



Immuno-modulation with lifestyle behaviour change to reduce SARS-CoV-2 susceptibility and COVID-19 severity: goals consistent with contemporary physiotherapy practice

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Abstract

Lifestyle-related non-communicable diseases (NCDs) and their risk factors are unequivocally associated with SARS-CoV-2 susceptibility and COVID-19 severity. NCD manifestations and their lifestyle risks are associated with chronic low-grade systemic inflammation (CLGSI). This review supports that immuno-modulation with positive lifestyle change aimed at reducing SARS-CoV-2 susceptibility and COVID-19 severity, is a goal consistent with contemporary physiotherapy practice. Physiotherapists have a long tradition of managing a , thus, managing CLGSI is a logical extension. Improving patients' lifestyle practices also reduces their NCD risks and increases activity/exercise capacity, health and wellbeing – all principal goals of contemporary physiotherapy. The COVID-19 pandemic lends further support for prioritising health and lifestyle competencies including smoking cessation; whole food plant-based nutrition; healthy weight; healthy sleep practices; and stress management; in conjunction with reducing sedentariness and increasing physical activity/exercise, to augment immunity as well as function and overall health and wellbeing. To support patients' lifestyle change efforts, physiotherapists may refer patients to other health professionals. The authors conclude that immuno-modulation with lifestyle behaviour change to reduce susceptibility to viruses including SARS-CoV-2, is consistent with contemporary physiotherapy practice. Immuno-modulation needs to be reflected in health competencies taught in physiotherapy professional education curricula and taught at standards comparable to other established interventions.

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Contribution of paper

- NCDs and their lifestyle risks are highly associated with COVID-19 susceptibility/poor outcomes, as well as contributing to physical impairment
- NCDs and their lifestyle risk factors are highly modifiable with behaviour change, if not, reversible, over relatively short timeframes
- As an effective evidence-based intervention, health behaviour change is highly consistent with physiotherapy practice, which is largely conservative
- Physiotherapists can lead in re-doubling efforts toward eradicating NCDs, thereby mitigating pandemic waves while maximising function.

Keywords: Chronic low-grade systemic inflammation; COVID-19; Disease prevention; Health promotion; Non-communicable diseases; SARS-CoV-2

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Introduction

In light of contemporary physiotherapists' scope of practice and in conjunction with its expanding evidence base, this review supports physiotherapists' role in reducing SARS-CoV-2 susceptibility and poor outcomes of COVID-19 through immune-modulation [1]. Risk factors for SARS-CoV-2 infection are largely the lifestyle-related non-communicable diseases (NCDs) including heart disease, hypertension, stroke, cancer, renal disease, obesity, and type 2 diabetes [2,3]; all of which are largely preventable and manageable [4]. Improvement in outcomes can be achieved with positive lifestyle behaviour change which upregulates or boosts the response of the immune system. Based on the extant literature, the authors propose that the well-documented chronic low-grade systemic inflammation (CLGSI) that underlies NCDs [5] lowers an individual's inflammatory threshold. This increases susceptibility to superimposed infection from viruses such as SARS-CoV-2 and blunts an effective immune response, thereby worsening outcomes. Implications for physiotherapy practice are described including the need for standardised health competencies [6]. Such competencies including lifestyle behaviour change are core to the contemporary practice of physiotherapists given that, of the established health professions, they are the leading health professionals that primarily exploit non-pharmacologic/non-surgical management [6]. Finally, the authors propose that health behaviour change competencies warrant being taught with comparable rigour as other established physiotherapy interventions. This includes foundational didactic knowledge and evidence-based competencies evaluated in written exams, and in practical and clinical settings.

Physiotherapists' evolving scope of practice

Over its 100-plus year history, physiotherapy has become an autonomous internationally-recognised health profession. It is the third largest established health profession except for pharmacy and dentistry which have distinct practice patterns [7]. Of these, it is the leading established predominantly non-invasive health profession. Over time, physiotherapists have become increasingly committed to developing a unique body of knowledge with competencies aimed at maximising activity/exercise capacity, health and wellbeing. It is now well established that activity/exercise capacity can be augmented with healthy lifestyle practices including not smoking; quality nutrition; weight control; moderate, if any, alcohol consumption; sleep hygiene; and stress management, as well as reduced sedentariness, increased physical activity including structured exercise [8]. Thus, effective lifestyle behaviour change is central to maximising physiotherapy and patient outcomes related to activity/exercise capacity, and overall health and wellbeing. By effecting healthier lifestyle practices in their patients, physiotherapists reduce CLGSI

that underlies NCDs and their risk factors, in turn, reducing susceptibility to viral infection or the risk of poor outcomes, if infected.

