The influence of epidemics on the role of physiotherapists in rehabilitation

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Abstract

Physiotherapists developed a strong reputation in rehabilitation therapy after the Great War in the early part of the 20th century. These skills were transferred to the management of children and adults during the global poliomyelitis epidemic which followed. Physiotherapists such as Miss M Manthel, a graduate from the Otago School of Massage, developed innovative ways of managing huge workloads as well as providing best practice in their rehabilitation programmes which she described in a letter to the Editor, New Zealand Journal of Physiotherapy, in 1938. Seventy five years on, the primary health epidemics that face the world are no longer caused by viruses but by diseases of lifestyle. These non-communicable diseases (NCDs) – namely cardiovascular disease, cancer, chronic lung diseases and diabetes - kill three in five people worldwide and the socioeconomic impact associated with NCD morbidity and mortality is huge. Other epidemics are also placing demand on rehabilitation services and are likely to continue into the future. They include obesity, and the explosion in the numbers of people living into old age. This commentary explores these health epidemics and their impact on the physiotherapists' role in rehabilitation over the past 75 years.

Skinner M (2013) The influence of epidemics on the role of physiotherapists in rehabilitation. New Zealand Journal of Physiotherapy 41(1): 22-25.

Key words: Rehabilitation, Poliomyelitis, Post polio syndrome, Noncommunicable diseases

INTRODUCTION

When Miss M Manthel, N.Z.R.M., wrote her letter to the New Zealand Journal of Physiotherapy describing her rehabilitation work with children in the "After Care" in Melbourne (Manthel 1938) the world was in the midst of a poliomyelitis (polio) epidemic caused by a virus for which no cure had been found. This year, seventy five years later, the primary health epidemics that face the world are no longer caused by viruses but by diseases of lifestyle. These non-communicable diseases (NCDs) – namely cardiovascular disease, cancer, chronic lung diseases and diabetes - kill three in five people worldwide (World Health Organization (WHO) 2011a) and the socioeconomic impact associated with NCD morbidity and mortality is huge (Chan 2011). Other epidemics are also placing demand on rehabilitation services and are likely to continue into the future. They include obesity, the explosion in the numbers of people living into old age and associated conditions (United Nations System Task Team (UNSTT) 2012), depression (UNSTT 2012) and poor sleep health (Stranes et al 2012). Only one, acquired immunodeficiency syndrome (AIDS) caused by the human immunodeficiency virus (HIV) is showing an overall decline in morbidity (UNAIDS 2013). This commentary explores these epidemics and their impact on the physiotherapists' role in rehabilitation over the past 75 years.

POLIOMYELITIS

Polio is thought to have been around as early as 1580 BC and at the height of the epidemic in the 20th century at least half a million people were paralysed or died from the human enterovirus, the poliovirus (WHO 2013). Physiotherapists, or masseuses as they were known then, were in strong demand and had already developed a high level of skill in physical rehabilitation whilst working alongside orthopaedic surgeons and treating the war injured in the early part of the century (Taylor 1988). In her letter Miss Manthel (1938) described aspects of the rehabilitation in a typical day. There was a focus on splinting, muscle re-education, strengthening programmes, postural correction and a strong interprofessional working relationship. The days were long, staff often did not finishing work till six o'clock; waiting lists were a reality and also needed to be prioritised (Manthel 1938). Has anything changed? The main difference is not related to the basic principles of physical rehabilitation but the fact that today polio has almost been eliminated from the world. Since 1988 polio cases around the world have decreased approximately 99% from 350 cases in more than 125 endemic countries to 650 reported cases in three endemic countries (WHO 2012). This year WHO is organising a campaign to eradicate polio from these last three countries, Afghanistan, Nigeria and Pakistan. The campaign is due to end in 2018 by which time it is estimated that every child will have a right to life without contracting polio (WHO 2013).

There are two key things that are part of the legacy of polio that remain important for physiotherapists today - the iron lung and post polio syndrome (PPS). The iron lung is a form of negative pressure ventilation which was developed during the polio epidemic to assist with breathing in those victims whose respiratory muscles were paralysed. In current practice the iron lung has largely been superseded by various forms of positive ventilation such as non-invasive positive pressure ventilation (NIV) and invasive mechanical ventilation (IMV). There is some debate in the literature about the benefits of positive over negative ventilator support (Corrado et al 2005, Engelberts et al 2012) but the cumbersome nature of the iron lung in contrast to the portability of NPPV devices means there is often little doubt about which device to use for respiratory patients.

