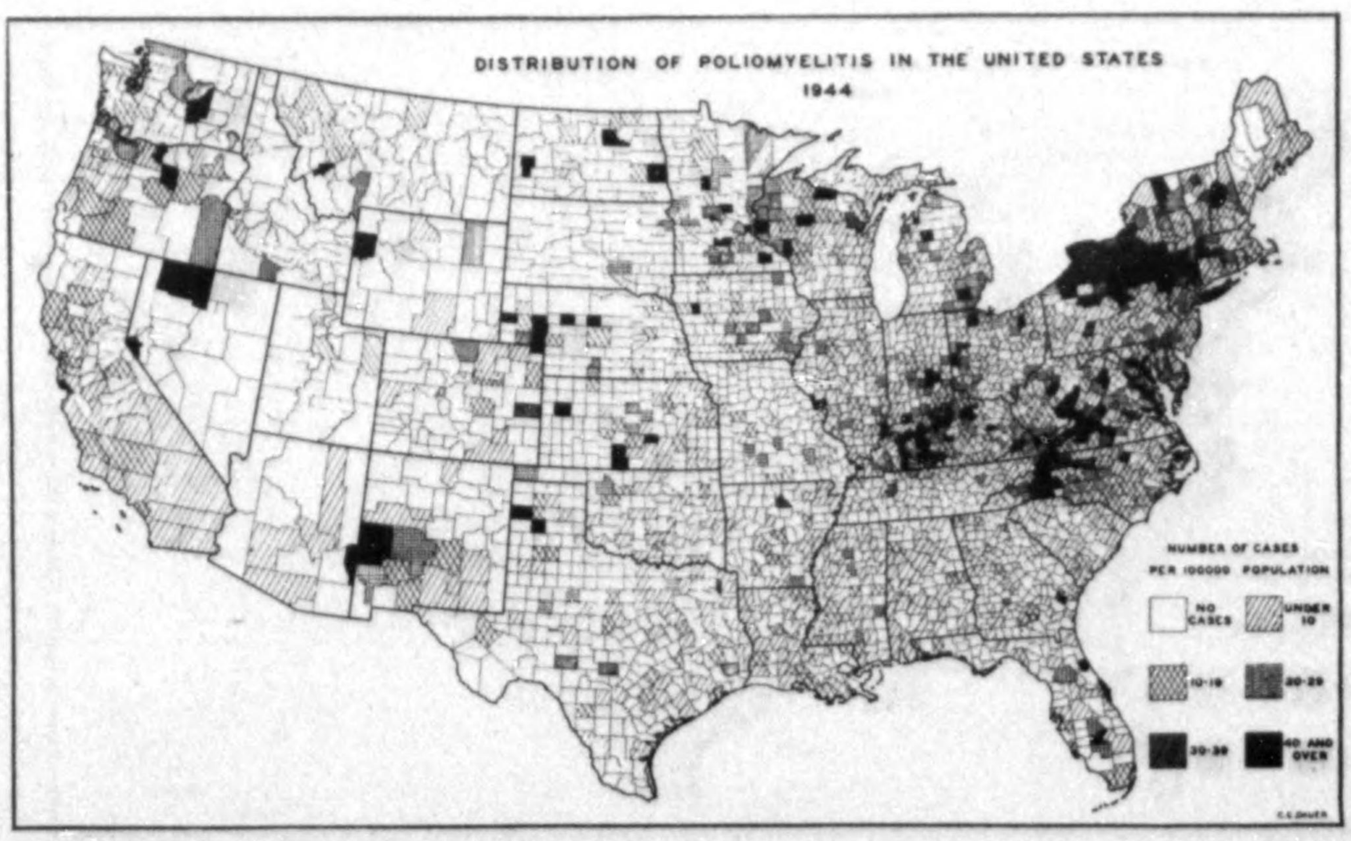

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A GUIDE FOR NURSES

in the

NURSING CARE of PATIENTS with INFANTILE PARALYSIS

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in the NURSING CARE of PATIENTS

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CONTENTS

THIS GUIDE has been prepared primarily to assist the nurse in giving and teaching care of the infantile paralysis patient in the home. Obviously, the same general principles apply regardless of where the care is given. It is assumed that the nursing care is always given under the direction of a physician. The outline is not intended to take the place of postgraduate study, practice or wider reading and preparation on the part of nurses.

We wish to acknowledge our indebtedness to the many workers whose ideas have been incorporated in this material.

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A GUIDE FOR NURSES

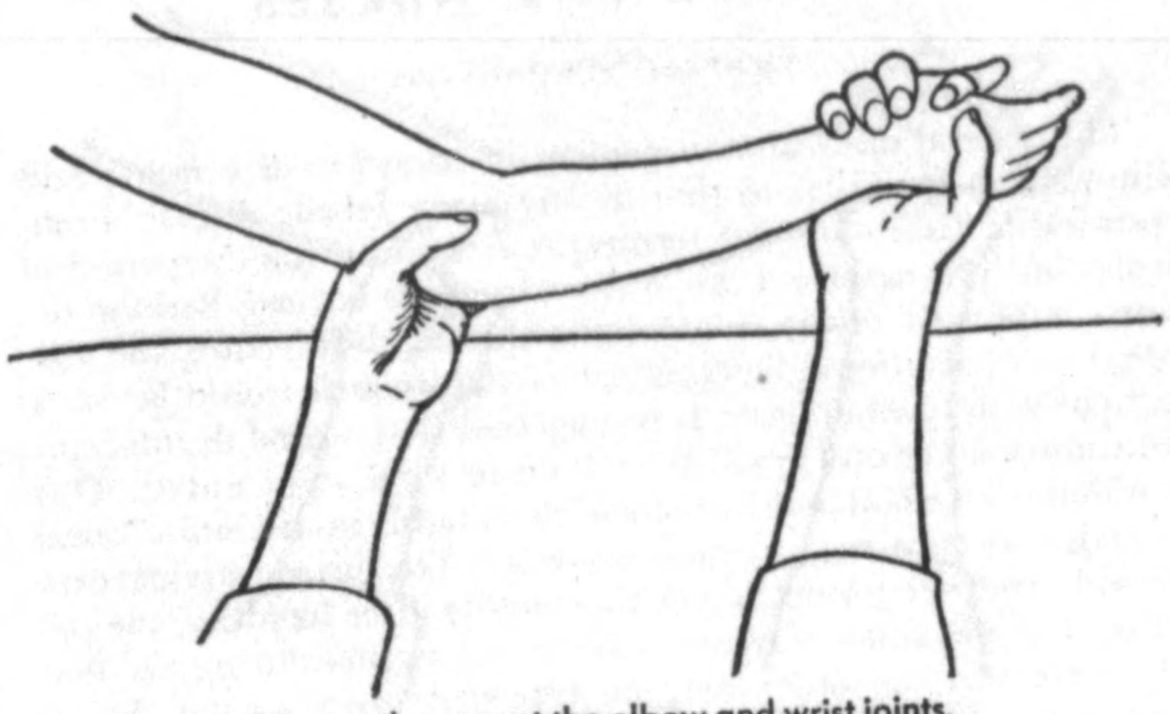
General Nursing Care

The general medical management in regard to diet, fluids, and elimination is similar to that of any acute febrile disease. Communicable disease nursing technique is used during the period of isolation. The nasal and throat discharges are burned. Because the virus is present in the stools, technique of disinfection and disposal of stools should be observed as rigidly as it would be for a patient with typhoid fever. It is suggested that a good disinfectant solution is 6 per cent lysol (8 oz. lysol to 1 gallon of water). This is added to an equal bulk of excreta, thoroughly mixed and allowed to stand for two hours before disposal. The person giving care should always scrub her hands thoroughly after handling the patient. The physician may prescribe an s.s. enema during the first 24 hours and the order may be repeated every second day if necessary.

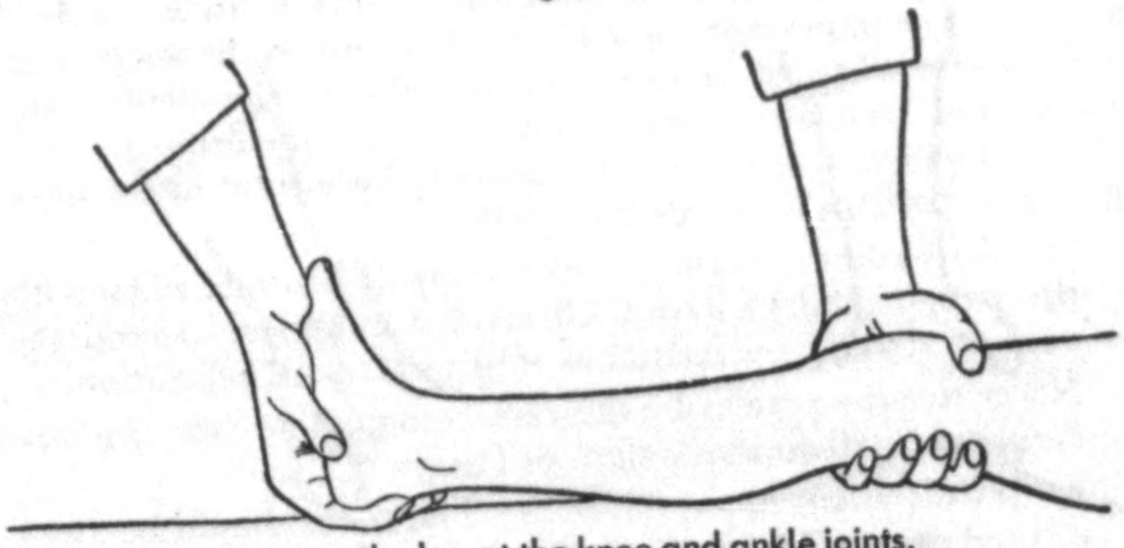
It is understood that all nursing care is given under medical direction. The importance of periodic checkups by the doctor cannot be overemphasized in order to detect the development of any distortion of body alignment or any beginning deformities.

