PHYSIOTHERAPY MANAGEMENT OF THE LATE EFFECTS OF POLIO

Christine Uriadka, Physiotherapist
Post Polio Clinic, West Park Hospital, Toronto, Ontario.

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Discussion Outline

I am a physiotherapist currently working in the Post-Polio Clinic at West Park Hospital, a rehabilitation and specialized continuing care hospital in Toronto, Ontario, Canada. In my discussion, I will touch upon several broad areas related to post-polio issues. I'll begin by discussing why it is essential for clinicians to be aware of how to manage the late effects of polio. I will go on to provide a general profile of the physical symptoms and functional difficulties that arise in the post-polio population, and talk about how these new concerns develop. This description would not be complete without addressing the emotional coping issues and lifestyle adaptations that accompany the physical changes. I would then like to discuss a number of symptom management approaches, from the physiotherapy perspective. After this, I will provide an overview of the structure of the Post-Polio Clinic at West Park Hospital.

Why do Clinicians Need to Know about the Late Effects of Polio?

I would like to begin by making some comments about why it is important for physicians, physiotherapists, and other clinicians in the rehabilitation disciplines, to have a general understanding of the late effects of polio and basic management principles. The demand to assist individuals across the country in managing polio-related problems is very real. It is estimated that there are 66,000 polio survivors in Canada, approximately 2/3 of who have or will develop the late effects of polio. There is also a need to provide care for those individuals immigrating to Canada from developing countries who have previously contracted polio.

The post-polio Clinic has frequently encountered the misperception that the post-polio population is dying out, and that the need to be educated about caring for this clientele will soon be obsolete. This assumption, however, is proving to be inaccurate. Children are continuing to contract polio at this time, with active outbreaks currently being reported in India and Albania. In 1996, over 80,000 new cases of polio were reported worldwide. Although the World Health Organization has been striving towards worldwide eradication of polio by the year 2000, progress towards reaching this goal is hindered by factors such as

the cost of transporting and refrigerating vaccine.

Throughout our contact with polio survivors in the Post-Polio Clinic, it is our understanding that this large number of individuals facing the late effects of polio have found it difficult to access health care practitioners who have a thorough understanding of their particular concerns, or of the impact of the late effects of polio on their medical management. Individuals whose mobility is severely compromised frequently need to travel hours to be assessed or treated by clinicians with any degree of expertise in the area of polio-related symptoms. This travel can often contribute to their pain and fatigue, particularly during the winter months, when their sensitivity to cold temperatures further restricts their mobility.

Physicians and therapists working with various client populations and in many different rehabilitation environments are likely to come into contact with polio survivors more regularly than one might realize. To illustrate this point, I would like to highlight that in the Post-Polio Clinic, we commonly encounter individuals who have not only had polio, but also have one or more additional coexisting conditions, such as osteoarthritis, fibromyalgia, injuries incurred in motor vehicle accidents, cardiovascular disease, respiratory conditions, even head injuries and strokes. This shows how essential it is for all clinicians, regardless of their area of specialization, to be aware of general management guidelines for individuals who have had polio. The impact of a person's previous polio may affect the approach that should be used even when treating that individual for an unrelated injury or illness. Whether you know it or not, the client you, as the therapist, are rehabilitating after abdominal surgery or treating for a whiplash injury or carpal tunnel syndrome, may have contracted polio earlier in their life. Some individuals, when providing their medical history to a physician or therapist, may not even consider it relevant to mention the fact that they were previously affected by polio. Therefore, it is helpful for any therapist to be able to generally recognize when an individual may be experiencing the late effects of polio, so that their symptoms may be managed accordingly.

The Late Effects of Polio

Now, I would like to give a general overview of the symptoms that may be experienced by polio survivors. The concerns that are frequently encountered as the late effects of polio may include profound fatigue, pain, increasing weakness over areas of the body that may or may not have been considered to be affected by the initial polio, diminished endurance, muscle cramping, and cold intolerance. Polio survivors may also present with respiratory impairment and/or swallowing difficulties.

Most of the late effects of polio are related to biomechanical stresses secondary to muscle imbalance and postural deformity, as well as excessive demands on surviving motor units, leading to premature degeneration of these motor units. The onset of what is generally termed "post-polio syndrome" generally occurs at 30-35 years after the initial polio. However, the development of symptoms is not limited to this time frame, and can frequently be compounded by the normal effects of aging, as well as coexisting conditions such as the ones that I have previously mentioned.

Development of Post-Polio Symptoms

I would like to take some time now to describe the process of events that generally occurs, perpetuating the development of post-polio symptoms. After recovery from the acute stages of polio, depending on the extent of neurological recovery, a person may be left with residual muscle weakness or deformity of the trunk or limb alignment. For many years, he or she compensates for this weakness or deformity in their activities by changing their patterns of movement, relying on greater use of other limbs or accessory muscles, or by changing their posture. These changes not only require a higher energy expenditure, but

they also place excessive metabolic demands on the motor units relied upon most heavily. At some point, the muscles involved become unable to cope with the additional load. These muscles may already have been compromised, but were affected to such a minimal degree by the initial polio, that no weakness had been previously detected. Unfortunately, the muscles finally succumb to the strain of chronic overuse. The resulting new weakness that arises as a late effect of polio may cause the previous compensations to become ineffective. As I've mentioned, this new weakness can be noted in previously affected muscles, as well as in muscle groups that were previously never considered to be impacted by the initial polio. As a result, the individual suddenly begins to encounter difficulties with daily tasks that previously did not present a problem.

