CONSENSUS DOCUMENT

Updated Recommendations on Cardiovascular Prevention in 2022:
An Executive Document of the Italian Society of Cardiovascular Prevention

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Received: 22 December 2021 / Accepted: 31 December 2021 / Published online: 13 January 2022
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Abstract
This executive document reflects and updates the key points of a Consensus document on Cardiovascular (CV) Prevention realized through the contribution of a number of Italian Scientific Societies and coordinated by the Italian Society of Cardiovascular Prevention (SIPREC). The aim of this executive document is to analyze and discuss the new recommendations introduced by international guidelines for the management of major CV risk factors, such as hypertension, dyslipidemias and type 2 diabetes, consisting in the identification of lower therapeutic targets, in the promotion of combination fixed drug therapies and in the introduction in routine clinical practice of new effective pharmacological classes. Moreover, the document highlights the importance of effective CV prevention strategies during the the coronavirus disease 2019 (COVID-19) outbreak which has dramatically changed the priorities and the use of available resources by the national healthcare systems and have caused a reduction of programmed follow-up visits and procedures and even of hospital admissions for severe acute pathologies. In addition, the pandemic and the consequent lockdown measures imposed have caused a widespread diffusion of unhealthy behaviors with detrimental effects on the CV system. In such a context, reinforcement of CV prevention activities may play a key role in reducing the future impact of these deleterious conditions.

Keywords Cardiovascular prevention · COVID-19 · High blood pressure · Hypercholesterolemia · Diabetes · Antiplatelet treatment · Obesity

1 Introduction
This executive document reflects and updates the key points of a Consensus document on Cardiovascular (CV) Prevention realized through the contribution of a number of Italian Scientific Societies (including the Italian Society of Cardiology [SIC], Italian Society of Diabetology (SID), Italian Society of Internal Medicine [SIMI], Italian Society of Arterial Hypertension [SIIA], Italian Society for the Study of Atherosclerosis [SISA], Italian Society of Nephrology [SIN], Italian Society of Obesity [SIO], Italian Society of Digital Health and Telemedicine [SIT], Italian Society of Nutraceutics [SINut], Italian Association of Clinical, Preventive and Rehabilitation Cardiology (AICPR), Italian Society of Gerontology and Geriatrics [SIGG], the Mediterranean Diet Foundation [FDM]) and coordinated by the Italian Society of Cardiovascular Prevention [SIPREC], published in 2021 [1].

A previous document was published in 2018 and highlighted the need for modern and comprehensive strategies to improve CV prevention. This was based on the so-called “4P” approach, namely Predictive of disease precursors at an early stage; Preventive, for the early elimination of risk factors; Personalized, based on the information available for everyone; Participative, which reflects the integration of multiple professionals and technologies available today with the key involvement of patients [2].
The aim of this updated executive recommendations of SIPREC consensus document is to analyze and discuss the evidence of the last years, providing an integrated tool to support treating physicians in their daily clinical practice.

Over the last few years, new recommendations have been introduced by international guidelines for the management of major CV risk factors (RFs), such as hypertension [3], dyslipidemias [4] and type 2 diabetes [5], consisting in the identification of lower therapeutic targets, in the promotion of combination (fixed) drug therapies and in the introduction in routine clinical practice of new effective pharmacological classes, such as sodium-glucose cotransporter-2 inhibitors (SGLT2i) and glucagon-like-peptide-1 receptor agonists (GLP1-RA) for the treatment of diabetes and proprotein convertase subtilisin/kexin type 9 inhibitors for hypercholesterolemia, respectively.