The second factor is PPS. Over the past 20-30 years there have been increasing numbers of people who had polio at an earlier stage in life, being diagnosed with PPS. The syndrome refers to late manifestations of symptoms such as generalised fatigue,

new signs of muscle weakness, and myalgias around 35 years after the initial diagnosis. There are a number of hypotheses to explain the origin of PPS, the most likely being a persistent post-virus infection, an autoimmune response, or the body's response to degenerating neurones (Jublet and Agre 2000). As the diagnosis of PPS is usually made in the older adult, careful screening for co-morbidities associated with diseases of lifestyle and the ageing process is important before considering the optimal approach to rehabilitation. In general, rehabilitation programmes have been based on ensuring that exercise is carried out at a submaximal level and not to the point of muscle fatigue (Ernstoff et al 2004). Studies have shown that for people with PPS strength, cardiopulmonary fitness, and flexibility can all be improved through aerobic conditioning (Ernstoff et al 2004) and hydrotherapy (Prins et al 1994). In New Zealand, Polio NZ Incorporated (http://www.postpolio.org.nz/) is a support group for those who have had polio as well as their families. A key focus for the group is promotion of the benefits physical rehabilitation for people diagnosed with PPS. Over the years the group has sponsored several lecture tours and conference presentations and promoted the work of a physiotherapist who specialises in managing PPS (Jegasothy 2012). So 75 years on the principles of physical rehabilitation applied by Miss M Manthel to children with polio at the height of the epidemic (Manthel 1938) are still the cornerstone of rehabilitation for those with PPS.

DISEASES OF LIFESTYLE

Diseases of lifestyle comprise non-communicable diseases namely cardiovascular disease, cancer, chronic lung diseases, and diabetes. The most significant factor common to all is smoking. However it is only within the past 60 years that the important associations between smoking and NCDs and cardiovascular disease and activity levels have been made. In 1953 Morris et al published a series of articles on the epidemiology of coronary disease. The study provided the first evidence that there was an association between physical activity at work and coronary heart disease in middle-aged men (Morris et al 1953). The evidence came from the result of studying smoking prevalence and linking it with on-the-job exercise levels in approximately 31,000 men aged 35-64 years. . Participants included drivers and conductors on London's red buses and the motormen and guards on London's underground. The results demonstrated that the risk of fatal coronary thrombosis was higher in drivers and motormen than in guards and conductors (Morris et al 1953).

The second watershed discovery was made by Doll and Hill (1951) when they showed an association between smoking and mortality. The participants were men and women who were on the British Medical Register of 1951. The doctors were followed up over a 10-year period and all those alive were invited to be reviewed in 1961. Results published showed independent associations between smoking and lung cancer, coronary heart disease, and chronic bronchitis as well as an association between the length of time smoking (in years) and mortality (Doll and Hill 1964). It was only after this time that the benefits of a smoke free environment and the promotion of physical rehabilitation for people with coronary heart disease gradually became accepted in modern society.

In New Zealand community based rehabilitation programmes were introduced around 1970 for patients with coronary heart disease. Edwin Nye, a cardiologist, was the first to introduce the concept of cardiac rehabilitation in Dunedin around 1970. The programmes run by a physiotherapist included land based aerobic activities combined with hydrotherapy sessions. By 1974 Nye had already published results of an examination of morbidity, mortality, and adherence to the programme after five years post event (Nye and Poulsen 1974) and the programme, run through the Phoenix Club, is still in existence today.

Moderate levels of aerobic activity were shown over 20 years ago to lead to delay all-cause mortality by lowering rates of cardiovascular disease and cancer risk (Blair et al 1989). Attributable risk estimates for all-cause mortality indicate that low physical fitness is an important risk factor in both men and women. It has also been shown that higher levels of physical fitness have a positive relationship by being a factor in delaying all-cause mortality primarily by lowering rates of cardiovascular disease and cancer (Blair et al 1989). The current body of knowledge in support of physical rehabilitation for reducing the risks associated with NCDs is huge but the content and presentation are important factors to consider in setting up a rehabilitation programme. For example, it is generally accepted that prescribing exercise in small bouts has greater benefits on adherence, cardiorespiratory fitness, and weight loss than a continuous period of exercise, as was demonstrated in the study on overweight women undertaken by Jakicic et al (1995).