A spiraling sequence of events is initiated when new muscle weakness develops. As muscles weaken, it gets harder for a person to keep up with their usual daily responsibilities. Because more energy is needed to perform ones normal activities, fatigue becomes a problem. The muscles tire more easily, causing muscle cramping and pain in the limbs or areas of the body that are required to bear excessive demands, secondary to chronic overuse. Furthermore, without the needed stability and protection that is normally provided to joints by muscle function, excessive mechanical stresses are placed on vulnerable joints by compensatory movements and postural deformities. As a result of the wear and tear, a person is at risk of developing degenerative changes in their joints. The corresponding pain sets up an all-too-familiar process of events.

As an individual experiences severe pain or discomfort, they are likely to decrease their level of activity. Due to this lack of activity, the person becomes deconditioned, which is accompanied by a further increase in muscle weakness. With restriction of a person's mobility, some muscles may eventually suffer from disuse. Thus, the cycle of events begins all over again. As the muscles continue to weaken, the muscle imbalances that are created lead to a worsening of the individual's pain. The process of decline continues. Later in my discussion, I will describe how the physiotherapist can be involved in interrupting the sequence of events that I have just outlined.

Functional Changes

Now, I would like to shift my focus back to elaborating on some of the functional changes that persons suffering from the late effects of polio may experience. A polio survivor that you may encounter could indicate that their general mobility has markedly deteriorated, with buckling of their knee, catching on their foot, and more frequent falling. Therefore, they may have greater difficulty managing stairs or using public transit. Aside from the localized muscle fatigue that I described earlier, your patient could also suffer from severe generalized fatigue which is disproportionate to the activities involved. This fatigue can be both physical and cognitive, manifesting as diminished activity tolerance, memory impairment, word-finding and concentration difficulties. Furthermore, it is quite common for individuals to indicate sleep disturbance, which could be related to a variety to factors, including leg restlessness or twitching, pain, anxiety, and sleep apnea. Such sleeping difficulties would undoubtedly contribute to their fatigue. An additional issue that quite often is a concern among the post-polio population is weight management. Certainly, any person whose mobility is limited and who has difficulty participating in regular conditioning activities is at risk of weight gain. As you know, any excess weight places additional mechanical stress on the spine and lower limbs and adds to the energy required for daily activities, thus also exacerbating a person's fatigue.

Impact on Accustomed Roles

The changes that I have outlined may affect the individual's ability to uphold their accustomed

responsibilities at work, as well as their household duties. The capacity to perform basic activities of daily living such as bathing and dressing independently could also be impacted. A person's family roles and personal relationships may suffer as relatives and friends have difficulty appreciating why the individual no longer is able to participate in accustomed activities such as family outings and recreational events, leading to social isolation. It follows that a person could experience pressure to continue keeping up with their habitual roles and what is expected of them, both by others and from within, as well as guilt when they are no longer able to do so.

Coping with Lifestyle Modifications

As a result of new functional difficulties that arise, relating to the late effects of polio, a polio survivor is faced with making significant lifestyle changes. These lifestyle modifications often present a definite challenge to ones self-image. The coping approaches or patterns of emotional response that people adopt to manage their physical challenges vary, depending on the individual's personality, their specific support network, and extent of residual disability. As they go through the process of making necessary adjustments, it is generally most essential to the polio survivor to maintain their sense of control and independence. The health care professional can assist by encouraging the individual to allow himself or herself permission to make changes, and guide the individual to reframe their expectations for success by focusing on innovative ways of achieving new goals.

Emotional Impact

It is equally important for the therapist to be aware of how previous polio may influence a person's emotional response to treatment and therapeutic equipment that is recommended. Individuals who had polio were usually considered to be fighters or survivors. After initial polio onset, they were encouraged by therapists and family members to struggle and push through the limitations of their pain and fatigue towards recovery of their mobility. Some children experienced traumatic long-term hospitalization, separation from family, and sometimes painful medical procedures. The ability to manage without assistive devices such as crutches, braces or wheelchairs was seen as a measure of success. With a lot of hard work, many individuals experienced good recovery of their function or learned how to compensate with their stronger muscles to pursue an active lifestyle. After overcoming all these difficult obstacles, and expecting that their "polio" problems have long been overcome, it is a terrible shock when new symptoms begin to arise decades later. It is understandable that, at this time, a person might respond by pushing harder, rather than using moderation. The need to return to using assistive devices, and to make lifestyle modifications, can be perceived as a step backwards, instead of a means of enhancing ones freedom and independence. It can also perpetuate fear of future deterioration. Discussion of present needs for adaptive equipment can bring back difficult memories of heavy orthopedic shoes or awkward metal braces. Even though most people experienced supportive and compassionate treatment during their original rehabilitation, strong feelings of helplessness, fear, disappointment, or lack of trust may remain. Therefore, it is important for you, the health care provider, to understand that your client may well be confronting feelings related to their original polio experience as they interact with you.