Moreover, starting December 2019 national healthcare systems have been overwhelmed by the coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was initially reported in China and then has been spreading worldwide [6]. Indeed, the COVID-19 outbreak has dramatically changed the priorities and the use of available resources by the national healthcare systems. The pandemic and the consequent lockdown measures imposed in several countries have caused a widespread diffusion of unhealthy behaviors with detrimental effects on the CV system, including inappropriate dietary habits, sedentary lifestyle and smoking [7, 8]. Furthermore, as a consequence of the COVID-19 outbreak, screening preventive clinical programs have been halted or significantly slowed since a relevant number of programmed follow-up visits and procedures have been cancelled, and even hospital admissions for severe acute pathologies, such as myocardial infarction, have been significantly reduced, with a parallel increase in fatality and complication rates [9–11]. This represents a serious social issue, whose impact will last for many years, and which deserves priority attention by the scientific and healthcare communities. In such a context, reinforcement of CV prevention activities may play a key role in interrupting this vicious circle [12].

Indeed, the general recommendation, shared by Centers for Disease Control and Prevention worldwide, was to defer any test or procedure unlikely to directly impact on clinical care or outcomes [14, 15]. In such a context, also screening and follow-up programs have been canceled, leading to a worrying overflow of missed diagnoses and delayed specific treatments, with predictable future consequences on increased rates of morbidity and mortality with a socio-economic impact and increased burden for Healthcare Systems. Moreover, a substantial reduction of hospitalizations for acute conditions other than COVID-19, such as acute coronary syndromes or cerebrovascular accidents, due to the fear of a possible contagion in the hospital setting, has been recorded during the initial phases of the pandemic [9–11]. The deferral of interventional procedures or of specific pharmacological treatments for these conditions are likely to generate meaningful sequelae in the next years, such as an increase of heart failure incidence and hospital admissions.

In addition, clinical risk for severe COVID-19 infection correlates with both advanced age and pre-existing medical conditions. The association between CV disease (CVD) and poor outcomes in COVID-19 has been demonstrated to exist independent of potential confounders and the presence of CVD is a key RF for the development of CV complications of COVID-19, such as myocardial injury, myocarditis, pericarditis, heart failure, arrhythmias and venous thromboembolic events [16–19].

In this context, the best strategy is represented by an integrated approach promoting and combining population and individual preventive interventions and vaccination campaigns of general population as fundamental weapons to reduce SARS-CoV-2 infection and COVID-19 overt disease [20–22]. More than 7 billion vaccine doses have been already administered worldwide. However, a huge effort should be done by national healthcare systems to further implement vaccination strategies. In this view, we strongly recommend that subjects affected by CVD get promptly vaccinated against SARS-CoV-2 to reduce the risk of COVID-19 and the burden of potentially serious related complications.

Another field of great interest in CV prevention is represented by the implementation of novel health technologies and by an expanded coverage of telemedicine. Indeed, telemedicine and remote monitoring may allow to optimize RFs control, modulate medications, assess diets and physical activity levels and perform closer follow-up, thus representing a great opportunity to enhance patient empowerment. Particularly in the context of CVD, real-time consultation using audio/video communication technology instead of in-person visits, as well as mobile health and telemonitoring are feasible and may reinforce primary and secondary prevention practices [23–25]. Moreover, during tele-visits physicians may have the opportunity to speak with family members and caregivers, acquiring exact information about...
patients’ health status, including complete medication lists (which are often forgotten during office visits). In this view, digital health may represent a fundamental innovative opportunity to improve the quality of medical care, also reinforcing patient–physician relationship and enhancing patients’ awareness and self-motivation in the management of their clinical conditions, and it should be included in long-term future CVD prevention strategies [23–25].

3 Estimation of CV risk

The 2021 European Guidelines have introduced some new recommendations in the estimation of CV risk, both in apparently healthy people (primary prevention) and in those who have already experienced a CV event (secondary prevention) [26].

The most important novelty is represented by the use of the updated Systemic Coronary Risk Estimation 2 (SCORE2) which, differently from the previous SCORE algorithm, estimates not only 10-year risk of CVD death but also of non-fatal CVD events (such as myocardial infarction and stroke) in subjects aged between 40 and 69 years [27]. In older patients the SCORE2-OP algorithm may better reflect the total burden of MACEs [28]. A 10-year CV risk (fatal and nonfatal MACEs) is generally considered very high and treatment of CV RFs is recommended when SCORE2 is ≥ 7.5% in subjects aged < 50 years, ≥ 10% in those aged between 50 and 69 years and ≥ 15% in older patients aged > 70 years [26].

