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CURRENT OPINION

Exercise for Multimorbid Patients in Primary Care: One Prescription for All?

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Abstract The purpose of this article was to discuss guidelines for the management of the most prevalent chronic diseases treated by primary care physicians (PCPs) in order to identify the best exercise regimen for each clinical population, and to provide preliminary guidance for primary care providers on exercise counselling in the 'real-world' context of multimorbidity. After a search of the PubMed electronic database, the 11 most prevalent conditions currently treated by PCPs were identified. The recommendations provided by recognised learned/scientific societies for the management of each disease were then examined and any recommendations involving physical activity and exercise were identified. It was found that the best exercise regimen (i.e. exercise type, intensity, duration, and frequency) was very similar across chronic diseases, which suggests that elaborating and implementing a standardised, minimum exercise guideline for multimorbid patients in primary care may be an alternative approach to time-costly individualised exercise prescriptions. Based on this finding, I propose an example of standardised, cross-disease exercise prescription, and discuss how such a prescription could be operationalised by PCPs in their routine clinical practice.

Key Points

Exercise is part of the management guidelines for the most prevalent chronic diseases treated in primary care.

The best exercise regimen (i.e. exercise type, intensity, duration, and frequency) is very similar across chronic diseases.

Elaborating and implementing a standardised, minimum exercise guideline in primary care for multimorbid patients may be an alternative to time-costly individualised exercise prescriptions.

1 Introduction

Physical activity (PA) and exercise are recognised as one of an individual's vital signs [1] and are important factors for health promotion in overall healthy adults and several clinical populations [2–5]. Exercise, a subset of PA that is planned, structured, repetitive, and purposeful, and that is frequently employed for improving or maintaining optimal levels of physical fitness and function, is often used as complementary treatment for very prevalent, burdensome, and costly noncommunicable disease (NCD), such as heart disease [6], stroke [7], osteoarthritis [8], osteoporosis [9], and diabetes [10].

Despite this recognition, PA and exercise are rarely assessed and promoted in the primary care setting [11–14]. Furthermore, when primary care physicians (PCPs) discuss PA with patients, discussions are short (1.5 min on

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average) and rarely involve providers' recommendations [15]. Indeed, lack of time is the most important barrier to PA counselling in primary care [16]. Furthermore, researchers have estimated that a physician would need to spend 108 h per year (i.e. >5% of the total average physician time per year) to provide the recommended PA counselling to patients [17]. Besides lack of time, lack of knowledge of PA and lack of counselling protocols, which are completely lacking in the context of multimorbidity (i.e. the presence of two or more chronic conditions), constitute obstacles to PA counselling in primary care. The high prevalence of NCDs and, most importantly, multimorbidity among patients in primary care [18–20] increases, therefore, the difficulty in providing adequate PA counselling in this clinical setting.

The purpose of this current opinion article was to discuss guidelines for the management of the most prevalent chronic diseases treated by PCPs in order to identify the best exercise regimen for each clinical population and to provide preliminary guidance for primary care providers on exercise counselling in the 'real-world' context of multimorbidity.

2 Multimorbidity in Primary Care

Studies relating to the prevalence of NCDs and multimorbidity in primary care are sparse [21]. These areas were recently investigated in a cross-sectional study in the US using the PPRNet database, a national primary care practice-based research network, with data from 148 primary care practices, for a total of 667,379 patients aged ≥18 years [18]. The PPRNet found that one-third of patients had either hypertension or hyperlipidaemia, and almost half had multimorbidity [18]. A small number of observational studies in European countries have also investigated the prevalence of NCDs and multimorbidity in primary care adult patients [19–23]. A list of some of the most prevalent chronic conditions for adults aged ≥18 years currently treated in primary care in the US and Europe is presented in Table 1. Beyond individual prevalence, co-occurrence among the conditions presented in Table 1 is very common [20, 23–25]. Hypertension often co-occurs with hyperlipidaemia and/or heart disease and/or diabetes and/or obesity, while patients with either diabetes or heart disease often have hypertension and/or hyperlipidaemia and/or obesity. Asthma, as well as chronic obstructive pulmonary disease (COPD) [26], often co-occurs with hypertension and/or diabetes and/or heart disease [24, 27]. Additionally, subjects suffering from back pain frequently have osteoarthritis or osteoporosis. Several of these diseases are often associated with depression.