Management of Post-Polio Symptoms

Now that I have outlined a general profile of a person experiencing the late effects of polio, I would like to go on to discuss some essential components of symptom management, primarily focusing on the role of the physiotherapist. Before I continue, I would like to make two comments. First of all, you will notice that many of the management strategies intermesh, and can be difficult to separate into mutually exclusive categories. For example, when a rollator walker is prescribed for a client to facilitate their ambulation, it is also contributing the additional benefits of providing postural support, alleviating muscle fatigue, and minimizing mechanical stress on the joints, thus relieving pain. Secondly, I'd like to emphasize the point that there is also extensive overlap between the roles of the different disciplines. To illustrate this idea, let's look at the example of a client who is having difficulty transferring in and out of their bathtub. The occupational therapist may be involved in prescribing the specific bathroom equipment needed to ensure a safe and efficient transfer. The physiotherapist may focus on providing exercises to strengthen particular muscles that are essential to the activity of transferring. The social worker may play a role in helping the client develop effective coping skills, so that they can adjust to and accept the changes that they are facing, as well as directing the client in locating funding sources for the equipment that they need. In this manner, the roles of the different health care clinicians very often complement and facilitate each other.

At this point, I will be describing six symptom management approaches for the post-polio population that particularly relate to physiotherapy. They include: exercise prescription, energy conservation, correction of postural alignment, prescription of assistive devices such as braces and ambulation aids, pain management and client education.

Exercise Guidelines for the Post-Polio Population

Let's talk about exercise guidelines first. When prescribing exercise to an individual with a history of polio, the physiotherapist needs to consider the client's description of their fatigue, pain, postural deformities, muscle imbalances, and previous surgical procedures. The therapist is challenged to find activities that help to prevent deconditioning and atrophy of the relatively unaffected muscles that are underused, while at the same time avoiding the risk of placing additional demands on weaker muscles that are already overworked beyond their capacity. As I prescribe exercise for the post-polio population, I generally have two goals in mind. The first goal is to improve the individual's cardiovascular conditioning. This serves to increase the overall efficiency of muscle function and oxygen transport. As the energy cost of movement is decreased, a person is left with less fatigue, and a greater energy reserve to apply towards other activities. The second goal of exercise prescription is to maximize the strength and endurance of specific muscles that are underused. As these muscles are strengthened, they can help to achieve appropriate compensations in movement and posture. As a result, harmful compensations that lead to joint degeneration and pain are avoided.

Prescription of Cardiovascular Exercise

Recent literature published by researchers such as Owen and by Dean and Ross, indicates that a modified, low-intensity regime of aerobic conditioning exercise within the individual's fatigue tolerance is beneficial in the post-polio population for maintaining or improving overall endurance and functional work capacity.

Dean and Ross feel that by optimizing both cardiovascular fitness and the biomechanical efficiency of movement, aerobic training is effective for post-polio clients in reducing muscle fatigue and joint stresses. Rather than being singled out, use of the affected muscles is integrated into a more general whole-body activity. Therefore, the affected muscles are subjected to a lesser degree of chronic overuse. For most of the post-polio clients that I see, I normally recommend low-resistance activities that are least likely to fatigue the compromised muscles. They include walking or bicycling on a level surface, pedaling a stationary bicycle or arm ergometer set on a minimal tension, swimming, and performing gentle conditioning pool exercises. Regardless of the type of cardiovascular activity that is prescribed, I always emphasize to a client who has had polio the importance of pacing. Because many post-polio individuals have typically conditioned themselves to disregard any discomfort and to push through it, a lot of time is spent educating the client about how to recognize muscle fatigue, and how to listen to their bodies. Clients

have to be taught to be aware of indications of fatigue, such as muscle cramping or twitching, burning pain, diminished range of movement, and shaking or heaviness of the limb. As soon as they begin to experience any of these symptoms, I direct the person to stop and rest for several minutes until the discomfort subsides, rather than continuing to force themselves through the exercise. Once the muscle gets tired, it is generally not advantageous to continue the exercise, as the individual starts to do use compensatory movements and do the exercise incorrectly, causing it to be more detrimental than beneficial. The general rule of thumb that I give to many of my clients is that if the discomfort persists after resting for 5 minutes, they should end their exercise session for the day. If however, any indications of fatigue are alleviated by several minutes of resting, they can resume their activity, continuing as long as the exercise does not exacerbate any pain or muscle cramping. In most situations, I encourage individuals to adhere to the generally recommended parameters for cardiovascular conditioning: 20-30 minutes of exercise, three times a week. If the client has not previously been exercising regularly, it is advisable for them to begin with a shorter duration of 5-10 minutes, and to gradually progress the duration within their fatigue tolerance. Spacing is equally essential in avoiding excessive overuse of the affected muscles. By scheduling the activity on alternate days, the individual allows their body ample rest time between

exercise sessions.