A 10-year CV risk of 2.5 to 5% in subjects aged < 50 years, 5 to < 10% in those aged 50-69 years and 7.5 to 15% in patients aged > 70 years is considered high and treatment of RFs should be considered, taking into account CV risk modifiers, frailty, polypharmacy, life-time risk, patient preferences and treatment benefit. A 10-year CV risk < 2.5%, < 5% and < 7.5% in subjects aged < 50, 50–69 and > 70 years, respectively, is considered low-to-moderate and requires pharmacological treatment when lifestyle modification fails to control RFs and if the estimated lifetime risk and treatment benefit is considered substantial [26].

It should be also highlighted that current risk charts and scores do not take into account organ damage (OD), although it has been largely demonstrated that markers of OD, such as left ventricular hypertrophy, carotid atherosclerosis, reduced estimated glomerular filtration rate (GFR) or creatinine clearance, microalbuminuria or proteinuria, may predict CV outcomes [29]. Accordingly, it has been shown that the addition of markers of OD to traditional scores may enhance their predictive power for the incidence of major CV events, providing a greater performance on risk stratification. These findings support the concept that assessment of multiple sites of OD in the same patient may be of great impact in clinical practice, in order to better identify individual global CV risk profile [30–32].

Indeed, CVD should be considered as a “continuum” from the presence of CV RFs through the development of subclinical and overt OD to the occurrence of MACEs, and preventive measures could and should be adopted at each level of the continuum to delay or even interrupt this progression. The intensity of preventive interventions and eventually of pharmacological treatments should be assessed on the basis of individual CV risk and as a result of a shared decision-making process [33] (Fig. 1).

New recommendations

In apparently healthy people aged < 70 years without established CVD estimation of 10-year fatal and non-fatal CV risk with SCORE2 is recommended

In apparently healthy people aged ≥ 70 years without established CVD, estimation of 10-year fatal and non-fatal CVD risk with SCORE2-OP is recommended.

A stepwise treatment-intensification approach aiming at intensive risk factor treatment is recommended for apparently healthy people at high or very high CV risk, as well as patients with established CVD and/or diabetes, with consideration of CV risk, treatment benefit of RFs, risk modifiers, comorbidities, and patient preferences.

Treatment of CV RFs is recommended in apparently healthy people at very high CV risk (SCORE2 ≥ 7.5% for age under 50 years; SCORE2 ≥ 10% for age 50-69; years SCORE2-OP ≥ 15% for age ≥ 70 years.

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Fig. 1 Multifactorial integrated CV prevention strategies along the CV continuum. CV cardiovascular, CVD cardiovascular disease, HF heart failure, MI myocardial infarction, OD organ damage, RFs risk factors

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4 Therapeutic Management of High Blood Pressure

The 2018 ESC/ESH guidelines on hypertension were revised with the aim of improving therapeutic efficacy of antihypertensive management and to improve blood pressure (BP) control as part of a comprehensive strategy of CV burden reduction[3, 34, 35]. Significant changes in BP therapeutic targets have been introduced. A goal of <140/90 mmHg is recommended in all patients. However, BP should be further lowered to BP values < 130/80 mmHg in most patients, especially in those at high or very high CV risk, assuming that antihypertensive therapy is well tolerated. In patients aged < 65 years, including diabetics, the systolic BP (SBP) goal is between 120 and 130 mmHg, whereas older subjects aged > 65 years, independent from their CV risk, should reach SBP levels between 130 and 140 mmHg. The recommended target of diastolic BP (DBP) is < 80 mmHg for all hypertensive patients, independently of age, comorbidities, and established CVD. With regard to the initiation of treatment, pharmacological therapy should be promptly started in patients with grade 1 hypertension (SBP140–159/DBP 90–99 mmHg) and at high CV risk or with signs of hypertension-mediated organ damage (HMOD). Drug treatment may be also considered in patients with high-normal BP (SBP 130–139/DBP 85–89 mmHg) and at high CV risk or with signs of hypertension-mediated organ damage (HMOD). Drug treatment should be initiated in patients with grade 1 hypertension (SBP140–159/DBP 90–99 mmHg) and at high CV risk or with signs of hypertension-mediated organ damage (HMOD). Drug treatment may be also considered in patients with high-normal BP (SBP 130–139/DBP 85–89 mmHg) when CV risk is very high because of history of previous CVD and particularly of coronary artery disease (CAD). Therapy should be immediately started in patients with grade 2 (SBP 160–179/DBP 100–109 mmHg) or 3 (BP ≥ 180/110 mmHg) hypertension [3, 34, 35].