Table 1 Some of the most prevalent chronic conditions among adults aged ≥18 years treated in the primary care setting in the US and in European countries [18–22]

Hypertension
Hyperlipidaemia
Depression
Gastroesophageal reflux
Diabetes mellitus
Obesity
Osteoarthritis
Asthma
Osteoporosis and osteopenia
Heart disease[a]
Chronic low back pain

[a] Defined as coronary artery disease or heart failure

3 Methodological Considerations

Although this article is not a literature review, an electronic search was performed in order to gather information on the main diseases currently treated by PCPs. The recent literature relating to chronic conditions among adult patients in primary care was first searched in PubMed in order to identify the most prevalent diseases treated in this setting. We restricted our search (see electronic supplementary material Table S1) to articles published from 2011 onwards (last 5 years) in an attempt to obtain data likely to mirror the reality of conditions currently treated by PCPs. Articles using any study design (except controlled trials, as interventional studies, such as exercise training, may impact the management of NCDs and therefore the patient's needs and use of primary care resources) were selected if they reported data relating to the prevalence of diseases treated in primary care. References of the retrieved articles [18–22], which included a systematic review [21], were cross-matched to find other potentially relevant studies. From the retrieved articles, some of the most prevalent conditions treated in primary care were identified, as shown in Table 1.

To examine whether PA and exercise are part of best practice for the management of specific diseases according to current guidelines, we examined the recommendations provided by recognised learned/scientific societies for the management of each disease and identified any recommendation involving PA and exercise. We also examined whether the American College of Sports Medicine (ACSM) has published specific recommendations for the diseases, the ultimate goal being to identify the best exercise prescription for each clinical population. Although no objective criteria were used for the selection of societies, all are well-established and internationally recognised learned/scientific societies responsible for the elaboration

of disease management guidelines for the specific chronic conditions examined.

4 Current Physical Activity and Exercise Recommendations for Selected Chronic Conditions

Table 2 shows, for each disease, the learned/scientific societies investigated, whether their recommendations involved PA and exercise, and the exact PA and exercise recommendations provided. For the majority of the 11 conditions examined, the learned/scientific societies clearly identified exercise as an important factor in disease management. For cardiovascular and metabolic conditions, i.e. hypertension, hyperlipidaemia, diabetes, obesity, and heart disease, exercise is a well-established aspect of disease treatment, leading learned/scientific societies to propose precise exercise guidelines for patients with those conditions. Although these societies identified PA and exercise as an aspect of the treatment of musculoskeletal and bone conditions, i.e. osteoporosis, back pain and osteoarthritis, precise exercise prescriptions for those patients were rare. If reported, the prescriptions were the same as the current international PA guidelines for public health [63], i.e. at least 150 min per week of moderate-intensity aerobic PA, or 75 min per week of vigorous-intensity aerobic PA, or an equivalent combination of moderate- and vigorous-intensity aerobic activity and muscle-strengthening activities of moderate or high intensity on 2 or more days a week (national guidelines in most countries, including the US and the UK, are similar to these international guidelines). Information relating to the role of PA and exercise for the management of asthma remains inconclusive. Gastroesophageal reflux disease (GERD) was the sole condition for which PA and exercise were not considered important aspects of disease management. However, since one of the recommendations for the management of GERD is weight loss for overweight subjects or those who have recently gained weight, it is plausible to suggest that PA and exercise may play an indirect role in a subpopulation of patients with this condition.

Examination of the reports from the learned/scientific societies (Table 2) revealed that the exercise prescriptions for different diseases were very similar. For example, the exercise prescription for hypertensive patients [25, 26], patients with hyperlipidaemia [25, 27], those with type 2 diabetes [32–36], patients with heart disease (coronary artery disease) [54], and patients with depression [29] suggests that patients should undertake 120–180 min per week of moderate-to-vigorous activity. For patients with obesity [37–40] or heart failure [53, 54], a minimum of 150 min per week of PA applies, but societies suggest up to 300 min per week. In patients with obesity, for example, this higher rate of PA is more effective for avoiding weight regain [39, 40]. Osteoporosis guidelines appear to provide similar recommendations (30 min daily) [49]. Resistance training, i.e. exercises performed to improve muscle strength, is part of the exercise prescription for several conditions, such as diabetes, osteoarthritis, osteoporosis and heart disease; exercises of moderate- to vigorous-intensity two to three times per week is prescribed for all of these conditions.