Please note that the exercise guidelines previously outlined represent a general approach. However, each person's exercise routine must be tailored to the specific individual, according to their fatigue level, activity tolerance and to the extent and distribution of muscle weakness. Some people encountering the late effects of polio experience such debilitating fatigue, that the effort involved in exercising renders a conditioning exercise program unfeasible and counterproductive. The exercise program for any polio survivor should be prescribed to meet their specific needs. It is essential that the type, intensity, frequency and duration of exercise activity be modified appropriately to correspond with the individual's level of physical function. It is recommended that the exercise program be re-evaluated on a regular basis.

Benefits of Aquatic Exercise

I would like to take a moment now to talk specifically about aquatic exercises. The benefits of pool exercises are many. Exercising in water gives one the opportunity to exercise in positions that allow any particular movement to be either assisted, supported, or resisted by the buoyancy of water. Depending on the level of immersion, a person standing in water is required to support only a portion of their total weight. This reduction of weight bearing dramatically decreases the mechanical stress placed on the lower limb joints. As well, the warmth of the water helps to promote improved circulation and muscle relaxation. For these reasons, many post-polio clients, especially those who are minimally ambulatory, find that they are able to enjoy activities in the water that they are not able to perform on land. I have encountered a number of people who have never considered exercising in a pool because they don't swim. There is a wide variety of pool activities that can be suggested to these clients that do not involve swimming, such as aquafit exercises, walking or marching in the water, kicking or pedaling the legs.

Considerations regarding Aquatic Exercise

Before referring a client to a community aquatic exercise program, there are several factors that the therapist needs to consider. Because of their cold intolerance, post-polio individuals find the temperature of many community pools uncomfortably cold. They may need to be referred to a therapeutic pool where the water temperature is kept within the range of 90-95 degrees Fahrenheit. Accessibility of the pool is also a factor that needs to be considered. To this end, it helps to investigate the distance from the parking lot to the change room, and between the change room and the pool. Does the pool provide a wheelchair that individuals can use to get to the pool? Can the client wear their brace to the pool deck? Are there

stairs in the way? Does the pool have stairs or a lift for entering the water? Is any assistance available at the poolside? Are any specific hours or programs offered for individuals with special needs? All of these issues can determine whether a person would be able to and interested in participating in a pool exercise program.

Before referring a client to a hydrotherapy or aquafit program, the physiotherapist must be aware of any aspects of the individual's medical history that may be considered a contraindication or precaution to pool exercise. Such conditions include unstable cardiac status, hypertension, open skin lesions, sensitivity to chlorine, seizures, and incontinence. The instructor of a community pool exercise class would likely have limited knowledge about the late effects of polio and the exercise approach that is appropriate for this population. Therefore, it is important for the referring therapist to act as an information resource for the instructor, perhaps even sending along some general literature or handout materials about the late effects of polio.

Prescription of Strengthening Exercises

Now that we have talked about aerobic conditioning, let's go on to discuss the use of resistive strengthening exercises for specific muscles. At present, prescribing aggressive strengthening exercises for the post-polio population poses some unanswered questions. It has indeed been demonstrated that a progressive, high-intensity strengthening regime for specific muscles is effective in maintaining or improving functional strength and endurance, as long as they do not increase the individual's level of discomfort. However, these exercises must be approached with caution. Activities that are isolated to a particular affected muscle may bring about the detrimental effects of chronic overuse, particularly if training is done against maximal resistance. Such constant excessive demands placed on partially denervated muscles may contribute to fatigue and promote overuse atrophy. I have personally maintained a relatively conservative approach to prescribing strengthening exercise for my post-polio clients, particularly as they go on to do the exercises without regular supervision of a physiotherapist. Generally, I limit the exercises to isometric and non-resisted activities, and I am careful to provide the client with the necessary education to enable them to safely modify their program. When performing more high-intensity resisted exercises, I feel that it is advisable for the individual to be monitored regularly by a physiotherapist.

Prescription of Stretching Exercises

The last component of exercise prescription that I would like to touch upon is stretching. Because of their muscle imbalances and postural deformities, it is fairly common for a post-polio client to develop tightness and shortening of certain trunk and lower extremity muscles, particularly if they are non-ambulatory. This muscle shortening further contributes to pain, joint instability, and inefficiency of movement. In the post-polio population, hip and knee flexion contractures, as well as ankle plantarflexion deformity, are the most common to develop. It is usually appropriate to prescribe specific stretches for localized joint contractures and muscle tightness. However, the therapist must be aware that in some situations a restriction in range may be functionally useful in assisting mobility. For example, I have encountered a large number of clients whose ankle has been fused to minimize footdrop and facilitate their ambulation. In such cases, it would obviously not be advisable to try to improve the range of motion of the joint. The approach to stretching for post-polio individuals needs to be gentle and slow. Because they tend to be so prone to cramping if the muscle is overstretched, I direct my clients to stretch within the range where only a slight pulling is felt.