Physiotherapists' evolving role in reducing susceptibility to SARS-CoV-2 and managing COVID-19

The profession of physiotherapy has responded rapidly to define its role and practice competencies in the management of COVID-19 [9–12]. Initially, focus was on the acute management of respiratory manifestations particularly because these can be life threatening. As delayed symptoms of COVID-19 became documented in COVID-19 survivors, the long haulers [13–15], focus shifted to include guidelines for managing associated fatigue, breathlessness, cognitive disturbances, and overall exercise intolerance. Based on extant literature, compelling arguments can be made to support physiotherapists' role in preventing SARS-CoV-2 susceptibility, as well as mitigating the signs and symptoms of COVID-19, with a focus on immune-modulation through lifestyle behaviour change.

Physiotherapists are well recognised on the basis of managing acute inflammation associated predominantly with a range of musculoskeletal soft tissue injuries. They prescribe a variety of immune-modulating interventions aimed at reducing the hallmarks of acute inflammation, namely, swelling, heat, pain, and movement limitation; and augmenting tissue healing and repair [16]. Immuno-modulation can be defined as modification of the body's immune system to activate or suppress its function [1]. The immune response is fundamental to both eliminating or reducing the threat of tissue damage, and promoting its repair. Following acute infection, injury or pathological process that threatens tissue health and function, the immune response is mobilised leading to a cascade of well-documented reactions [5]. With judicious health promotion education, physiotherapists can strengthen these responses in their patients.

Mid-20th century, the economy of the industrialised world began recovering after world war II. Increasingly, the lifestyle of the industrialised countries became characterised by several previously-mentioned lifestyle practices that are now well documented to be detrimental to activity/exercise capacity, healing and repair, and to health overall. Commensurate with the adoption of these unhealthy lifestyle practices typically beginning in childhood and adolescence, the prevalence of lifestyle-related NCDs escalated throughout the latter half of the 20th century to present-day global 'pandemic' levels. Despite their being largely preventable, NCDs are now the leading causes of disability and premature death in high-income countries and increasingly in middle- and low-income countries with globalisation [4].

As the incidence and prevalence of the NCDs escalated, physiotherapists responded. They not only began to manage the functional deficits of patients with lifestyle-related NCDs

Italy Coronavirus Deaths and Multi - morbidity (%)

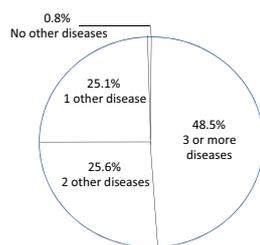


Fig. 1. The proportion of COVID-19 deaths by number of multi-morbidities in Italy at the peak of the pandemic in that country, resembling the distribution globally.

Adapted from: ISS Italy National Health Institute. https://www.epicentro.iss.it/coronavirus/bollettino/Report-COVID-2-19-17_marzo-v2.pdf.

as primary or secondary conditions, but also they became active in their prevention with imparting health knowledge and education [17]. Over the past 20 years however, the role of CLGSI in the underlying pathophysiology of NCDs has been unequivocally established [5]. In response, there has been a call within the profession to be increasingly engaged in NCD prevention as well as management, including the need for standardised health competencies [6,18].

Physiotherapists' competency in immuno-modulation for CLGSI

A virulent inflammatory load, such as SARS-CoV-2 infection superimposed on CLGSI associated with NCDs [19,20], can initiate a cytokine storm, an over whelming immune response leading to COVID-19 and its potential dire consequences [21]. Adverse lifestyle practices contributing to most NCDs that have been well documented to be pro-inflammatory, include the standard western diet, specifically, processed and refined foods; inadequate vegetables, fruits and legumes; inadequate consumption of whole grains; consumption of animal protein; and excess fat, sugar and salt; inactivity; and smoking [22–24]. Superimposed SARS-CoV-2 infection exacerbates this pro-inflammatory response. This has been evidenced in the two most severely affected sub-populations, older people and those with multi-morbidity. These two cohorts have increased susceptibility to SARS-CoV-2, greater disease severity, and poorer outcomes including mortality [25]. To dramatically illustrate this point, the figure shows data from Italy supporting the strong association between NCDs and SARS-CoV-2 related deaths. Of those who died, less than 1% had no underlying conditions. These data support a protective role of NCD risk factor modification (Fig. 1).