The following suggestions are especially important in the nursing care of patients with infantile paralysis.

1. It is important to maintain an optimistic attitude when with the patient and to have a cheerful atmosphere around the patient, striving for mental as well as physical relaxation.
2. Never tire the patient by the care being given. Stop the care *before* the patient shows signs of fatigue.
3. Keep the patient in a quiet room. The room should be aired but not drafty. The ideal room temperature during the acute illness is 80° Fahrenheit.
4. Always be sure the hands are warm before touching the patient.
5. Warm the bedpan or urinal before giving to the patient.
6. Handle the patient as little as possible. Touching and moving the patient aggravate spasm. Do not raise the patient's head to give him fluids by mouth; give small sips of fluids by spoon.
7. In turning the patient give support to the joints and avoid touching the muscle bellies. (See figs. 1 and 2.)
8. Use an air ring instead of a pillow under the head so as to



Support the arm at the elbow and wrist joints.
Fig. 1

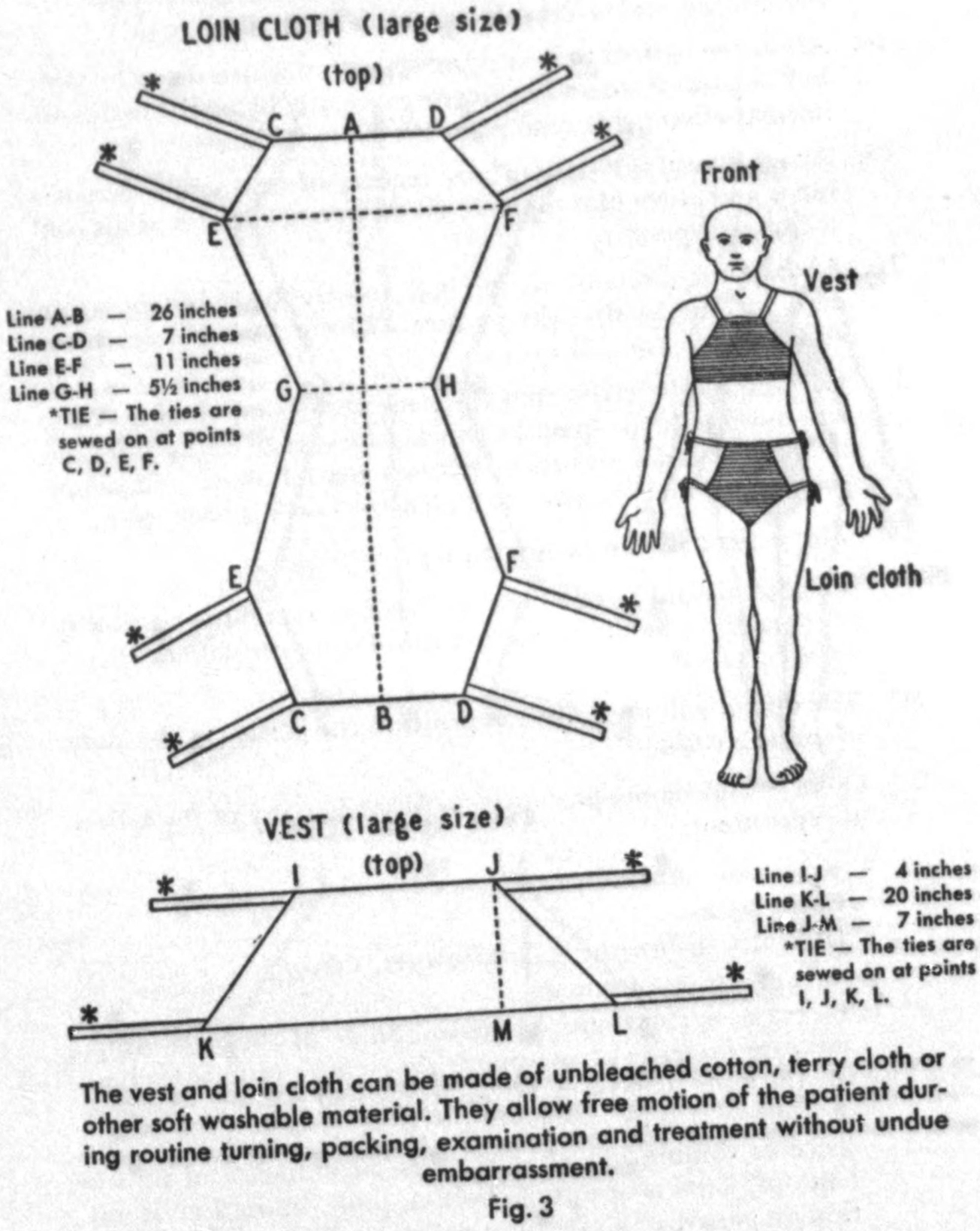


Support the leg at the knee and ankle joints.
Fig. 2

maintain normal alignment if there is difficulty in breathing and swallowing, or if neck muscles are paralyzed.

9. The patient's position should be changed three or four times daily and he should be put in the face-lying position at least twice a day, except when spasm of the diaphragm is present.
10. Omit baths during the stage of painful spasm. Baths are given when the patient can tolerate them. When baths are given, handle the patient gently. Blot up moisture with a towel. Don't rub.

11. Alcohol rubs and massage are not given during the stage of painful spasm.
12. Omit pajamas or nightgowns during the period of severe



The vest and loin cloth can be made of unbleached cotton, terry cloth or other soft washable material. They allow free motion of the patient during routine turning, packing, examination and treatment without undue embarrassment.

Fig. 3

Contributed by Dr. Robert L. Bennett, Warm Springs Foundation, Warm Springs, Georgia.

spasm. While packs are being given it is well for the patient to wear a loin cloth and vest. (See fig. 3.)

13. Tub baths and sun baths generally prove beneficial after the patient has recovered sufficiently to be moved about.
14. Allow the patient to assume any position which is comfortable but as painful spasm is relieved gradually bring the body into normal alignment. (See page 10: Body Alignment.)
15. Avoid giving the patient any feeling of restriction of movement and allow him to move about in bed as freely as his condition will permit.
16. Change the direction of the bed and the bedside table from time to time, so that the patient will not look and reach for things only in one direction.
17. Care should be taken that the patient does not arch his back when using the bedpan. He should be turned on his side, the bedpan placed in position, pillows placed above and below the bedpan and the patient rolled over on his back again.
18. The patient should be given plenty of fluids.
19. The diet should be light and well balanced and the possibility of overweight should be kept in mind since the patient's activity is curtailed.
20. The doctor will prescribe the position the patient is to assume when he is eating.
21. Observe and report promptly to physician any of the following symptoms:
    a. Retention of urine
    b. Constipation
    c. Difficulty in breathing, swallowing, talking
    d. Accumulation of mucus
    e. Increase or recurrence of spasm. Some of the signs which indicate presence of spasm are shortening of muscles causing the body to be pulled from its normal position, presence of abnormal skin creases, sulci or bony prominences, absence or diminution of skin folds, prominence of muscle tendons, flatness of muscle bellies, pain, limitation of motion on passive or active movement, sensitiveness of muscles to touch or pressure.

NURSING CARE OF PATIENTS WITH RESPIRATORY INVOLVEMENT

1. *Difficulty in inspiration* — Rapid, shallow breathing, cyanosis, rigid flat chest, inability to take a deep breath or to hold breath, arms inwardly rotated and held close to the body, exaggerated thoracic cleft, use of the sternocleidomastoid muscles in an attempt to elevate the rib cage. These symptoms indicate spasm of the pectoral muscles or paralysis (or weakness) of the diaphragm or intercostal muscles. Frequently the sternocleidomastoid muscles are in spasm, very often the posterior neck muscles also.
   a. Apply packs to the chest every few minutes until respiration is improved. Packs should be of light-weight wool and covered only with oiled silk to avoid any feeling of excess weight.
   b. When respirations are easier due to relief of severe spasm teach the patient to breath correctly without using his neck muscles.
2. *Difficulty in expiration* — Expanded chest, cleft at level of sixth rib, prominent eyeballs, depression or groove on either side of the lower chest, raised abdomen on exhalation. These signs indicate spasm of the diaphragm.
   a. Apply packs over area of the diaphragm (encircling the body from the xiphoid process of sternum to the umbilicus) every few minutes until respiration is improved.
   b. Turn the patient on his left side with his knees flexed. Place pillows between his legs and support his right arm on a pillow.
   c. Do not put the patient in the face-lying position.
   d. Use rectal tube to relieve distention caused by flatus.
   e. Elevate the head of the bed as a means of easing expiration.
3. *Respiratory difficulty due to bulbar paralysis* — Shallow, irregular breathing, difficulty in talking and swallowing, excessive mucus.
   a. Suction the mucus with a soft rubber catheter.
   b. Raise the foot of the bed and turn the patient's head to the side to encourage postural drainage.
   c. Feed slowly with a spoon. Do not use drinking tube.
   d. Avoid milk since it may thicken mucus, but give fruit juices.
   e. Packs are usually applied to the back and neck. Pressure over the front of the neck should be avoided.