Energy Conservation

The next area of management that I would like to briefly speak about is energy conservation. In our Post-Polio Clinic, it is primarily within the occupational therapist's role to instruct a client in appropriate energy conservation and pacing strategies. However, because energy conservation approaches are such an integral part of general lifestyle adjustments that are recommended for this population, and because pacing is always incorporated into the client's exercise program and pain control strategies, energy conservation is one area that truly overlaps across all of the disciplines. I'll just review some sample energy conservation techniques that are frequently recommended. One aspect of energy conservation involves scheduling. This includes such suggestions as planning two 20-minute rest breaks during the day before the onset of fatigue, spreading activities out over the course of the day or the week, breaking up strenuous activities into smaller components, and alternating between light and heavy tasks. Once a person is tired, it takes much longer to build up their energy reserve. Therefore, they need to take a break before their energy supplies are depleted and they are running on empty. Next, it is important for the individual to modify activities that are particularly fatiguing. For example, strenuous activities such as vacuuming or shoveling

snow can be delegated to others. Arrangements can be made to have groceries delivered. Tasks that involve standing or walking should be limited in duration, and minimizing any unnecessary use of stairs is encouraged. Proper positioning is also essential to energy conservation. A person should sit in a supportive chair with their arms supported to perform activities whenever possible, maintaining correct posture. Arranging the workspace so that the working surface is at a comfortable height can be very helpful. Assistive devices also go a long way in making activities less tiring. Such adaptive aids can include items such as tap turners, jar openers, stocking aids, barbecue tongs for removing clothes from the dryer, and a trolley for transporting heavy loads. Perhaps the most difficult aspect of energy conservation can be setting priorities. It is not always easy to weed out nonessential activities and eliminate them to save energy for activities that are more important to ones self-image, and this process can involve making some difficult choices. I also would like to include the comment that, for people who are working, it is usually more challenging to follow energy conservation principles on the job. People don't have as much control over their environment, the pace that is expected, and scheduling of work hours and rest breaks at their place of employment. Finding energy conservation strategies that can be implemented even at work can require a lot of resourcefulness, open-mindedness, and imagination.

Postural Correction

I'll go on now to speak about the third area of symptom management for post-polio individuals: that of postural correction. Asymmetrical postural alignment can most frequently be attributed to muscle imbalance. As well as often being implicated in the etiology of pain, postural deformities can dramatically impact on an individual's energy efficiency during various activities. Again, this is where postural exercises can play an important role. With respect to alignment of the trunk, the most common remarkable finding encountered in the post-polio population is spinal scoliosis. The scoliosis that is noted may be a true fixed scoliosis that has developed due to weakness of the trunk and paraspinal muscles over one side of the body. More frequently, it is an apparent scoliosis, associated with unequal height of the two halves of the pelvis, that is secondary to a leg length discrepancy. This type of scoliosis is correctable by placing a lift of the appropriate height under the client's shorter leg to compensate for the leg length discrepancy. Post-polio individuals often also present with upper thoracic kyphosis and forward head posture, with a compensatory hyperlordotic curve. With regards to the lower extremities, some of the postural malalignments that are frequently encountered include:

- genu valgus and recurvatum deformities
- pelvic obliquity
- uneven weight distribution between the limbs, and also through the soles of the feet
- calcaneal valgus or varus

Strategies to Correct Postural Alignment

I've already referred to some examples of interventions related to the posture of a post-polio client, that are aimed at relieving muscle tension and preventing unnecessary joint stresses. As I have mentioned, the strategies that are recommended by the physiotherapist should include toning and/or stretching exercises for the paraspinal and abdominal muscles, as well as postural exercises for the neck and shoulder girdle region. The exercises should always be accompanied by education regarding general back protection and the use of correct body mechanics. Some clients may even benefit from being referred to an outpatient facility for a comprehensive back care program. Appropriate resting positions should be suggested for persons who have back pain related to poor posture. Adaptive aids such as contoured therapeutic pillows, neck collars, and abdominal belts can be considered, to provide adequate postural support. In addition, the use of orthotics, shoe lifts, or bracing to promote more symmetrical postural alignment is an option that is sometimes suggested as appropriate.

While we're on the topic of posture, I just want to again touch upon the issue of weight management. It is undeniable that excess weight and abdominal obesity do contribute to poor posture. Once more, the benefits of aerobic exercise in promoting a higher metabolic rate and burning off calories come into play. Despite the client's residual muscle weakness or functional impairments, the therapist can usually work together with the client to find some forms of cardiovascular conditioning activities that are feasible and enjoyable for them to do, which may facilitate weight loss. To this end, some clients benefit from being referred to a dietitian for nutritional counseling.

Adaptive Equipment: Benefits of Orthotic Prescription

The fourth management strategy that I would like to address is that of adaptive equipment, specifically bracing and the use of ambulation aids. In the post-polio population, an orthosis can be used during ambulation as a means of facilitating the client's mobility and reducing the effort involved in walking by compensating for muscle weakness. An orthosis may be recommended for the purposes of ensuring correct position and stability of the joint, providing more equal weight distribution, and supporting the weaker leg, thereby indirectly also alleviating the load on the stronger leg.

