Prescribing Nature in Primary Care: A Non-Pharmacological Approach to Complement Current Chronic Disease Management

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ABSTRACT

Chronic diseases account for a large proportion of morbidity and mortality worldwide. Chronic diseases negatively affect patients' health and quality of life, and increase healthcare expenditures. Nurse Practitioners must seek out cost-effective initiatives to decrease the burden of chronic diseases; prescribing time spent in nature is one such initiative. Spending time in nature improves mental and physical health and helps people become more environmentally conscious, thereby benefiting planetary health. Social prescriptions, such as green prescriptions, are an effective tool to encourage patients to spend more time in nature on a regular basis, which can lead to significant health benefits.

KEYWORDS: Nature, health, green space, forest, wellbeing, green prescribing, social prescriptions, planetary health

Noncommunicable chronic diseases account for 74% of deaths globally each year.[1] Cardiovascular diseases account for most of these deaths, followed by cancers, chronic respiratory diseases, and diabetes.[1] In Canada, 44% of adults over the age of 20 live with at least one of the following chronic conditions: hypertension, osteoarthritis, mood and/or anxiety disorders, osteoporosis, diabetes, asthma, chronic obstructive pulmonary disease, ischemic heart disease, cancer, and dementia.[2] Chronic illness is costly to the healthcare system; at $7,507 per person annually, Canada has some of the highest healthcare expenditures of any country, trailing behind only the United States, Germany, and the Netherlands.[3] In 2010, Canada's direct health expenditures totalled $183.1 billion, with another $18.9 billion in indirect health expenditures related to loss of productivity due to morbidity and informal caregiving.[4]

Nurse practitioners (NP) play an important role in health promotion and disease prevention.[5] As such, NPs are ideally situated to recommend and prescribe time in nature, which is a cost-effective strategy for illness prevention and health promotion that can also reduce the economic burden of chronic diseases.[6] As an additional benefit, recommendations to spend more time outdoors tend to decrease sedentary time and increase exercise, without the resistance that typically occurs when patients are explicitly directed to increase exercise time.[7] In addition to the direct benefits on patients' mental and physical health, spending time in nature helps individuals become more environmentally conscious, ultimately benefiting the health of the planet.[8]

Defining Nature

Nature is a broad term that can have a variety of meanings and interpretations for different individuals. Research studies examining the health benefits of nature have focused on the effects of green spaces or forests in contrast to more urbanised environments. For example, one study examined the effects of forest therapy on serotonin.[9] The researchers described the forest site in detail, including its overall size (in square meters) and distribution of trees (by type and percentage). The forest site was studied in contrast to an urban site, which had a tree-lined sidewalk with a single type of tree and no green space within a one-kilometer radius.[9] Other studies have been less precise in their definition of nature and have included a variety of settings, such as gardens, parks, sports fields, and woodlands.[10] Some studies have referred more specifically to "forest-bathing", also known as "shinrin-yoku," which is a Japanese practice that includes mindfulness of all five senses while immersing oneself in nature.[11] Mental and physical health benefits of one's own neighbourhood, including one's own backyard, have also been studied.[6] Regardless of the exact definition used, existing studies on nature therapy have identified consistent health benefits, both mental and physical. Further research is needed to determine if distractions, such as electronic devices, may negate the positive effects of nature exposure.

It is apparent that spending time in nature can mean different things to different people, and may vary depending on context. In clinical practice, it would be beneficial to use a broader definition of nature that simply encourages clients to spend time outside, without being overly restrictive about the specific natural environment. For this purpose, nature could be defined as any area consisting of living plants and animals that may have varying degrees of man-made influences. This broader definition allows for a variety of nature settings, ranging from a small urban park to a remote wild forest,[12] many of which are readily accessible to most people and all of which will provide some health benefit. Therefore, this type of definition makes it easier for NPs to prescribe nature as an adjunct to traditional chronic disease management.