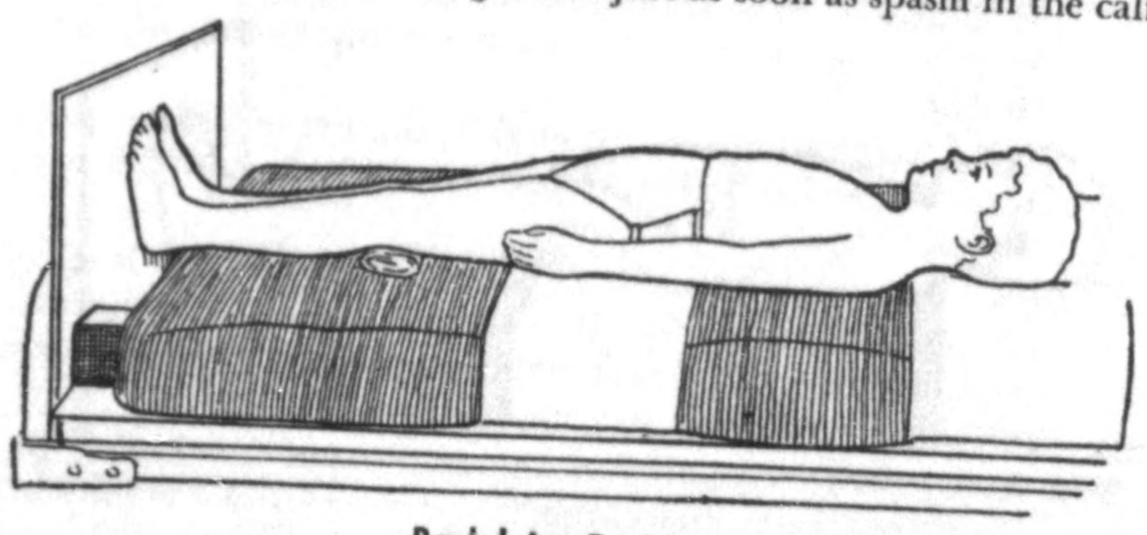
f. Gavaging is usually considered inadvisable as there is danger of aspiration of fluids into the bronchii. Intravenous feeding is usually preferred. Rectal feeding is sometimes used.

(NOTE: Patients with respiratory difficulty should be transferred to a hospital where a respirator can be secured immediately if ordered by the physician.)

BODY ALIGNMENT

1. *Normal alignment in the back-lying position* (See fig. 4)

The patient lies flat on bed, arms at the side, forearms midway between pronation and supination. Place the feet against the footboard to maintain standing reflex just as soon as spasm in the calf

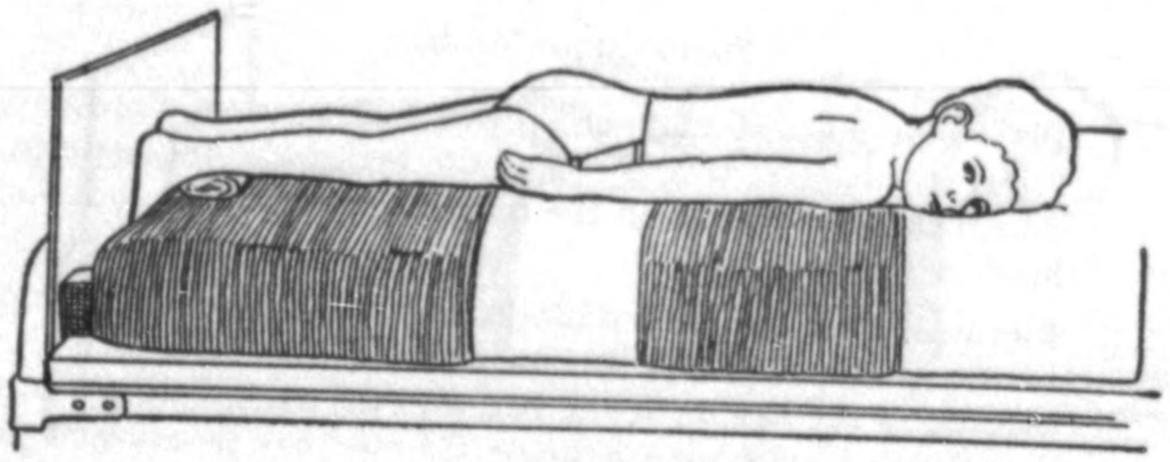


Back-lying Position.
Fig. 4

muscles is released. Do not force the feet against the footboard or spasm may be prolonged. The space between the end of the mattress and the footboard allows the heels to be free from contact with the bed, when the soles of the feet are against the footboard. Folded towels or rolled blankets may be used to prevent external rotation of lower extremities and to support arms and hands in normal position.

2. *Normal alignment in the face-lying position* (See fig. 5)

The patient lies on his face, his feet over the edge of the mattress, and the soles of his feet in contact with the footboard if spasm in calf muscles is relieved. Place folded towel underneath ankles to relieve tension on the knees. Pads made of small folded bath towels may be necessary under the shoulders to maintain normal alignment of the scapulae.



Face-lying Position.
Fig. 5

Routine turning to the face-lying position should be started four to six times a day as soon as possible, even though the patient cannot remain in this position at first longer than ten or fifteen minutes at a time.

3. TEMPORARY *positions which may be assumed for relief of pain*
   a. *Severe spasm in the spinal muscles:*
   Place the patient in the face-lying position. Prop the spine into hyper extended position by placing pillows under the head and shoulders and under the pelvis and thighs; high roll under the ankles to prevent contact of the toes with the bed. The pillows are gradually removed as spasm is released.
   b. *Severe spasm in the abdominal muscles:*
   Place the patient in the back-lying position. The hips and knees are flexed at right angles and are supported on pillows. The pillows are removed one at a time as pain, discomfort and muscle shortening are decreased.
   c. *Spasm in the diaphragm:*
   Turn the patient on his left side with his knees flexed. Place pillows between legs and support right arm on pillow. Do *not* put the patient in the face-lying position.
   d. *Spasm in the hamstrings:*
   Use a pad under the knees in the back-lying position, a pad under the ankles in the face-lying position.

These are temporary positions and normal body alignment should be gradually attained as the spasm disappears.

Preparation of Bed

1. Place a large board made of 3-ply or 5-plywood, or 3 ordinary "fracture" boards, lengthwise of the bed under the mattress. The board should rest on the metal supports at the foot and head of the bed.
2. Elevate the bed on wooden blocks to prevent back strain of the person giving care. The height of the blocks used varies according to the height of the bed and the attendant. Usually 8x8x8-inch blocks are adequate. Casters may be attached to the under surface of the blocks so that the bed may be moved easily.
3. Use a firm mattress.
4. Place the footboard on the metal supports at the foot of the bed. The board should be ½ to 1 inch thick, as long as the width of the bed, and high enough to extend at least 15 inches above the top of the mattress.
5. Insert two 4-inch blocks of wood between the end of the mattress and the footboard at the corners of the bed to maintain space between the mattress and the footboard. If the patient is a small child the blocks should be smaller.
   Substitutes: bricks, books, boxes.
6. Protect the mattress with a rubber sheet.
   Substitutes: oil cloth, raincoat cut to lie flat and smooth, processed rubber, bed pad, newspaper, duck, tarpaulin, and other water resistant materials.
7. Make the bed with blankets instead of sheets. Patient should lie between blankets since they absorb moisture and prevent chilling. Cold sheets may aggravate spasm.
8. A piece of blanket should be placed under the patient's heels when they are in the trough between the end of the mattress and the footboard, in order to prevent air from coming up from the floor in this space. The piece of blanket is placed over the footboard, across the trough (loosely) and under the patient's legs below the knees. The sides of the blanket can then be tucked under the mattress on either side.
9. Use two draw sheets. Place the first one over the rubber sheeting and the underneath blanket. This will avoid skin irritation and will save the underblanket from too frequent wash-

ing. The second draw sheet is placed under the head to avoid irritation of the patient's face by the blanket.