5 A Standardised Exercise Prescription for Patients with Asymptomatic Conditions

Since the exercise recommendations vary only minimally across the most prevalent chronic conditions, multimorbid patients with asymptomatic diseases may, in theory, benefit from a single, standardised exercise prescription, with only minimal adaptations to the specificities of some diseases (e.g. patients with osteoporosis should be encouraged to do weight-bearing, rather than water-based, activities). On the basis of the guidelines examined and displayed in Table 2, an example of a standardised, cross-disease exercise prescription is proposed in Table 3; however, it is important to note that this exercise prescription would only apply to asymptomatic patients who the PCP, on the basis of his/her clinical judgement, considers could start moderate-intensity exercise without the need for further specific examination. Multimorbid patients with signs and symptoms of their disease may require further medical examinations; these patients may also need to exercise under the surveillance of a clinical exercise physiologist or equivalent health professional.

Since, for most of the examined diseases, the PA and exercise prescription (Table 2) indicate patients should engage in 120–180 min per week of moderate-to-vigorous activity, this lower range was defined as the minimum PA that multimorbid patients should target. The example of a standardised guideline shown in Table 3 may represent a conservative approach for some conditions (e.g. obesity); however, it has the advantage of being safe and potentially effective for all patients provided their disease is asymptomatic. Moreover, this minimum exercise prescription can potentially be provided by the PCP in a brief advice format during a typical time-constrained consultation, especially when accompanied by supporting written material (e.g. electronic supplementary material Box S1).

The exercise prescription provided in Table 3 is similar to current public health guidelines on PA [63] but with three main differences:

Table 2 Recommendations relating to physical activity in guidelines for the management of the most prevalent chronic conditions treated in primary care practice

Chronic condition	Learned/scientific society	Recommendation and PA[a]	Excerpts from recommendations
Hypertension	ASH/ISH [28]	Direct recognition, no PA prescription	"Patients should be encouraged to walk, use bicycles, climb stairs, and pursue means of integrating physical activity into their daily routines"
	NICE [29]	Direct recognition, no PA prescription	"Ascertain people's (…) exercise patterns because (…) regular exercise can reduce blood pressure. Offer appropriate guidance and written or audiovisual materials to promote lifestyle changes"
	ACC/AHA [30]	Direct recognition and PA prescription	"3 to 4 sessions per week, lasting on average 40 minutes per session, and involving moderate- to vigorous-intensity physical activity"
	ACSM [31]	Direct recognition and PA prescription	"*Frequency:* on most, preferably all, days of the week. *Intensity:* moderate-intensity (40–60% of VO_2R)[b]. *Time:* 30 min of continuous or accumulated physical activity per day. *Type:* primarily endurance physical activity supplemented by resistance exercise"
Hyperlipidaemia	ACC/AHA [30]	Direct recognition and PA prescription	"3–4 sessions per week, lasting on average 40 min per session, and involving moderate- to vigorous-intensity physical activity"
	NICE [32]	Direct recognition and PA prescription	"At least 150 min of moderate intensity aerobic activity or 75 min of vigorous intensity aerobic activity or a mix of moderate and vigorous aerobic" AND "muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders and arms)"
Depression	APA [33]	Direct recognition, no PA prescription	"For patients with depression of any severity and no medical contraindication to exercise, physical activity is a reasonable addition to a treatment plan for major depressive disorder. The optimal regimen is one the patient prefers and will adhere to"
	NICE [34]	Direct recognition and PA prescription	"Physical activity programmes for people with persistent subthreshold depressive symptoms or mild to moderate depression should: be delivered in groups with support from a competent practitioner; consist typically of three sessions per week of moderate duration (45 min to 1 h) over 10–14 weeks (average 12 weeks)"
Gastroesophageal reflux	ACG [35]	No recognition	
	NICE [36]	No recognition	
Diabetes mellitus	ADA/ACSM [37]	Direct recognition and PA prescription	"Aerobic exercise (…) at least 3 days/week (…) at least at moderate intensity, corresponding approximately to 40–60% of VO_2max (…) minimum of 150 min/week of exercise undertaken at moderate intensity or greater" AND "Resistance exercise (…) at least twice weekly (…), but more ideally three times a week (…) moderate (50% of 1-RM) or vigorous (75–80% of 1-RM) (…). Each training session should minimally include 5–10 exercises involving the major muscle groups (in the upper body, lower body, and core) (…). A minimum of one set of repetitions to near fatigue, but as many as three to four sets, is recommended"
	NICE[c] [38]	Direct recognition, no PA prescription	"Integrate dietary advice with a personalised diabetes management plan, including (…) increasing physical activity"
	NICE [39]	Direct recognition and PA prescription	"All adults aged 19 years (…) over a week (…) 150 minutes (2.5 hours) of moderate intensity physical activity in bouts of 10 minutes or more. Alternatively (…) 75 minutes of vigorous intensity activity (…) or combinations of moderate and vigorous intensity activity. (…) physical activity to improve muscle strength on at least 2 days a week. (…) minimise the amount of time spent being sedentary (sitting) (…). Older adults (65 years and over) who are at risk of falls should incorporate physical activity to improve balance and coordination on at least 2 days a week. (…) the key issue is that some activity is better than no activity"