Another important aspect highlighted in the 2018 ESC/ESH guidelines on hypertension is that recommended targets should be reached within 3 months from the initiation of the treatment. Since combination therapy regimens are more effective than up titration of one antihypertensive agent (monotherapy), due to pathophysiological and pharmacological synergisms, this therapeutic strategy is now recommended as first-line therapy to achieve the recommended BP goals. Moreover, single-pill combinations (SPC) should be preferred, since they are characterized by a better tolerability profile and by greater adherence rates, compared to free combination therapies. The most recommended combinations are angiotensin receptor blockers (ARBs) or angiotensin-converting enzyme inhibitors (ACEi) with calcium channel blockers (CCBs) and/or a Thiazide/Thiazide-like type diuretic [3, 34, 35]. This represents an important change with respect to previous 2013 guidelines which suggested to start treatment with monotherapies, based on five principal drug classes (ACEi, ARBs, CCBs, Beta-Blockers and Thiazide-like diuretics), up titrating the dose or switching to another drug class when BP control was not achieved [36].

New recommendations

In patients with grade 1 hypertension at low–moderate-risk and without evidence of hypertension-mediated organ damage (HMOD), BP-lowering pharmacological treatment is recommended if the patient remains hypertensive after a period of lifestyle intervention.

In patients with high–normal BP drug treatment may be considered when their CV risk is very high due to established CVD, especially CAD.

Prompt initiation of BP-lowering pharmacological treatment is recommended in patients with grade 2 or 3 hypertension at any level of CV risk, simultaneous with the initiation of lifestyle changes.

The first objective of treatment should be to lower BP to < 140/90 mmHg in all patients and to 130/80 mmHg or lower in most patients.

In patients aged < 65 years SBP should be lowered o a BP range of 120–129 mmHg in most patients and DBP to < 80 mmHg.

In older patients aged ≥ 65 years, including fit patients aged > 80 years SBP should be targeted to a BP range of 130–139 mmHg.

Therapeutic goals should be achieved within 3 months from the initiation of the treatment.

Pharmacological treatment should be started with a two-Drug combination, preferably in a SPC, with the exception of frail older patients and those with grade 1 hypertension at low CV risk.

The most recommended combinations are ACEi/ARBs with CCBs and/or a Thiazide/Thiazide-like type diuretic.

5 Therapeutic Management of Hypercholesterolemia

Another fundamental intervention for CV prevention consists in the effective treatment of dyslipidaemias (mostly hypercholesterolemia), since the linear relationship between the reduction of low density lipoproteins cholesterol (LDL-c) and CV risk is well established [37].