10. Drape and pin the bed covering over the footboard to prevent the bed clothes from touching the painful limbs. If adequate protection is not obtained in this way, use a cradle.
11. Place a slip cover over the headboard of the bed to prevent drafts.
12. Do not put a pillow under the patient's head.

Hot Packs

Hot packs are always prescribed and ordered discontinued by the physician. The prescription should indicate areas to be packed and the frequency of application. In the early stage of the disease the packs may be changed every few minutes, particularly if there is severe spasm of either the respiratory or spinal muscles, or both. During the first 24 to 48 hours of acute spasm, the handling of the patient should be reduced to a minimum. It is suggested that the packs be *laid on* rather than wrapped around the body segments. The patient remains in the back-lying or face-lying position, depending on where the muscle spasm is. During this phase of the acute stage six to nine full or lay on packs in 24 hours may be ordered.

Avoid tiring the patient by overpacking. During the first few days if the patient is critically ill, only the muscles of breathing, swallowing and of the spine are packed. After painful spasm has subsided the packs are usually changed less often during the day, gradually increasing the interval between the packs as indicated by the condition of the patient, and are not applied during the night. If too few packs are given, recurrence of spasm or increase in spasticity may be noted. Packs for a specific area are discontinued when spasm has been completely released and full range of motion is possible. Except in very mild cases, a minimum of five to seven weeks of intensive packing is generally indicated.

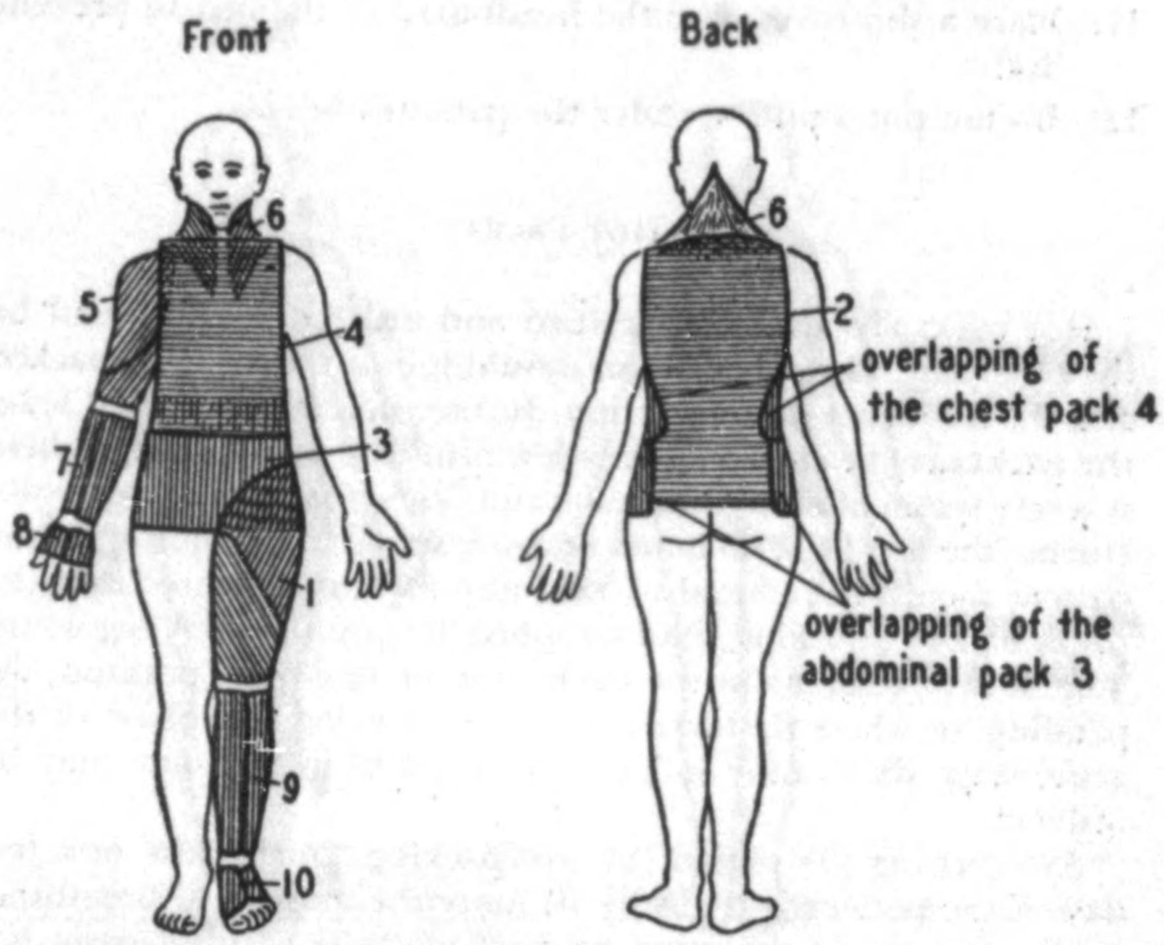
1. Purpose

a. To relieve pain and spasm in the affected muscles.
b. To improve the circulation and metabolism locally and in general.

2. Areas of body to which packs are applied

a. *Full pack:* (See fig. 6)

thigh	abdomen	shoulder	forearm	lower leg
back	chest	neck	hand	foot



(1) Thigh (2) Back (3) Abdomen (4) Chest (5) Shoulder (6) neck (7) Forearm (8) Hand (9) Lower Leg (10) Foot

The elbow, wrist, knee and ankle joints are not covered by the packs so that there may be no restriction of joint motion.

Fig. 6

b. *Prone back:* (face-lying)

Posterior surface of neck and back
Posterior surface of thighs
Posterior surface of lower legs
Plantar surface of feet

3. Materials for the packs

a. *Inside pack*—60 to 100 per cent wool.

b. *Middle pack*—Waterproof material. Oiled silk is desirable but other materials may be used, such as shower curtains, baby crib sheeting, processed rubber, cellophane, waxed paper (several layers are needed of the last two).

c. *Outside pack*—Same as inside is desirable, but other materials may be used, such as cotton blankets, outing flannel, old coats, suits, skirts.

4. Cost of materials

A blanket, 72x84 inches, 75 to 80 per cent wool, costs $7 to $10, depending on looseness of weave and quality of wool. The amount of shrinkage depends on the weave and wool content. Material with 100 per cent wool content, 36 inches wide, varies in price and amount of shrinkage; the average price is about $2 a yard.

5. Sources from which materials may be obtained

The National Foundation for Infantile Paralysis, 120 Broadway, New York 5, N. Y., can supply wool when the needs cannot be met locally.

Used blankets and substitute waterproofing may also be solicited through the newspapers and over the radio. Local Chapters of the National Foundation for Infantile Paralysis and other organizations are able to help solicit and collect materials.

Oiled silk usually comes in 36-inch width, costs about $1.50 a yard. Oiled silk and other suitable water-impervious material may be purchased from any surgical supply house.

6. Methods of measuring and cutting the packs

(See figs. 7, 8, 9, 10, 11 and 12)

a. *General directions:*

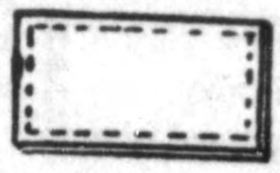
The inner and outer packs to be firm should be cut on the straight of the material, not on the bias. The same pattern used for the outer packs may be used for the waterproof material. If blankets are used, binding should be removed before cutting. If old blankets are used, areas darned with cotton should be discarded.

b. *Amounts of material needed for a complete set of packs:*

	72x84-inch blanket		36-inch woolen material		36-inch waterproof material
	Outer	Inner	Outer	Inner	Middle
Medium-sized adult	¾	1⅓	4 yds.	8 yds.	4 yds.
12-yr. old child.....	½	¾	3⅓ yds.	6 yds.	3⅓ yds.
5-yr. old child.....	⅓	½	2⅓ yds.	4 yds.	2⅓ yds.

c. *Diagrams for cutting the packs:*

Figures 12a, b, c, d show the patterns for a complete set of packs for medium-sized adult cut from standard size blankets (72x84 inches) and 36-inch material, placed to conserve material. Allowance for shrinkage of the inner packs has been made. Measurements for the inner packs allow for double thickness since additional heat is obtained in this way. After the inner packs have been cut out, stitching together the two layers all around the outer edges (see diagram) will make the packs easier to handle.



d. *How to measure patients for packs:*

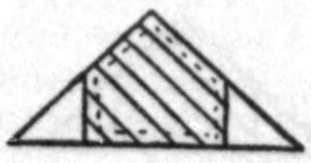
Inner packs are of double thickness.

Middle and outer packs are of single thickness.