Health Benefits of Nature

COVID-19 Pandemic

Research on the benefits of time spent in nature has gained traction in recent years, especially during the COVID-19 pandemic.[13-15] COVID-19 restrictions resulted in negative psychological consequences for many affected individuals;[13] depression and anxiety commonly occurred as a result of loneliness and boredom, while reduced physical activity negatively affected physical health.[14] During the pandemic, researchers studied Canadian undergraduate students' wellbeing and found that those who spent more time in nature reported higher levels of wellbeing.[13] Wellbeing was measured according to the students' affect, vitality, ability to flourish, and overall life satisfaction.[13]

During the COVID-19 pandemic, increased exposure to nature improved the health and wellbeing of individuals, both mentally and physically.[14] Researchers documented several benefits of nature therapy during the pandemic, including increased physical activity, improved sleep, reduced stress, and decreased rates of mental health disorders such as depression and anxiety.[14] In addition, time spent in nature was correlated with lower perceived levels of stress and an improved ability to cope with life during the pandemic.[15] Research has shown that lower stress levels are directly correlated with positive health effects.[16] It is well recognized that stress affects autonomic and neuroendocrine responses; as such, chronic stress can lead to the development of hypertension, atherosclerosis, inflammation, fatigue, obesity, and other chronic diseases.[16] Chronic stress can also indirectly increase negative coping mechanisms, including gravitation toward dietary patterns that are high in fat and low in fruit and vegetable intake, which can contribute to obesity, cardiovascular disease, and cancer risk.[16]

Mental Health

Spending time in nature is associated with a significant decrease in the stress hormone cortisol;[17,18] the amount of time spent in nature is directly and positively correlated with the degree of stress reduction a person experiences.[17] However, the most significant stress reduction is achieved within the first 20 to 30 minutes of nature exposure.[17] Furthermore, living in a neighbourhood with a high percentage of natural vegetation has been associated with improved mental health.[19] Meditating and exercising in a forested environment has been shown to increase serotonin levels, leading to elevated mood.[9] Forest bathing has been shown to decrease symptoms of depression[20,21] and anxiety.[20] When immersion in nature is combined with daylight exposure, there is a potentiating effect on the mood and affect of those with symptoms of depression.[22]

Physical Health

While spending time in nature has been shown to improve mental health, it is also associated with physical health benefits. Spending time in forests has been shown to significantly reduce both systolic and diastolic blood pressure, particularly for individuals diagnosed with hypertension.[23] Fatigue can affect mental and physical wellbeing, and research conducted on truck drivers found that those who visited gardens, parks, sports fields, allotments, woodlands, lakes, rivers, coastlines, beaches, or mountains at least once per week experienced less chronic and acute fatigue.[10] Various positive associations between nature exposure and health have been found, including improved cognitive function, brain activity, blood pressure, mental health, physical activity, and sleep.[24]

Many studies have examined the correlation between nature exposure and the prevention of specific diseases. One study found the risk of developing Parkinson's disease was significantly decreased with exposure to higher levels of residential greenness.[25] Another study examined the effects of outdoor light exposure on myopia in school children, and found that increasing time spent outdoors during the school day led to delayed onset and slowed progression of myopia in the study participants.[26] Furthermore, increased exposure to green spaces, and more time spent playing outdoors, decreased the need for spectacles (a probable marker of myopia) in school children.[27] Research examining asthma hospitalizations found that there were significantly fewer acute asthma hospitalizations in areas with higher tree density.[28] In another study, elderly patients with COPD who were brought on a forest bathing trip experienced significantly lower levels of perforin, granzyme B, pro-inflammatory cytokines, and stress hormones when compared to the control group who were brought to an urban setting.[29] Men living in areas with higher levels of greenness showed reduced risk of prostate cancer.[30] In a nation-wide study in the United States, women with higher levels of greenness around their home had lower rates of all-cause mortality, with the strongest findings for mortality from cancer, respiratory, and kidney disease.[31]

It is important to consider that simply spending more time outdoors may increase time spent in physical activity and, thus, decrease sedentary time.[7] It has been suggested that setting targets for outdoor time may be met with less resistance from patients than setting targets for physical activity. Both of these targets may improve patients' physical activity levels and, thus, result in the same or similar health benefits.[7]