Despite the high level of evidence for the benefits of physical activity and the fact that a global increase in activity levels is being advocated by all the key global health agencies, access to and uptake of cardiac rehabilitation programmes remains poor. In a study undertaken of patients admitted with a cardiac episode to New Zealand hospitals which provided access to cardiac rehabilitation services showed only 36% of patients were referred for rehabilitation. Further analysis showed attendees included a proportionately greater number of men, more representative of the older age group and of patients who had previously attended (Doolan-Noble et al 2004). The investigators concluded that not only was there a need to improve processes for referral but also the promotion and provision of programmes as well as outcome monitoring. Currently, the National Heart Foundation co-ordinates information on Phases II (outpatient) and III (community) cardiac rehabilitation and secondary prevention in the 13 regions throughout the country. The focus of the rehabilitation is on empowerment of individuals to take responsibility for their lifestyle including diet and exercise, quality of life, and support for individuals to return to a full and active life (National Heart Foundation 2012). However within New Zealand, as well as globally, the uptake of cardiac rehabilitation remains suboptimal so a variety of approaches to cardiac rehabilitation are being trialled in order to boost attendance rates. A systematic review undertaken in the United Kingdom to compare the effect of home based cardiac rehabilitation and supervised community groups on mortality, morbidity, quality of life, and modifiable risk factors showed that the two approaches were equally effective in improving clinical outcomes and health related quality of life in low risk patients (Dalal et al 2010). This finding suggests that where there is a choice, patients should be able to state their preferred approach to rehabilitation.

Innovative approaches to try to improve suboptimal levels of attendance are not peculiar to cardiac rehabilitation programmes. Pulmonary rehabilitation is the essence of

management for those with chronic obstructive pulmonary disease (COPD) and other chronic lung diseases but even for this group, attendance is suboptimal. Barriers such as access to services and lack of car parking nearby were identified (Yohannes and Connolly 2004). As for cardiac rehabilitation there is a high level of evidence to support pulmonary rehabilitation programmes, comprising physical activities, education, and training in self-management, and their positive effect on quality of life, acute exacerbations, and hospital admission levels, and as a consequence also health costs (Holland and Hill 2011). New approaches to improving attendance rates and outcomes of management of chronic pulmonary conditions include commencing pulmonary rehabilitation while the patient is still in the acute phase, changing training loads and physical activity levels over time, offering home based programmes, behaviour modification, and the use of telecommunications for programme reminders (Holland and Hill 2011).

A further development that has evolved from the days of the dependence on negative pressure and the iron lung for patients with polio affecting the respiratory muscles is the current best practice guideline for the application of positive pressure to deliver non-invasive ventilation (NIV) in patients with persistent hypercapnic ventilatory failure during exacerbations. In accordance with the National Institute for Health and Clinical Excellence (NICE) Guidelines for COPD (NICE 2010) NIV should be used as the treatment of choice in this situation. In many hospitals around the world it is the physiotherapists who are responsible for applying NIV to such patients admitted to emergency departments.

CONCLUSION

The WHO has a global action plan for the prevention and control of NCDs and has set targets to achieve major reductions in NCDs and their risk factors by 2025 (WHO 2011b). Targets include screening for risk factors, smoking cessation, reducing pollution, and increasing physical activity. The epidemic of NCDs and the growth in the number of people living to old age are set to remain for the foreseeable future and thus the demand for physiotherapists to provide physical rehabilitation, education, and preventive therapies will increase. We owe it to our patients to do what Miss Manthel (1938) did in managing patients during the polio epidemic: work hard, provide comprehensive patient centred rehabilitation including education, and optimise the opportunities that come from collaborating with our health professional colleagues.

KEYPOINTS

- The expertise built up by physiotherapists in rehabilitation of patients with poliomyelitis is in demand as post-polio syndrome is now being diagnosed in these people as they age.
- There is a high level of evidence for rehabilitation programmes to reduce the risks associated with the current global epidemic of non-communicable diseases.
- Attendance rates and compliance with rehabilitation programmes is suboptimal so new ways of approaching rehabilitation are being developed to improve the potential for all to benefit from the rehabilitation.

Figure: Early rehabilitation for polio (Acknowledgements: the Frank Weedon collection).

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