Table 2 continued

Chronic condition	Learned/scientific society	Recommendation and PA[a]	Excerpts from recommendations
	AHA [40]	Direct recognition and PA prescription	"Patients with T2DM accumulate a minimum of 150 min/week of at least moderate-intensity physical activity and/or 90 min/week of at least vigorous-intensity cardiorespiratory exercise. Additionally, resistance training three times per week should be encouraged. (…) Exercise should be completed on at least 3 days per week (…) Resistance exercises, all muscle groups should be used, and patients need to progress to 8–10 repetitions per set for a total of 3 sets"
IDF [41]	Direct recognition and PA prescription	"30–45 min on 3–5 days per week, or an accumulation of 150 min per week of moderate-intensity aerobic activity"	
Obesity	NIH/NHLBI/ NIDDK [42]	Direct recognition and PA prescription	"Physical activity should be an integral part of weight loss therapy and weight maintenance. Initially, moderate levels of physical activity for 30–45 min, 3–5 days a week, should be encouraged. All adults should set a long-term goal to accumulate at least 30 min or more of moderate intensity physical activity on most, and preferably all, days of the week"
	NICE [43]	Direct recognition and PA prescription	"Encourage adults to do at least 30 min of moderate or greater intensity physical activity on 5 or more days a week"
	ACSM [44]	Direct recognition and PA prescription	"ACSM recommends that adults participate in at least 150 min/wk of moderate-intensity PA (…) overweight and obese individuals participate in this level of PA (…) greater weight loss and enhanced prevention of weight regained with doses of PA that approximate 250–300 min/week (…) of moderate intensity PA"
	AHA/ACC/TOS [45]	Direct recognition and PA prescription	"Aerobic physical activity (…) for >150 min/week (equal to >30 min/day, most days of the week) (…) approximately 200–300 min/week (…) to maintain lost weight or minimise weight regain"
Osteoarthritis	OARSI [46]	Direct recognition, no PA prescription	"Exercise (land-based). Recommendation: appropriate. (…) Exercise (water-based). Recommendation: appropriate (…) Strength training. Recommendation: appropriate"
	AAOS [47]	Direct recognition and PA prescription	"We recommend that patients with symptomatic osteoarthritis of the knee participate in (…) strengthening, low-impact aerobic exercises (…) and engage in physical activity consistent with national guidelines"[d]
	NICE [48]	Direct recognition, no PA prescription	"Exercise should include: local muscle strengthening and general aerobic fitness"
	ACR [49]	Direct recognition, no PA prescription	"All patients with symptomatic (knee or hip) OA be enrolled in an exercise programme commensurate with their ability to perform these activities (…) no preference for aquatic exercises as opposed to land-based exercises"
Asthma	ERS/ATS[e] [50]	No recognition	
	NHLBI [51]	Indirect recognition[f]	"(for children ≥12 and adults) clinicians encourage full participation in physical activities (…) activity should be limited (…) only as a last resort"
	BTS/SIGN [52]	Direct recognition, no PA prescription	"Physical training (…) should be seen as part of a general approach to improving lifestyle and rehabilitation in people with asthma"