Social Prescribing

Prescribing non-medical interventions to improve health behaviours and manage chronic conditions is referred to as social prescribing. The purpose of social prescribing is to connect patients with activities or support services within their community.[32] A green prescription, which falls under the umbrella of social prescribing, is a formal recommendation for patients to spend time in nature to benefit their health and wellbeing.[33] Patients are more likely to follow a social prescription if the chosen activity is readily accessible and the positive benefits from the activity are clear.[34] Spending time in nature may be more challenging for those living in an urban centre, where there is limited access to green spaces. However, it should be emphasized that any time spent outdoors will produce some benefit, especially in terms of reducing sedentary time.[7] Nurse practitioners who provide green prescriptions should follow up with their patients to review the patients' experiences of spending more time outdoors and to monitor specific markers of health, including blood pressure, mood, affect, and stress levels.[34]

Nurse practitioners can use the following screening questions to identify clients who might benefit from a nature prescription: "Have you been outside yet today?" and "Have you been outside in nature in the last week to walk, hike, play with a pet, listen to birds, garden, or have a picnic?".[35(p69)] If the patient responds "no" to both questions, they likely have a nature deficit and could benefit from a nature prescription.[35] The nature prescription should include specific types of activities as well as location, duration, and frequency.[35] In addition, it may be beneficial to request that the patient record their mood, feelings, blood pressure, and heart rate before and after the nature activity.[35] Although there is no consensus on the exact amount of time patients should spend in nature, at least 120 minutes per week has been shown to improve overall health and wellbeing.[36] The 120 minutes of nature time is cumulative, and can be broken down into smaller sessions of 20 to 30 minutes over the course of the week; shorter periods of nature exposure can still produce significant health benefits.[17]

The British Columbia Parks Foundation initiated a national program called PaRx to assist healthcare providers in prescribing nature.[37] This program allows NPs and other healthcare providers to prescribe one Parks Canada Discovery Pass per month; the pass provides one year of free access to all national parks, national historic sites, and national marine conservation areas.[37] The aim of the program is to increase patients' access to nature and, given

that an NP can prescribe one pass each month, should prioritize clients for whom financial barriers would prevent access. The PaRx program has been endorsed by multiple medical schools as well as physican and NP groups across Canada. Licensed healthcare providers simply need to register on the program's website to receive instructions on how to engage in this initiative.[37]

Planetary Health

The health of human beings is inextricably linked to the stability of Earth's natural environments.[38] As a result, planetary health is directly linked to human health. Planetary health is defined as the interdependent power of all natural and man-made ecosystems to live, grow, and thrive.[39] Planetary health research has highlighted key areas of planetary damage, including pollution, climate change, and loss of biodiversity, all of which negatively affect the health of human beings.[40] For example, extreme weather, multi-year warming, and tropical cyclone exposure are each associated with worsening markers of mental health.[41] In addition, climate change has contributed to increased incidences of Lyme disease in the United States, due to higher annual average temperatures that have increased tick survival and enhanced their host-seeking behaviors.[42] These are just a few examples of how human health is affected by damage to the Earth's natural environments.

Spending time in nature has been found to increase one's value for and connection to nature, which leads to an increase in pro-environmental attitudes and behaviors.[8] By encouraging patients to spend time in nature to improve their physical and mental health, NPs are also developing more environmentally conscious citizens, thereby contributing to planetary health.[33,43] When citizens are passionate about improving the health of their communities and environment, they may become involved in political and legal actions, and pressure governments to make positive legislative changes to improve planetary health.[44] As such, health becomes more than just an individual concern; it becomes a community concern, as members of the community realize that decreasing pollution and improving planetary health can enhance the health and wellbeing of all those living within the community.[45]

Conclusion

Chronic diseases are significant contributors to global morbidity and mortality as well as rising healthcare expenditures. Therefore, it is critical to find cost effective interventions to treat and manage these illnesses. Nurse practitioners can incorporate nature prescribing into their regular practice to improve patients' health outcomes, reduce healthcare spending, and contribute to planetary health. Since any amount of time spent outdoors can increase patients' level of physical activity and improve overall health, nature prescriptions can use broad definitions of time spent in nature. When writing nature prescriptions, NPs should focus on the types of activities most readily available and accessible to patients, based on factors such as proximity and transportation. Nurse practitioners should prescribe 120 minutes per week of outdoor time, encourage patients to engage in activities they enjoy, and monitor changes in patients' mental and physical health as they begin spending time in nature. Individuals who spend more time outdoors develop a greater connection to nature and the environment, and become more environmentally conscious citizens who tend to modify their behaviours and choices to improve planetary health, which positively impacts human health.

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