(See Figures 12a, b, c, d for placing of packs on material)

e. *A variation of the inner packs:*

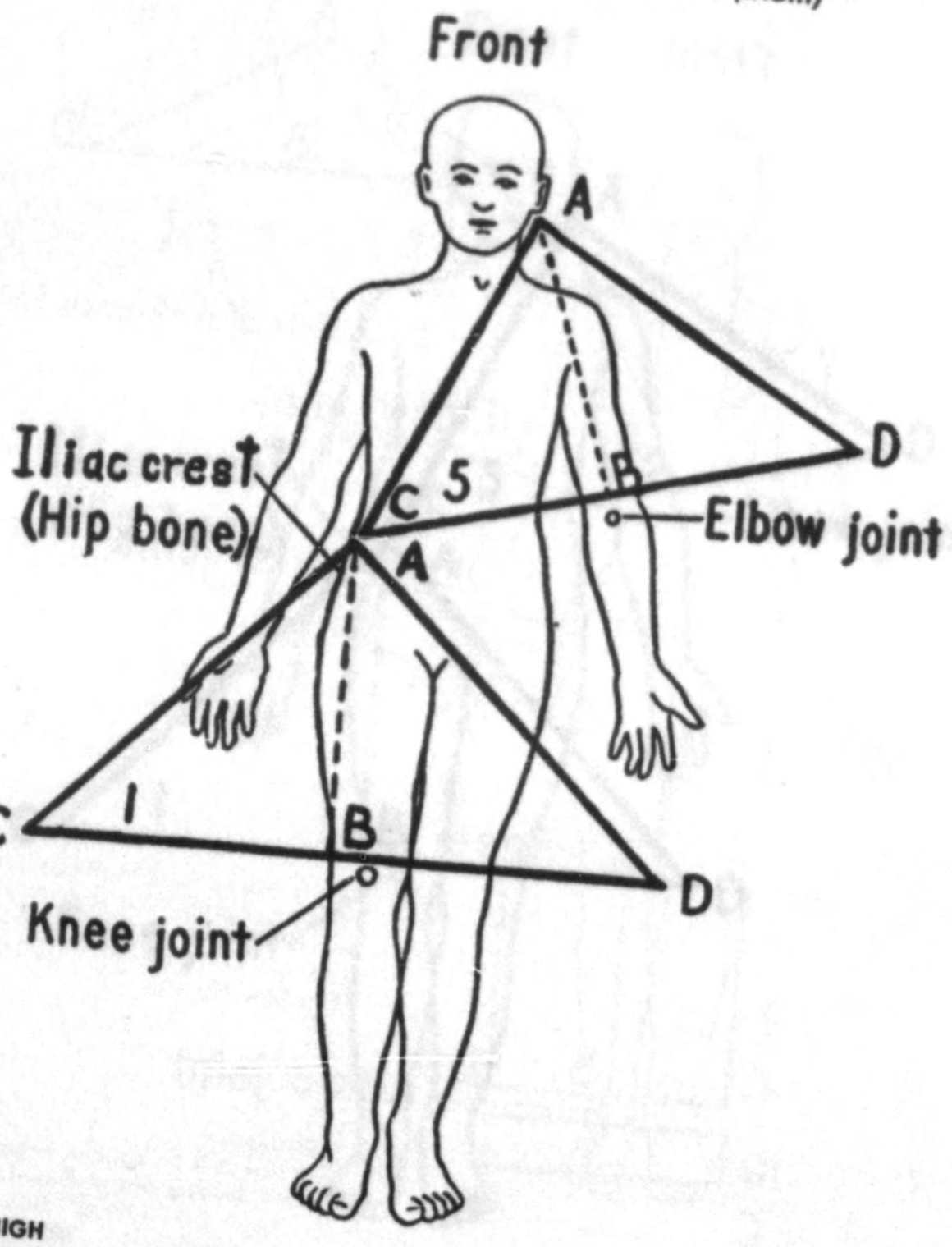
These can be made of one thickness of material with a reinforcement of double thickness stitched into the middle of the pack leaving the ends of single thickness. This method will give the additional thickness for heat where it is needed but will eliminate bulkiness at the ends of the pack. Illustrations are given as follows:



In the triangular pack

In the rectangular pack

Line A-B — the vertical measurement (length)
Line C-D — the horizontal measurement (width)

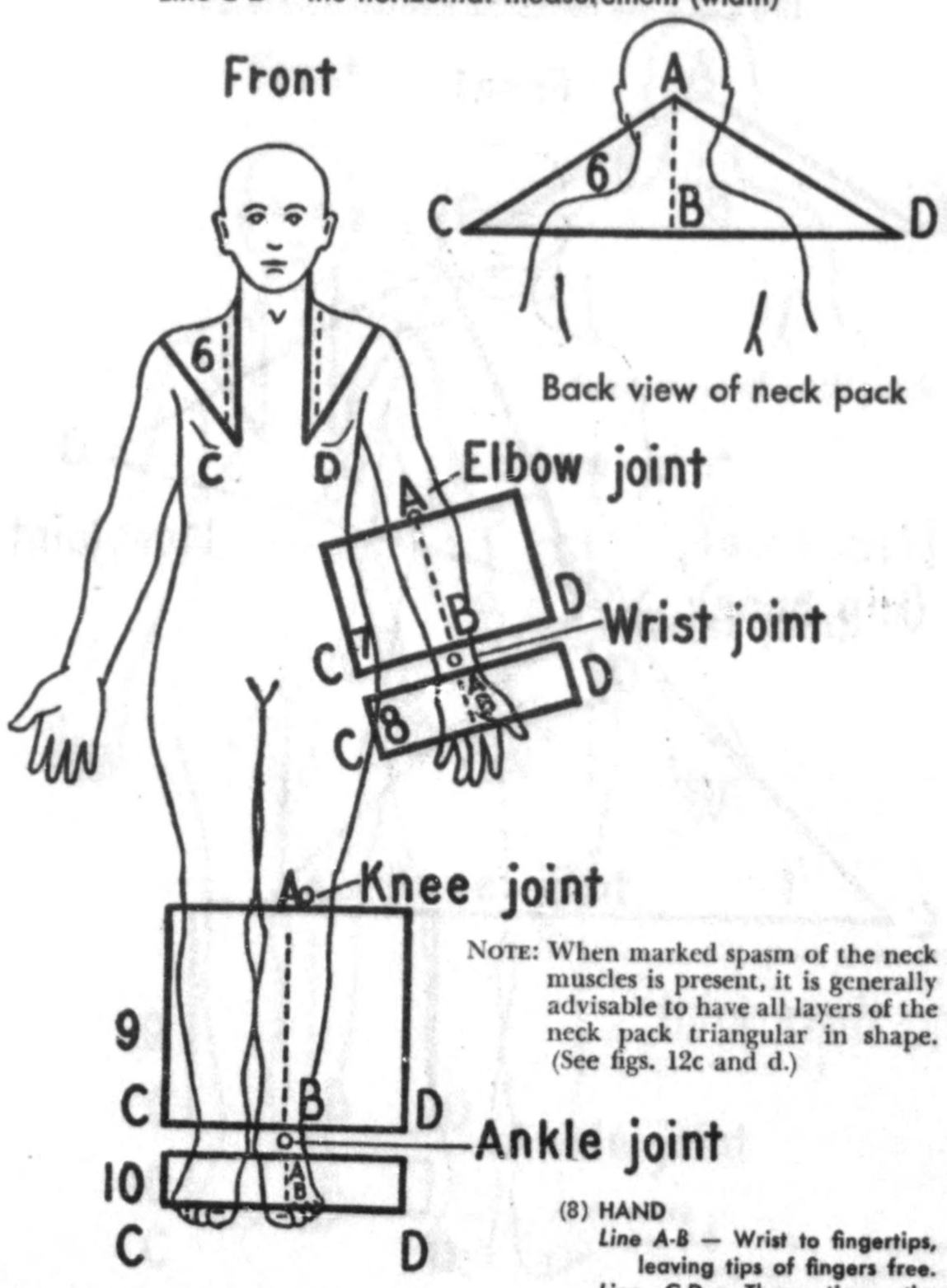


(1) THIGH
Line A-B — 3 inches above highest point of crest of ilium to knee.
Line C-D — two times the length of Line A-B.

(5) SHOULDER
Line A-B — mastoid process to olecranon of elbow.
Line C-D — two times length of line A-B.

Fig. 7

Line A-B — the vertical measurement (length)
Line C-D — the horizontal measurement (width)



NOTE: When marked spasm of the neck muscles is present, it is generally advisable to have all layers of the neck pack triangular in shape. (See figs. 12c and d.)

(6) NECK (triangular pack)
Line A-B — Base of occiput to 2 inches below 7th cervical vertebra ("collar button").
Line C-D — Around back of neck from one nipple to the other.

(7) FOREARM
Line A-B — Elbow to wrist.
Line C-D — Same as length plus four inches.