Table 2 continued

Chronic condition	Learned/scientific society	Recommendation and PA[a]	Excerpts from recommendations
Osteoporosis and osteopenia	NOF [53]	Direct recognition, no PA prescription	"Provide a complete exercise recommendation that includes weight bearing aerobic activities for the skeleton, postural training, progressive resistance training for muscle and bone strengthening, stretching for tight soft tissues and joints and balance training"
	AACE [54]	Direct recognition, no PA prescription	"Maintain an active lifestyle, including weight bearing exercises for at least 30 min daily"
	SIGN [55]	Direct recognition, no PA prescription	"(for postmenopausal women) combinations of exercise types including balance training, flexibility or stretching exercises, endurance exercise and progressive strengthening exercises should be considered" AND "(for premenopausal women) high-impact exercise (…) and combining impact exercise (…) with progressive-resistance strength training (…)
Heart disease[g]	NICE (heart failure) [56]	Direct recognition, no PA prescription	"Offer a supervised group exercise-based rehabilitation programme (…) Ensure the patient is stable and does not have a condition or device that would preclude an exercise-based rehabilitation programme"
	AHA (heart failure)[h] [57]	Direct recognition, no PA prescription	"Exercise training guidelines for patients with cardiovascular disease should be followed as provided in the AHA Standards"
	AHA [58]	Direct recognition and PA prescription	"Endurance training. Frequency ≥5 days/week. Intensity 55–90% maximum predicted HR or 40–80% VO_2max or HR reserve (or) RPE 12–16. Modality walking, treadmill, cycling, etc. Duration 30–60 min Resistance training. Frequency 2–3 days/week. Intensity 50–80% of 1-RM or RPE 12–16; 1–3 sets of 8–15 repetitions per exercise. Modality lower extremity: leg extensions, leg curls, leg press. Upper extremity: bench press, (…) biceps curl, triceps extension. Duration 30–45 min"
	ACSM (coronary artery disease) [59]	Direct recognition and PA prescription	"Mode (…) Large muscle groups, continuous exercise, such as walking, jogging (…) Resistance exercises (…), up to 10–12 exercises using 10–12 repetitions of resistances (…) performed comfortably. Frequency (…) three nonconsecutive days per week (…) Duration (…) warm-up and cool-down (…) of at least 10 min (…) should precede and follow 20–40 min of cardiovascular exercise (…) Intensity (…) 40–85% of VO_{2max} (…) keeping the intensity at a moderate level"

Table 2 continued

Chronic condition	Learned/scientific society	Recommendation and PA[a]	Excerpts from recommendations
Chronic low back pain	ACP/APS [60]	Direct recognition, no PA prescription	"For patients who do not improve with selfcare options, clinicians should consider the addition of nonpharmacologic therapy with proven benefits (…) for chronic or subacute low back pain, (…) exercise therapy"
	NICE [61]	Direct recognition, no PA prescription	"Advise people with low back pain that staying physically active is likely to be beneficial (…) Advise people with low back pain to exercise. (…) Consider offering a structured exercise programme (…) up to a maximum of eight sessions over a period of up to 12 weeks (…) group supervised exercise (…) of up to 10 people (…) one-to-one supervised exercise programme may be offered if a group programme is not suitable (…) Exercise programmes may include (…) aerobic activity, movement instruction, muscle strengthening, postural control, stretching"