The lipid goals are part of a comprehensive CV risk reduction strategy and depend on individual CV risk evaluation. The 2019 European guidelines have proposed a lowering of LDL-c targets. Patients at very high CV risk should achieve a LDL-c reduction of at least ≥ 50% from baseline and a LDL-C goal of < 55 mg/dL. For patients with history of CVD who experience a second vascular event within 2 years (not necessarily of the same type as the first event) while taking maximally tolerated statin-based therapy, a LDL-c goal < 40 mg/dL may be considered. Individuals at high CV risk should reach a LDL-c goal < 70 mg/dL. In patients at moderate CV risk a LDL-c goal < 100 mg/dL should be considered, while for low-risk individuals a goal < 116 mg/dL may be considered [4]. Among patients with diabetes or high triglyceride levels and in those with very low LDL-c levels, measurement of both ApoB and non-HDL-c is recommended as part of routine lipid analysis for risk evaluation.
Statins with different power and at different dosages on the basis of LDL-c levels and estimated CV risk represent the first-line drug strategy. If the goals are not achieved with the maximum tolerated dose of statin monotherapy, combination therapy of statin plus ezetimibe is recommended [38]. For secondary prevention, patients at very-high risk not achieving their goal on a maximum tolerated dose of statin and ezetimibe, a combination with a PCSK9 inhibitor is recommended. PCSK-9 inhibitors are also recommended in primary prevention for patients with familial hypercholesterolemia at very-high risk who do not achieve their goals on a maximum tolerated dose of statin and ezetimibe [39–42]. An alternative approach targeting PCSK9 consists of RNA interference. Preliminary data from phase I and II trials have shown that the small interfering RNA (siRNA) molecule inclisiran is able to reduce by up to 50% LDL-c levels with a dose-dependent effect [43].

Another potential future therapeutic perspective is represented by bempedoic acid, a first-in-class, oral small molecule which inhibits cholesterol synthesis by inhibiting the action of ATP citrate lyase, a cytosolic enzyme upstream of 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase. This novel agent has been shown to reduce LDL-c levels by 30% when used in monotherapy and by about 50% in combination with ezetimibe [44–46].

With regard to hypertriglyceridaemia, statin treatment is recommended as the first drug of choice for reducing CV risk in high-risk individuals with triglycerides > 200 mg/dL. In patients taking statins who reach LDL-c goals but have high levels of triglycerides, fenofibrate or bezafibrate may be considered [4]. In high-risk patients n – 3 polyunsaturated fatty acid (PUFA) (icosapent ethyl 2 g twice in a day) may be considered in combination with a statin. However, recent trials have provided controversial results about the CV benefits of treatment with PUFA and further studies may be required [47].

### New recommendations

More intensive reduction of LDL-c levels are recommended across CV risk categories

If the goals are not achieved with the maximum tolerated dose of statin, combination with ezetimibe is recommended

Patients at very-high risk with previous CV events, diabetes or with familial hypercholesterolemia not achieving their goal on a maximum tolerated dose of statin and ezetimibe, a combination with a PCSK9 inhibitor is recommended

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### 6 Therapeutic Management of Diabetes Mellitus

Several novel recommendations have been introduced by recent guidelines also in the management of diabetes mellitus, in particular with regard to the use of new pharmacological classes with favorable CV effects namely SGLT2i and GLP1-RA [5]. Indeed, the SGLT2i empagliflozin, canagliflozin, ertugliflozin and dapagliflozin and the GLP1-RA liraglutide, semaglutide and dulaglutide have been demonstrated to reduce CV events in patients with diabetes and CVD, or in those who are at high or very high CV risk [48–51]. Moreover, dapagliflozin and empagliflozin have shown beneficial effects in patients with HF with reduced ejection fraction, reducing the composite of CV mortality and hospitalizations for HF [52, 53]. The efficacy of empagliflozin has been also shown in patients with HF and preserved ejection fraction [54]. The CV benefits of SGLT2i are mostly unrelated to the glucose lowering and could include effects on reducing plasma volume and direct effects on cardiac metabolism and function. GLP1-RA improve several CV parameters, including a small reduction in SBP and weight loss, and have direct vascular and cardiac effects [55].

According to this evidence, in patients with type 2 diabetes, in addition to the lifestyle intervention and metformin, SGLT2i and GLP1-RA may be used for a dual therapy, whereas sulfonylureas and acarbose are suggested only for triple therapeutic regimen. Insulin may be used at any stage of the natural history of the disease [5].