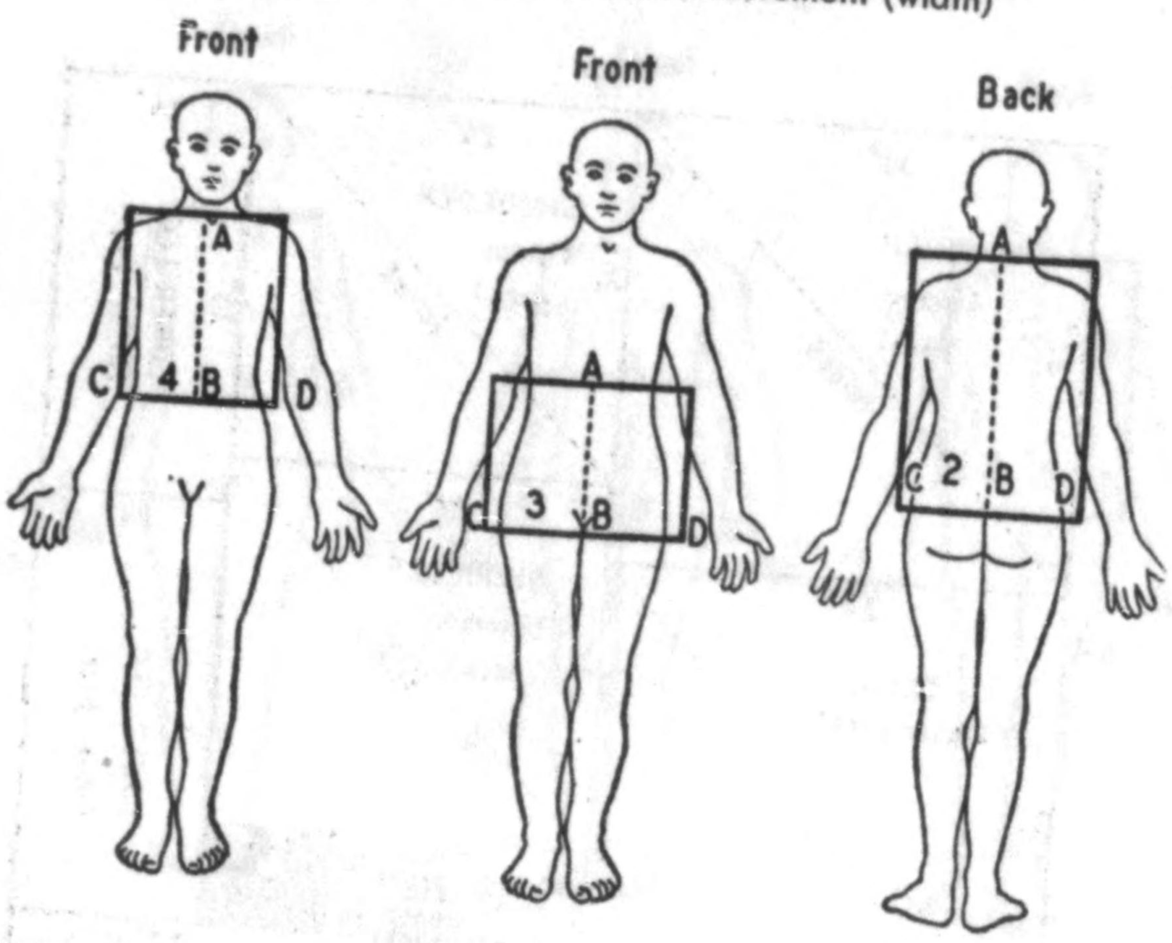
(8) HAND
Line A-B — Wrist to fingertips, leaving tips of fingers free.
Line C-D — Three times the length.

(9) LOWER LEG
Line A-B — Knee to heel.
Line C-D — Same as length plus four inches.

(10) FOOT
Line A-B — Heel to toes, leaving tips of toes free.
Line C-D — Three times the length.

Fig. 8

Line A-B — the vertical measurement (length)
Line C-D — the horizontal measurement (width)



(4) CHEST
Line A-B — Clavicle to umbilicus.
Line C-D — Width of chest plus 4 inches.

Fig. 9

(3) ABDOMEN
Line A-B — Lowest rib to pubis.
Line C-D — Width of abdomen plus 4 inches.

Fig. 10

(2) BACK
Line A-B — 7th cervical vertebra ("collar button") to gluteal fold.
Line C-D — Width of back plus 4 inches.

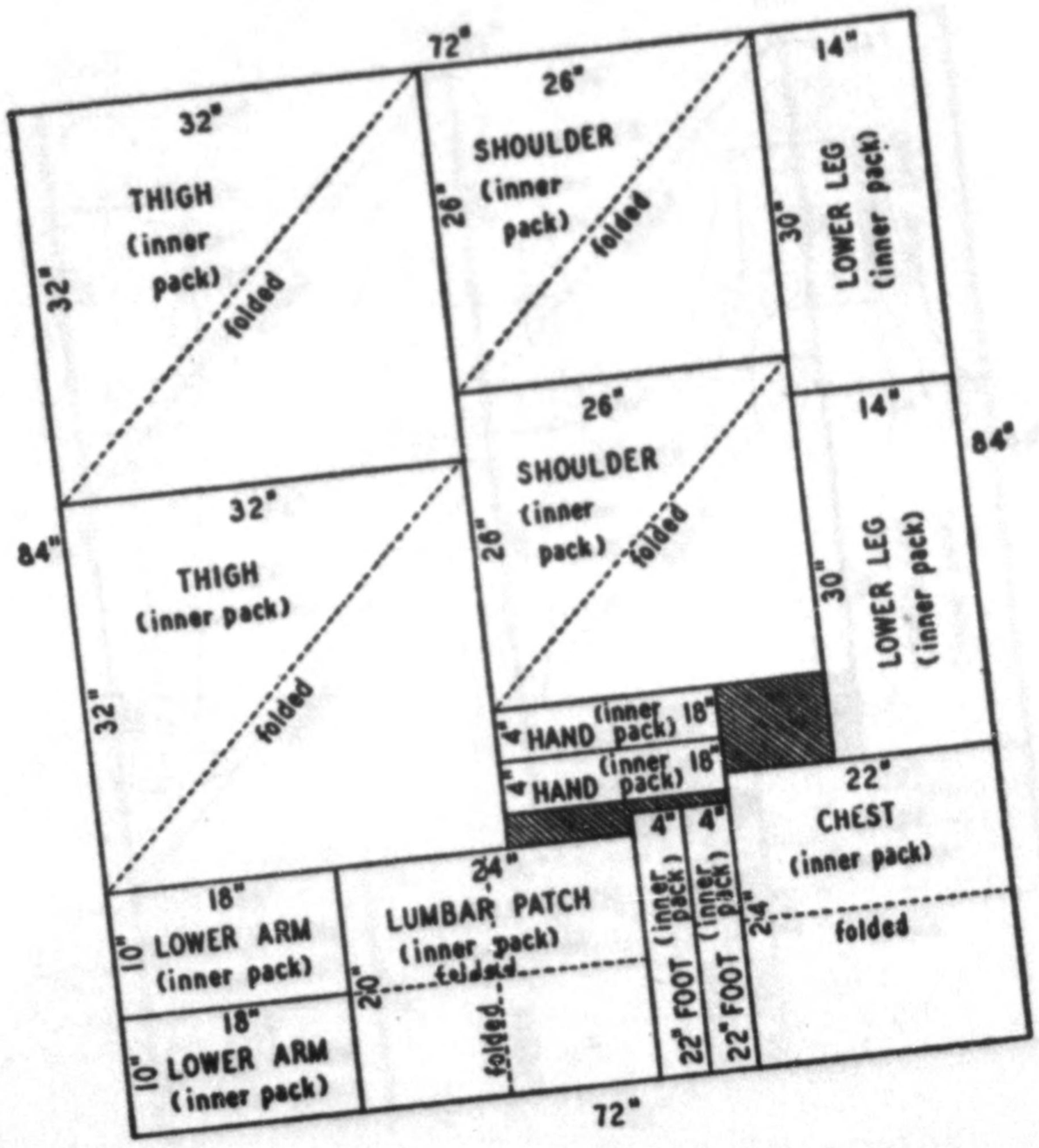
Fig. 11

Note: Sides of abdominal and chest packs overlap the sides of back pack.

Lumbar patch *Line A-B* — from lowest rib to coccyx
(See figs. 12a and d.)
Line C-D — width of back
This patch gives additional heat for severe spasm in this area

Neck (rectangular pack) *Line A-B* — around back of neck from one nipple to the other.
(See figs. 8, 12b and d.)
Line C-D — 1/4 of the length.

The patterns for a complete set of packs from standard size blankets, placed to conserve material.