AACE American Association of Clinical Endocrinologists, *AAOS* American College of Orthopaedic Surgeons, *ACC* American College of Cardiology, *ACG* American College of Gastroenterology, *ACP* American College of Physicians, *ACR* American College of Rheumatology, *ACSM* American College of Sports Medicine, *ADA* American Diabetes Association, *AHA* American Heart Association, *APA* American Psychiatric Association, *APS* American Pain Society, *ASH* American Society of Hypertension, *ATS* American Thoracic Society, *BTS* British Thoracic Society, *ERS* European Respiratory Society, *HR* heart rate, *IDF* International Diabetes Federation, *ISH* International Society of Hypertension, *NHLBI* National Heart, Lung, and Blood Institute, *NICE* National Institute for Health and Care Excellence, *NIDDK* National Institute of Diabetes and Digestive and Kidney Diseases, *NIH* National Institutes of Health, *NOF* National Osteoporosis Foundation, *OA* osteoarthritis, *OARSI* Osteoarthritis Research Society International, *PA* physical activity, *RM* repetition maximum, *RPE* rate of perceived exertion, *SIGN* Scottish Intercollegiate Guidelines Network, *T2DM* type 2 diabetes mellitus, *TOS* The Obesity Society, VO_2max maximum oxygen uptake, *VO2R* oxygen uptake reserve

[a] Recommendations on PA were categorised as follows: *No recognition:* PA and exercise are not referred to as important aspects for the management of the disease; *Indirect recognition:* PA and exercise are referred to as important aspects for the reduction of either risk factors or consequences of the disease, but not for the management of the disease; *Direct recognition, no PA prescription:* PA and exercise are referred to as important aspects for the management of the disease, but no clear prescription is provided; *Direct recognition and PA prescription:* PA and exercise are referred to as important aspects for the management of the disease and clear prescription is provided in terms of frequency, intensity, and session duration

[b] On a 10-point scale rating the perceived exertion, where sitting is 0 and all-out effort is 10, moderate-intensity activity is a 5 or 6 [62]

[c] The NICE guidelines on the management of type 2 diabetes indicates in its Recommendation 1, point 1.3.10: "For recommendations on lifestyle advice, see the NICE guidelines on: (…) physical activity". Therefore, we opted to present both NICE reports (type 2 diabetes and PA) in the same diabetes management section

[d] US national guidelines on PA for adults are: at least 150 min (2 h and 30 min) a week of moderate-intensity, or 75 min (1 h and 15 min) a week of vigorous-intensity aerobic PA, or an equivalent combination of moderate- and vigorous-intensity aerobic activity AND muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week

[e] These guidelines were specific for severe asthma

[f] This was set as 'indirect recognition' because this recommendation was based on the importance of PA for overall health rather than for the management of asthma

[g] Defined as coronary artery disease or heart failure

[h] This AHA guideline indicates that the exercise prescription "should be followed as provided in the AHA Standards". Therefore, we opted to present both AHA reports (Exercise Standards, and Exercise and Heart Failure) in the same heart disease management section

Table 3 Standardised minimum exercise guideline for multimorbid patients with asymptomatic chronic conditions in the primary care setting

Overall guidance
Patients should perform at least 120 min/week of moderate exercise (aerobic exercise alone or aerobic and resistance exercises combined) on 3 or more days/week
Specific guidance
1 Activities for improving cardiovascular and respiratory capacities (aerobic activities)
1.1 Type: all cyclic activities performed for ≥10 min, such as walking, jogging, swimming, bicycling, several individual or collective sports, etc.
1.2 Frequency: 3 or more days/week
1.3 Intensity: moderate (e.g. brisk walking), i.e. 40–60% of VO_{2max}, or, alternatively, a perceived exertion rate of 5 or 6 on a 10-point scale, where sitting is 0 and maximum effort is 10
1.4 Duration: 90 min/week or more
AND
2 Activities for improving muscle strength (resistance exercise)
2.1 Type: activities for major muscle groups (upper body, lower body, and core) such as weight lifting, chair rises and stair climbs, functional training (fitness center), etc.
2.2 Frequency: 2 or more days/week
2.3 Intensity: moderate, i.e. approximately 50% of one RM, or, alternatively, exercises that can be executed at the intensity of 13–15 RM
2.4 Duration: 5–10 exercises, executed at 1–3 sets of 8–15 repetitions. The exact number of exercises and sets per exercise may vary according to patients' capabilities, interests, and time availability
AND
3 Sitting time. Try to spend less than 7 h per day sitting. If not possible, avoid spending more than 10 h per day sitting

RM repetition maximum, VO_{2max} maximum oxygen uptake

1. It does not involve all PA domains. The total amount of exercise includes only leisure-time and commuting PA, which have been shown to result in superior health benefits [64]; occupational and household PA is not integrated into the suggested guideline.
2. The minimum PA rate of 120 min per week is less than the PA amount recommended in current public health guidelines (150 min per week), which suggests that the proposed standard prescription will probably be easier to adhere to over the long-term.
3. The proposed standardised guideline includes a prescription for reducing sitting time.