Factors Affecting Bracing Requirements

The physiotherapist may be called upon to provide input in establishing the client's need for a brace. Whether an individual requires an ankle-foot orthosis or a knee-ankle-foot orthosis is determined by several factors, such as the degree and location of muscle weakness, gait deviations, extent of joint instability and alignment deformities, and their daily functional requirements. In general, clients that demonstrate extensive instability of the knee joint and an overall lower extremity strength less than grade 2 tend to require a KAFO. However, the benefits and disadvantages related to bracing need to be weighed in each specific situation. When considering prescription of an orthosis, one must take into account the weight of the brace, the risk of aggravating lower back strain, whether the person has sufficient muscular function at the level of the hip to be able to maneuver the braced leg, and whether the client would have difficulty managing stairs while wearing a brace. Having said that, I also want to draw your attention to the fact that braces are now being made of stronger compounds, allowing them to provide the necessary support while being less bulky and conspicuous. Many clients are pleasantly surprised by how light and uncumbersome their orthosis is, compared to their earlier experiences. Certainly, becoming accustomed to walking with a brace requires an adjustment period, during which modifications may need to be made to the brace. This process of getting used to the orthosis and learning to use it should be approached gradually. The success of bracing is greatly influenced by the client's receptiveness to the orthosis, and

willingness to endure the adjustment period.

Purposes of Ambulation Aid

The main objectives of prescribing a walking aid in the post-polio population are essentially the same as the purposes of bracing. An ambulation aid is used to ensure more stable balance, promote better posture, minimize fatigue and energy required for walking, and to alleviate the load on the joints. When considering the appropriateness of a walking aid for a post-polio client, the physiotherapist must take into account their general status, the strength and functioning of their upper and lower limbs, their balance, and any coexisting orthopaedic problems. The client's environment, access to transportation, and available means of transporting the walking aid or mobility device also needs to be established.

Considerations for Ambulation Aid Prescription

One of the biggest setbacks that is encountered when prescribing an ambulation aid is the risk of aggravating any discomfort or problems in the upper extremities. Use of any walking aids can pose a difficulty for persons with polio involvement of one or both arms. Even when the arms were not affected by the initial polio, long-term use of the arms for weight bearing can perpetuate osteoarthritis in the upper limb joints or carpal tunnel syndrome. These problems can be minimized if correct height of the device is ensured, and if the client is trained to use the device properly. You would be surprised at the number of clients I see who walk in with a cane that is much too high, or who use their cane in the inappropriate hand. When either a walking aid or a brace are prescribed for a client, it is essential that appropriate follow-up by the physiotherapist be available for any gait reeducation that may be required. Such follow-up gives the therapist the opportunity to ensure that the device fits correctly and that the client is able to walk safely with the device on a level surface, outdoors, and on stairs.

Pain Management Strategies

I'll go on now to comment on the fifth area of intervention : pain management. I find that it is impossible to separate the topic of pain control from the other aspects of the client's symptom management. I've already talked about how bracing, walking aids, and postural supports can have the effect of minimizing stress on the joints and alleviating overuse of the muscles. In many cases, pain can be successfully managed by postural correction, joint protection techniques, and establishment of the right balance between appropriate exercise and rest. I would venture to say that for the greatest number of clients, the most essential component of pain management is learning how to conserve their energy, and finding the combination of activity and pacing that works best for them. If the above measures do not provide adequate pain relief, the individual may need to be referred for ongoing physiotherapy treatment. A variety of therapeutic modalities can be effective in treating any orthopaedic problems that arise indirectly from the residual polio-related weakness, such as joint inflammation, tendonitis, and ligament laxity. The physiotherapist can also provide the individual with ongoing relaxation training to help them cope with ongoing pain and to manage discomfort related to anxiety and tension. Some post-polio clients have extreme, widespread pain that interferes with their ability to continue their usual daily activities. These persons may need direction in locating and accessing a comprehensive pain management program or clinic in their community. This type of multifaceted approach in coping with pain, consisting of pharmacological treatment, exercise, relaxation, biofeedback, and counseling, can often elicit a very positive response.

Client Education

The sixth and final management strategy that I will discuss is perhaps the most essential of all - education. What our team hears so often from our clients is the ambiguity of their situation. Many people travel from clinician to clinician, with no one explaining to them the cause of their new severe fatigue and pain. They get a lot of conflicting messages about whether they should be exercising or not, working or not, walking or not. So many people do not really understand how their initial polio affected their motor neurons. A large number of polio survivors fear that they are experiencing a recurrence of their polio, and undergo tremendous anxiety about how much further their function will deteriorate in the future. Clients find it such a relief when they are finally provided with an explanation as to why they have been experiencing recent symptoms and reassured that, with the appropriate lifestyle modifications, they will likely not continue to undergo extreme decline. By providing the individual with a plan of action, and an understanding of what they need to do to minimize or slow the rate of future deterioration, even maintain or improve their mobility, the clinician can make huge strides with regards to putting the person at ease. This increased awareness makes it more likely that the client will be compliant with their management program. The client should be involved as an active participant in determining how to approach their symptoms most effectively.