Reducing the inflammatory load on the immune systems of patients by addressing CSLGI and enabling them to respond more effectively to acute infection, warrants being a primary clinical goal. This can be achieved by targeting the causes of CLGSI through promoting the adoption of an immune-

boosting, anti-inflammatory lifestyle including consuming a whole food plant-based diet [26–29]; participating in regular moderately-intense physical activity [30,31]; and not smoking [32]; in addition to moderate alcohol use, improving sleep quality and effectively managing stress.

The pathological correlates of oxidative stress associated with NCDs and their risk factors and consequent CLGSI can be reversed or minimally improved with effective lifestyle behaviour change [33–36]. Positive health promoting changes can be effective within short timeframes such as days or weeks for high blood pressure, cholesterol and abnormal blood sugars. Reversal of atherosclerosis based on angiographic evidence or sustained weight loss however, may require months or a year or more [37,38]. Given that the COVID-19 pandemic timeline including multiple waves is estimated to be months or years [39] however, there is time to minimise CLGSI and viral susceptibility in our patients as well as NCD risk. Even though physiotherapists may have a limited number of visits with their patients, the process of lifestyle behaviour change can be initiated and follow-ups can be scheduled electronically or by phone. As autonomous health professionals, physiotherapists also need to assess their patients and evaluate their need for referral to other health professionals. As positive health behaviour changes take effect, physicians will need to monitor their patients to eliminate or reduce medications. A close and collaborative working relationship of the physiotherapist with the health care team and the patient is essential.

Standard health competencies in physiotherapy professional curriculum consistent with immune-modulation

Health competencies consistent with a framework of health and lifestyle behaviour change are strongly supported within the profession of physiotherapy given its contemporary scope of practice [40,41]. These are consistent with those competencies for effective immune-modulation to boost patients' immune status by reducing pro-inflammatory health practices and increasing anti-inflammatory practices. These health competencies warrant being taught in physiotherapy professional education curricula in a manner comparable to other competencies. Foundational knowledge consists of the scientific basis of behavioural change competencies, which is followed by student evaluation and demonstration of these competencies practically and clinically. Given many practising physiotherapists have not been formally trained in health competencies, this constitutes an essential topic for their continuing professional education.

Finally, consistent with accreditation standards for physiotherapy education programmes, World Physiotherapy (formerly, the World Confederation for Physical Therapy) has an increasing number of member organisations and countries that are incorporating health promotion and lifestyle behaviour change as physiotherapy competencies into the

curricula of their physiotherapy entry-level programmes. Such competencies are consistent with physiotherapy's goal of augmenting general health as well as patients' activity/exercise capacity. In addition, augmenting general health independently can increase patients' activity/exercise capacity. Such a health-based practice inherently requires interprofessional team work and clinicians' knowledge and capacity to refer to other health professionals. By virtue of being termed 'health' professional, health professionals have a collective responsibility to at least initiate (assess and intervene) or to refer to others. Positive lifestyle change reduces the need for medication, e.g., for elevated blood pressure, blood sugar, and blood lipids, thus patients need to be closely monitored by their physicians when undertaking a lifestyle change programme. This process needs to be initiated by the physiotherapist when initiating a lifestyle behaviour change programme with patients. Health professionals are required to support and follow-up their patients' progress, accordingly. Physiotherapy referral to other health professionals requires professional autonomy; countries are at various stages of having their physiotherapists being recognised as referring clinicians.

Conclusion

Physiotherapists are strategically well positioned to address chronic inflammation underlying NCDs through immune-modulation with effective lifestyle behaviour change, itself a unique clinical competence. Strengthened immunity increases infection threshold, thereby reducing risk of infection, and improving outcomes should a patient become infected with SARS-CoV-2 and its variants or other micro-organisms. More than ever, the COVID-19 pandemic calls for standardised health and lifestyle behavior change competencies to be formally integrated into physiotherapy professional education curricula. Further, these need to be taught at comparable accredited standards as for other established physiotherapy practices. As autonomous leading established health professionals, physiotherapists have a major role to play in health promotion and prevention of acute as well as chronic diseases and underlying inflammation related to both.

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Conflict of interest: None declared.

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