In regard to the last point, while no learned/scientific societies have integrated specific guidelines for reducing sitting time, important findings from recent well-conducted meta-analyses have found that increased sitting time is associated with a higher risk of type 2 diabetes, cardiovascular disease, and all-cause mortality [65, 66]. Mortality risk appears to be greater after 7 h per day of sitting time, and increases by 34% after 10 h per day of sitting [66]. The associations between sitting time and adverse health outcomes occur independently of PA levels.

6 Guidance for Primary Care Providers

Providing a comprehensive consultation guided by the '6As' (assess, advise, agree, assist, arrange and assess again), as well as other practical steps [1] for prescribing an individualised exercise plan, should represent the ideal approach to increase PA levels among patients in primary care; however, most primary care doctors do not have the time, knowledge or intent to implement those steps. Nevertheless, their advice and capacity to stimulate participation in PA and exercise remain crucial for patients.

When assessing any patient with any of the chronic conditions listed in Table 1 (with the exception of GERD), or presenting with other diseases potentially treatable through exercise (e.g. COPD), primary care providers should systematically ask two questions [67]. (1) In a typical week, how many days do you engage in moderate or greater PA (such as a brisk walk) during your leisure time or to move from one location to another? (2) On each of those days, how many minutes do you spend doing such activities?

After multiplying the number of weekly days by the minutes spent in PA each day, healthcare providers can obtain the total weekly amount of leisure-time and commuting PA usually performed by the patient. If the total amount of PA is less than 120 min per week, the patient has no contraindication to exercise (see electronic supplementary material Box S2), and the PCP judges the patient as being clinically able to undertake moderate-intensity activity, he/she should provide the patient with a standardised minimum exercise prescription, as shown in Table 3, together with written supporting resources (electronic supplementary material Box S1). It is important to note that the exercise prescription should be a formal

medical prescription, just like a drug prescription (with the physician's stamp and signature).

7 Conclusions

Exercise is an important component of the treatment of several prevalent and burdensome chronic diseases, thus making it part of best practice for such conditions. Providing multimorbid patients with an exercise prescription is therefore the duty of any healthcare provider, particularly in the primary care setting. Individualising counselling [68], after examining the patient's readiness for behavioural change and establishing suitable specific goals, is an effective approach to promote PA in adults in primary care practice, and this individualised counselling approach should be pursued whenever possible. However, counselling patients about PA and exercise in this setting remains rare [16] because it is time-consuming, requires enhanced knowledge of exercise counselling, and no exercise guidelines have been developed for multimorbid patients.

Therefore, the approach to elaborating a standardised, minimum exercise guideline for patients with multiple chronic conditions proposed herein is an alternative to the traditional individualised exercise prescription. The construction of this standardised prescription is based on the thought that 'doing something for my patients is better than doing nothing'. In other words, providing a nonindividualised exercise prescription is better than providing no exercise prescription. When providing any exercise guidelines, PCPs and other healthcare providers must keep in mind that any amount of PA and exercise is better than none. The dose–response association between PA and health benefits is well-established [69–72], with the greatest benefit found when subjects move from a sedentary behavior to being slightly active [69, 72]. They should also provide positive feedback for patients who start doing some exercise, even though these patients do not achieve the levels of exercise recommended in the guidelines. PCPs should advise patients about local resources for PA and exercise, such as health and fitness centres or sports clubs (e.g. hiking clubs), in the neighbourhood. Encouraging patients to find other peers to exercise with may be important for long-term adherence to exercise [73].

Although the elaboration of a standardised exercise guideline for multimorbid patients suffering from the most prevalent NCDs managed by PCPs is very attractive, future research is needed to validate this approach and to define the best structure (e.g. guidelines in the form of bullet points or script) and content of standardised minimum exercise guidelines in terms of (cost-) effectiveness for well-defined subgroups of multimorbid patients.

Compliance with Ethical Standards

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