Standard size blanket 72x84 inches

Medium adult size packs — complete set

Inner pack 1⅓ blankets

Outer pack ¾ blanket

Fig. 12a

The patterns for a complete set of packs from standard size blankets. *(Continued)*

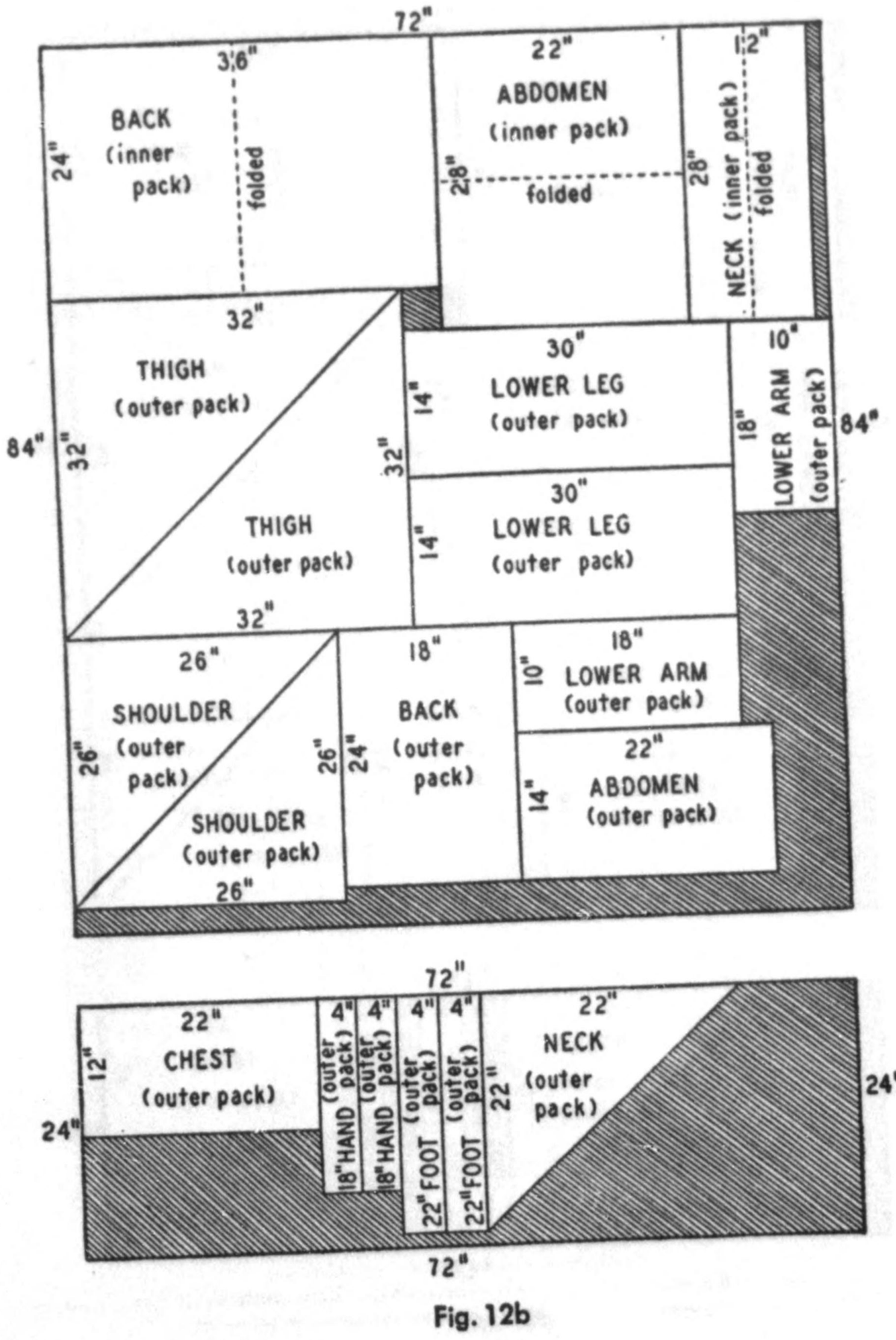
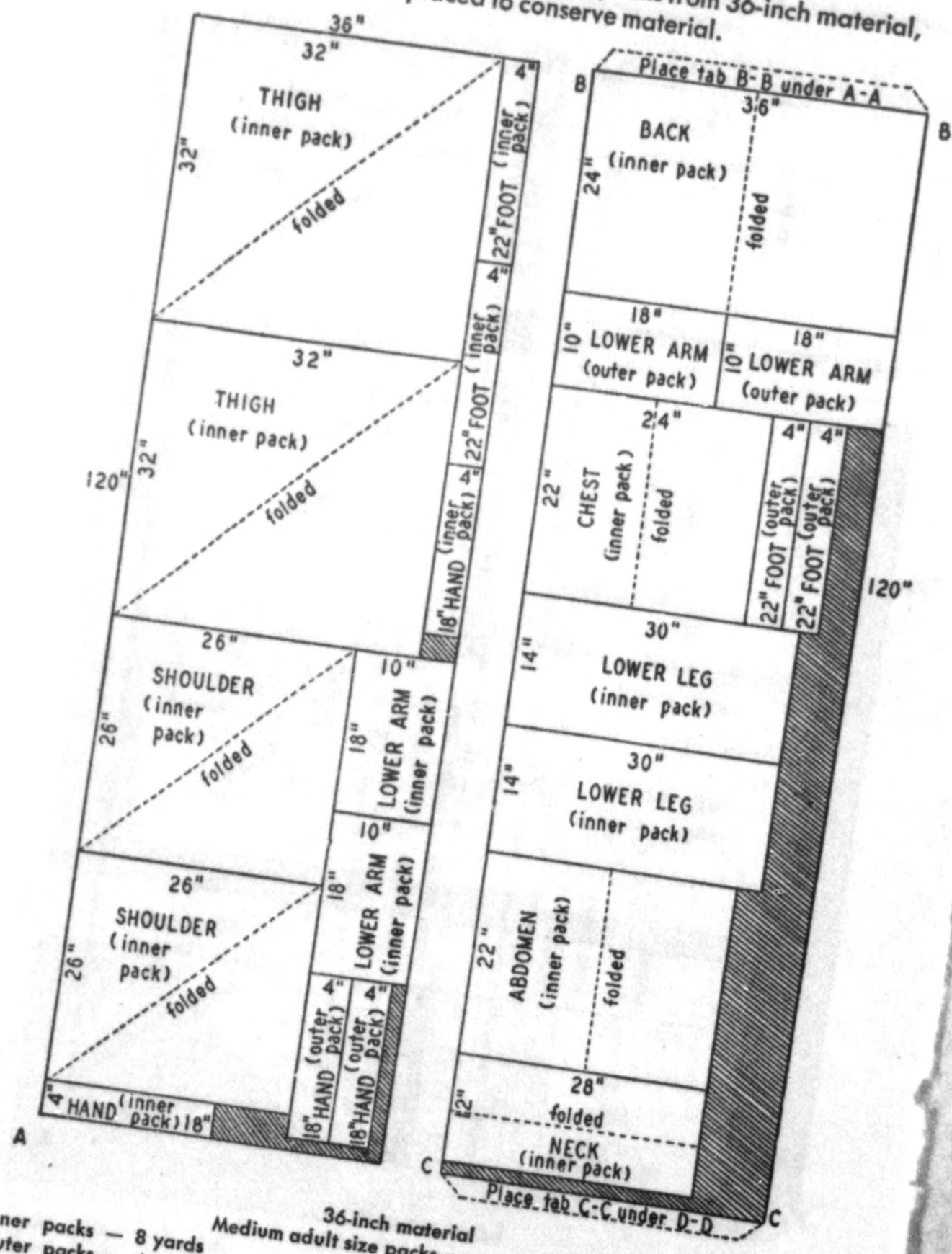


Fig. 12b

The patterns for a complete set of packs from 36-inch material, placed to conserve material.



Inner packs — 8 yards
Outer packs — 4 yards

36-inch material
Medium adult size packs — complete set
Middle packs — same patterns as outer pack — 4 yards (waterproof material)

Fig. 12c

The patterns for a complete set of packs from 36-inch material, placed to conserve material. *(Continued)*