At this point, I'd like to add one last comment to my discussion of management strategies. It's important to be aware that there is no one standard recipe that works for all polio survivors. Each person has individual needs, and copes with their limitations in their own way. Only by doing a thorough assessment of each client's medical history, social situation, subjective symptoms, and physical observations, can the clinician determine how to optimize the client's ability to be mobile and enjoy a full, rewarding life. Rather than focusing only on specific problems, every client should be approached holistically, and considered as a person in their entirety.

Post-Polio Clinic Role and Structure

I'll go on to provide you with some background information about the role and structure of the Post-Polio Clinic. The Clinic has existed at West Park Hospital since 1986, funded initially by the Ontario March of Dimes, and then through the Ontario Ministry of Health. It currently consists of a physiatrist, coordinator, occupational therapist, physiotherapist, social worker and secretary. The role of the clinic is to provide assessment and education to post-polio individuals, using a transdisciplinary model. Clients enter the clinic by physician referral. On receipt of the referral, they are mailed a questionnaire to complete, outlining in detail their medical history, physical concerns, and functional difficulties. The team finds this information extremely valuable in providing advance knowledge of the issues that are of prime importance to the client.

Client Care Process

Each client is initially assessed by the physiatrist, and then is referred to the remaining disciplines as appropriate. During the team assessment day, clients are given an education handbook that provides background information regarding the late effects of polio, management strategies, the roles of the different team members, and other resources. The assessment day ends with a wrap-up session with each individual client, during which the team reviews their recommendations and clarifies any questions that the client may have. On assessment by the team, a letter summarizing the team's findings and recommendations is sent to the client and the referring physician. As the Post-Polio Clinic serves clients from across Ontario, referrals for ongoing treatment are generally made outside of West Park Hospital, in the client's local community. After coming through the Clinic, clients are mailed a satisfaction survey, providing the team with feedback as to whether the client was satisfied with the process, and whether the Clinic has met their needs. Each individual has the opportunity to have an optional follow-up visit with the team, approximately one year after their initial assessment. This follow-up visit is used to determine whether the client has had any difficulties in following the previous recommendations, evaluate whether the management strategies have been effective, and to address any new concerns that have arisen. If the client requires no further active involvement by the team after the follow-up visit, they are discharged from the clinic.

Access to Clinicians at West Park Hospital

The post-polio clinic has developed linkages with many other departments or areas of West Park Hospital, and our clients are quite frequently referred to other clinicians within the hospital for assessment, as needed. The list of disciplines that may be involved with post-polio individuals includes: psychology, respirology, speech-language pathology, dietary, chiropody, orthotics, seating clinic, and pre-vocational assessment. One definite advantage of our being located in a rehabilitation hospital is this ability to easily access such a wide variety of services for our clients, and I would like to describe a couple of them in greater detail.

A monthly orthotics clinic has been established as a collaboration between the Prosthetics/Orthotics department and the Post-polio Clinic. Individuals can be referred here by any member of our team to be assessed by the Orthotist, Physiatrist, and Physiotherapist if needed, to evaluate their bracing requirements. They can be seen in the orthotics clinic whether they require fabrication of a new brace, or need modification of an existing brace that is not optimally functional. West Park Hospital also has a hydrotherapy program, to which our clients can be referred. This program provides a person with several individualized instruction sessions with the pool physiotherapist, 1-2 times weekly. During the sessions, they are taught an appropriate pool exercise program which they can then continue independently in a community pool. The pool is accessible by a hydraulic lift, and is kept at a temperature of 94 degrees Fahrenheit.

Outcomes

One of the main goals of my discussion was to fairly extensively describe the model around which we base our management approaches at the Post-Polio Clinic. Based on a qualitative impression of the information that the team collects when clients attend their follow-up visits, these strategies appear to yield very positive results with respect to the client's overall functional status. Using pacing and energy conservation techniques, most clients are able to control their fatigue, leaving them with adequate energy reserve to participate in a regular exercise regime. Of the clients who keep up with their prescribed exercise program, a high proportion either improve or maintain their strength and endurance levels at the time of reassessment. With the postural support and joint protection provided by assistive devices, many individuals find that they are less restricted by pain, allowing them to follow a more active lifestyle.

The success of the management strategies, however, can only be as good as the client's compliance. The team has observed that the level of compliance with our recommendations can be limited by factors such as financial constraints, language barriers, geographical remoteness, scheduling conflicts and inadequate support networks. In our experience, the follow-up is an extremely valuable opportunity to identify such barriers and explore new options.