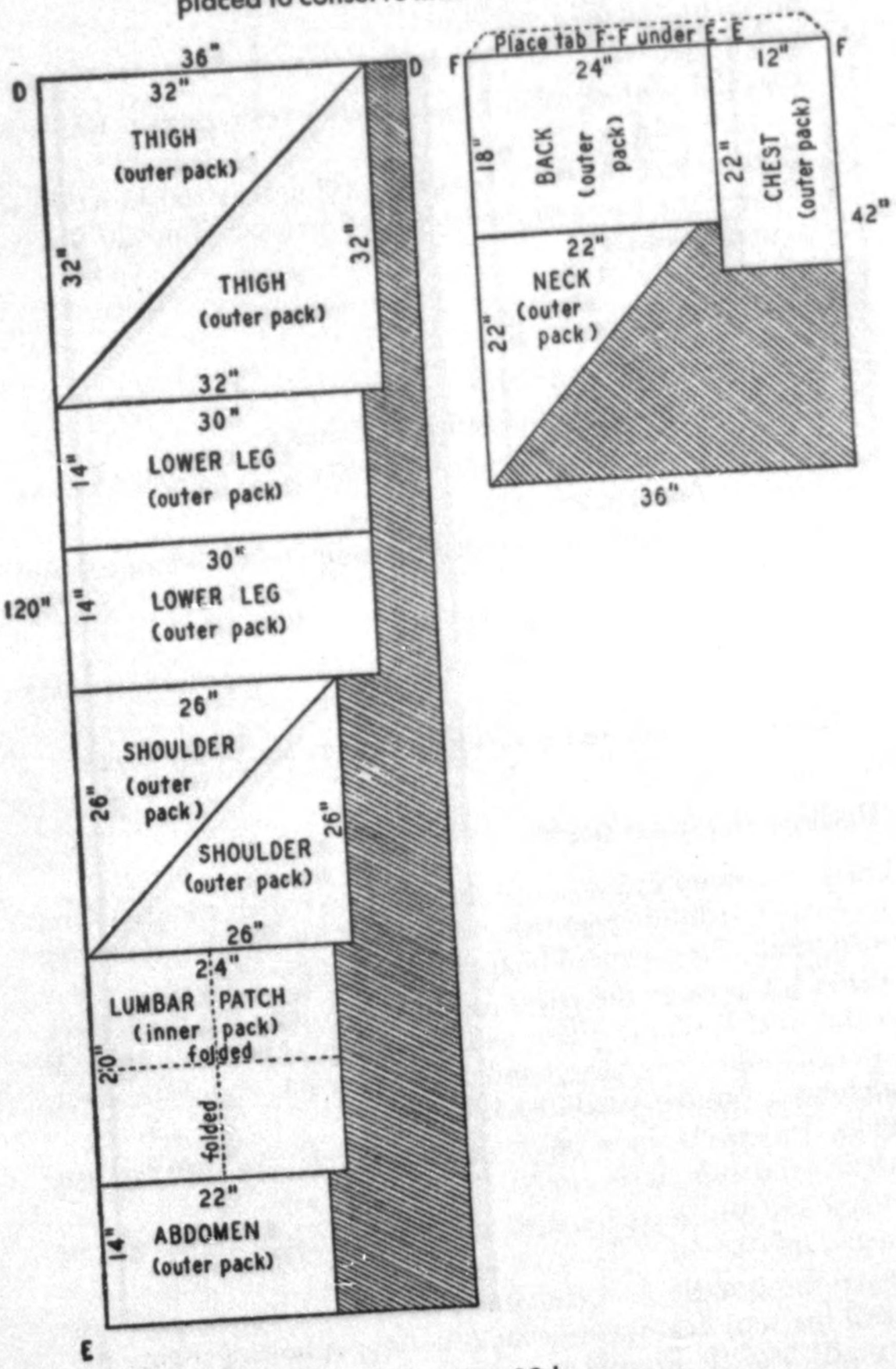


Fig. 12d

7. Equipment needed for application of packs

Stove, hot plate or sterilizer
Wash boiler
Covered pail or other large covered container in which to boil packs
Rubber sheet or other heat conserving material in which to carry the packs to the bedside if wringer is not in the patient's room

At the bedside:

Wringer—electric or hand
Bench or low table for pail and wringer
Long-handled forceps, tongs or forks with rounded prongs
3 dozen 2-inch safety pins
Abdominal and chest binders to hold chest, abdominal and back packs in place
Loin cloth and vest (see fig. 3)
Brassiere, halter or gauze squares to cover nipples of woman patient
Rolls for ankles and pads for shoulders for prone packs

8. Heating the inner packs

There are many variations of the order in which the packs can be applied. The following order is suggested for minimum moving of the patient and for speed of application of the packs.

a. Fold and arrange the packs as follows so that the thigh pack which will be applied first will be on top when the bundle is opened: foot, lower leg, hand, forearm, neck, shoulder, chest, abdomen, lumbar patch, back, thigh.
b. Place the packs in a large turkish towel. (*Substitutes:* unbleached cotton, terry cloth.)
Wrap and pin securely with a safety pin large enough to be easily unfastened.
Place the bundle in a container, cover with water, and heat until the water throughout the container is boiling vigorously. Usually 5 to 10 minutes are required for a full pack.

If more than one patient is having packs, a means of identification of each patient's bundle of packs should be used, such as a cloth label sewn onto the outside wrapper with the patient's name written on the label in indelible ink.

(There are a number of hot-pack machines on the market. These serve as time and labor saving devices.)

9. Application of the full pack

a. *Essential principles to be observed in applying the packs:*

Although individual nurses may vary in the techniques of applying packs, the following essential principles should be observed:

Test the wringer for tightness before beginning the application of the packs.

Be sure there are no wet spots left in the pack since wet spots cause burns.

Run each pack through a tight wringer twice.

Apply the packs as hot as the patient can stand them. "Get a squirm without a burn." If the pack is too hot, lift it quickly and blot up any excess moisture on the skin before reapplying the pack. In treating children, tolerance to heat should be built up gradually in the first applications, to prevent a fear reaction by the child.

Be sure that the pack covers the entire muscle but does not cover the elbow, wrist, knee and ankle joints. Fit the packs to the contour of the parts as gaps will allow air to enter.

Make sure the patient has no sense of restriction of joint motion. There should be no interference with respiration, circulation or movement but the packs should be on firmly enough so that they will not slide off. Check the packs regularly to see that they have not slipped or pulled loose.

b. *Preparation of the patient:*

The patient wears only a loin cloth and lies on his back on the blanket which covers the bed.

Place the abdominal and chest binders in position under the patient ready for pinning after the packs are applied.

Place the outer and middle packs conveniently near the patient with the waterproofing on top of the outer pack.

Remove any excess lint left on the body from the previous pack.

Sometimes the doctor prescribes salt tablets for the patient while he is receiving the packs.

c. *Technique of applying packs:*

Apply the inner pack first and quickly cover with the waterproofing to minimize heat loss, then the outer covering. The outer pack is pinned on itself at its outer edge.

The following order of applying the packs requires less turning of the patient and conserves time:

Thigh—Place the apex of the pack well above the crest of ilium. Wrap the outer flap over the front of the leg, and then underneath the inner surface of the leg. Wrap the inner flap over the front of the leg and then over the outer surface of the leg.

Back—Turn the patient on his side. Place the pack on the back from the seventh cervical vertebra to below the coccyx. Tuck the lower corners under the thigh packs. Prepare the lumbar patch if it is used. Keep the back pack covered with the waterproof pack until the lumbar patch is ready.

Lumbar patch—Fold the patch in fourths as noted in the diagram and apply to the lumbar region on top of the inner back pack. Roll the patient back onto the binder which has previously been placed in position.

Abdomen—Place the pack on the abdomen just above the lowest rib to the pubis. Tuck the lower corners under the thigh packs.

Chest—Apply the pack to extend from the clavicles to the umbilicus extending around either side to lap over the back pack. Adjust and pin the abdominal and chest binders. The chest binder should not be so snug that chest expansion is restricted.

NOTE: Omit the chest binder and the outer pack covering in case of acute respiratory difficulty to avoid excess weight on the chest.

Shoulder—Place the apex of the pack directly below the mastoid process. Proceed in the same manner as in the thigh pack. Tuck the upper corners of the back pack under the shoulder packs.

Neck—Place the pack around the neck to include both sternocleidomastoid muscles. Do not cross the ends over the neck in front. The tracheal area should be exposed to avoid the sensation of choking. Place the ends parallel, and tuck under the chest pack.

The triangular pack can be placed so that its apex (A) comes at the *top*, at the middle of the back of the head as shown in fig. 8, back view; or that its apex is at the *bottom*, pointing down between the shoulder blades with the base of the triangle (Line C-D) well up around the back of the neck. The decision to place the apex (A) at the top or bottom depends on where most of the tightness of the back of the neck is, in order to have the greatest amount of heat from the bulk of the pack (beginning at Line C-D) where it is most needed.

Forearm—Wrap the outer edge of pack over and under the inner side of the forearm. Wrap the inner edge over the outer side of the forearm.

Hand—Wrap the outer edge of the pack over the palm of the hand then underneath the hand, leaving the thumb free. The inner edge is wrapped over the palm and includes the thumb. Leave the finger tips free.

Lower Leg—Apply the pack in the same manner as the forearm pack.

Foot—Wrap the foot in the pack with most of the thickness over the plantar surface. Leave the tips of the toes free.

Pin the outer packs to each other at the following points to prevent slipping:

Ends of the neck pack to the chest binder in front.

Sides of the neck pack to the points of the shoulder packs.

Point of the neck pack to the chest binder in back.

Upper edges of the shoulder packs to the chest binder in front and back.

Upper edges of the thigh packs to the abdominal binder in front and in back.

Lower margin of the chest binder to the upper margin of the abdominal binder in front and in back.

Edge of the foot pack to the front of the leg pack.

10. Application of the prone pack (face-lying)

Place the patient in the face-lying position with his feet over the edge of the mattress. A small towel roll is placed under the ankles to maintain relaxation of the knees. Towel pads are placed under the shoulders to maintain normal alignment of the scapulae.

The parts to be packed and the corresponding packs are as follows:

Neck .....the neck pack
Back .....the back pack
Posterior surface of thigh.....the thigh pack
Posterior surface of leg.....the lower leg pack
Foot .....the foot pack

Fold the packs to fit the part and apply over the areas in spasm. It is not necessary to pin them in position as they are changed very frequently.

After the packs have been applied, place the patient in the position ordered by the physician. Keep the packs on the length of time ordered by the physician. Sometime during the 24 hours (usually at night) the inner packs should be dried and the middle and outer packs aired. The inner packs should be washed when necessary.

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* May be obtained free from the Joint Orthopedic Nursing Advisory Service, 1790 Broadway, New York 19, New York.

Memoranda

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