Post-Polio Educational Kit

While referring to the Clinic, I have the chance to tell you about quite an exciting initiative in which we were involved, which I hope may be of interest to you. You may be aware that the Post-polio Clinic has developed educational kits for clinicians about the late effects of polio, which were launched in November of 1995. We decided to pursue this project for several reasons. It is our hope that the kits will help to improve the awareness of health care providers of issues that are relevant to polio survivors. This would make it easier for post-polio individuals to access knowledgeable clinicians in their own communities, and ensure that they are provided with appropriate management. An additional reason for developing the kits was to promote continuity of care for post-polio clients. Such continuity of care relies on the development of essential channels of communication and the maintenance of permanent information resources. In order for polio survivors to be referred to practitioners with appropriate expertise, family physicians need to be aware of the potential impact of the late effects of polio, as well as the services that are available to people who have had polio.

The contents of the educational kits were developed to educate several target groups that may be involved in providing care to individuals experiencing the late effects of polio. These groups include rehabilitation departments in hospitals, private health practitioners, and rehabilitation companies. Despite staff turnover in health care facilities, it is hoped that, with the educational kits remaining as a permanent information resource for new staff, the level of expertise within the facility regarding the late effects of polio will not be lost as a staff member leaves. The kits have also been promoted to universities, as a tool to increase the awareness of occupational therapy, physiotherapy, and social work students about the late effects of polio. Finally, the kits have been purchased by post-polio support groups as an information resource for polio survivors and their families.

The Post-polio Clinic has developed a specific educational kit for each discipline: occupational therapy, physiotherapy and social work. Each profession's kit contains a videotape presentation, in addition to written reference materials. In the videotape, the physiatrist and the other practitioners mentioned each discuss essential aspects that need to be emphasized during assessment of a post-polio client, the concerns that are frequently encountered, management strategies, and intervention programs. The video presentation of the entire team was included in each discipline's kit to highlight the importance of

approaching the management of each client holistically. Particularly for independent practitioners who work alone without the support of the team, it can be most beneficial to have an understanding of the approaches taken by other disciplines. The videotape also illustrates how the roles of the disciplines are related, and how they complement each other.

The remainder of the kit contains discipline-specific written reference materials to complement the content covered in the videotape. Each discipline's kit contains a section of general background information relating to the late effects of polio that may be relevant to any profession, such as the client education handbook that is distributed in the Clinic, and information about community resources that are especially applicable to the post-polio population. Materials about footwear and adaptive equipment, energy conservation and relaxation techniques, and adjustment strategies to lifestyle changes are also included in this section. The physiotherapy kit further provides sample physiotherapy assessment, reassessment, and referral forms that are used in the Post-Polio Clinic. It also contains materials related to specific intervention approaches that may be relevant to the physiotherapist, such as orthotic management, addressing respiratory impairment, and myofascial release therapy. Finally, the last section of the physiotherapy kit contains materials about exercise prescription guidelines for post-polio individuals. It includes sample exercise programs with illustrative photographs, of several case-study clients that are presented.

I would like to comment on what a tremendous learning experience it was for myself and the rest of the team to go through the process of developing the kits. In doing so, we all had the opportunity to enhance our research skills. Each of the team members wrote original articles for their specific kits, which may lead to future publication opportunities. We discovered new sources of information, and became aware of areas in which scientifically based data was lacking. We also developed new valuable networks with

colleagues and researchers.

I am going to close my discussion with a statement that may seem incredibly obvious, but which is unfortunately too often overlooked: One of the most essential sources of knowledge that a health care provider can access is the client. Through our daily work with post-polio clients, the team is continuously learning about the experience of being a polio survivor, what the clients' goals are, and how they can be reached. I'd like to share with you a list of what the post-polio population needs from the clinician, which was compiled with input from individuals who have had polio.

SUGGESTIONS AND APPROACHES FOR HEALTH CARE PROFESSIONALS

1. Attitudes should acknowledge the abilities, competencies, successful careers, and lives of persons with polio.
2. Use a listening/learning approach that communicates respect for the individual's knowledge and experience of coping with polio.
3. Do not misinterpret the level of frustration that individuals sometimes express. Many have searched for years to find health care providers who have a working knowledge of polio and its late effects.
4. Recognize the courage it takes for some individuals to reinitiate contact with the rehabilitation field.
5. Where appropriate, encourage the inclusion of family members in discussion and educational opportunities. Living with the late effects of polio is a family systems issue. Family members also need time to adjust to the changes and challenges associated with the late effects.
6. Be aware of polio survivors' typical past coping styles and their need to employ different tactics for coping during the rehabilitation process.
7. When completing documents for individuals, be clear and detailed regarding the impact of the late effects of polio on function. The forms represent opportunities to educate private and government

agencies.

8. Join the Polio and Post-polio syndrome computer Internet.
9. Network with the post-polio support group in your area, and encourage your clients to do so.

I hope my discussion has given you a greater awareness of the concerns that you may encounter when treating a post-polio individual, and some practical information about how management strategies can be adapted for the post-polio population. I appreciate the opportunity for sharing ideas!

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The Secretary, Lincolnshire Post-Polio Network
PO Box 954, Lincoln, Lincolnshire, LN5 5ER United Kingdom
Telephone: +44 (0)1522 888601
Facsimile: +44 (0)870 1600840

Email: info@lincolnshirepostpolio.org.uk
Web Site: www.lincolnshirepostpolio.org.uk

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