With regard to glucose control, a target HbA1c < 7.0% is recommended to reduce microvascular complications (such as retinopathy, nephropathy and autonomic neuropathy) related to diabetes and MACEs, when initiated early during the course of the disease. Less-rigorous targets should be considered in elderly patients on a personalized basis and in those with severe comorbidities or advanced CVD. In such a context, the use of new glucose-monitoring technologies such as continuous glucose monitoring and electronic ambulatory glucose in the control of post-prandial glycaemia and glucose variability may contribute to a more efficacious achievement of recommended targets, although the role of these tools need be better defined [56].

In diabetic patients with high or very-high risk CV risk low-dose aspirin (75–100 mg/day) for primary prevention may be considered taking both ischaemic and bleeding risk into consideration, whereas it is not recommended in subjects a moderate risk.

### New recommendations

Use of self-monitoring of blood glucose should be considered to facilitate optimal glycaemic control in type 2 diabetes mellitus.
New recommendations

SGLT2i are recommended in patients with type 2 diabetes and CVD, or at very high/high CV risk, to reduce CV events

GLP1-RA are recommended in patients with T2DM and CVD, or very high/high CV risk, to reduce CV events

SGLT2i (empagliflozin and dapagliflozin) have demonstrated the reduction of CV death and HF hospitalizations in patients with HFpEF

Aspirin (75–100 mg/day) for primary prevention may be considered in patients with diabetes at very high/high risk in the absence of clear contraindication

7 Antiplatelet Treatment

After an acute coronary syndrome (ACS) dual antiplatelet treatment (DAPT), consisting on a potent P2Y12 receptor inhibitor combined to aspirin, is generally recommended for 12 months unless there are contraindications [57]. DAPT duration can be shortened (< 12 months) when haemorrhagic risk exceeds the risk of atherothrombotic events, and the decision depends on individual clinical judgement on the basis of the occurrence of adverse events, comorbidities and co-medication. In patients at very high risk of bleeding, defined as a recent bleeding episode in the past month or planned, not deferrable surgery in the near future, 1 month of aspirin and clopidogrel should be considered. On the other hand, in patients who have tolerated DAPT without a bleeding complication, a prolonged DAPT course > 12 months should be considered in those with high thrombotic risk (diabetes, severe CAD, implantation of multiple stents) and without an increased risk for major or life-threatening bleeding, and may be considered in patients with moderately elevated thrombotic risk [58]. In this view, the 60 mg bis in die (b.i.d.) dose for ticagrelor (reduced from the 90 mg b.i.d dose recommended after ACS) is now approved in many countries for this indication [59].

More recently, data on a novel strategy of dual antithrombotic therapy (DAT), consisting of factor-Xa inhibition with a very low dose of rivaroxaban (2.5 mg b.i.d.) plus aspirin, has emerged as a safe treatment option for maintenance treatment beyond 12 months post ACS percutaneous coronary intervention. This strategy has demonstrated to reduce the risk of MACEs and CV mortality without a significant increase in the risk of fatal, intracranial, or critical organ bleeding events [60]. Greater absolute risk reductions have been demonstrated in high-risk patients, including those with diabetes or polyvascular disease such as CAD plus peripheral artery disease (PAD). Based on this evidence, rivaroxaban (2.5 mg b.i.d.) should be considered, in addition to aspirin in patients at high thrombotic risk and without an increased risk for major or life-threatening bleeding [60].

Although the recommendations for antiplatelet use in secondary prevention of atherothrombotic MACES are clearly established, the use of aspirin in primary prevention is more controversial. Indeed, CV events are more likely to further occur in patients who have already experienced clinical manifestations of atherothrombosis [61]. However, the risk of CV events may be significantly increased also in individuals with several concomitant CV RFs. In such a context, the presence of subclinical atherosclerosis (defined as the presence of atherosclerotic plaques in the abdominal aorta, carotid arteries or iliofemoral arteries or coronary artery calcification score (CACS) ≥ 1), should be considered in the decision process, since it is associated with a significantly increased risk of CV events [62]. North American guidelines suggest that low-dose aspirin (75–100 mg orally daily) might be considered for the primary prevention of CV events among select adults aged 40 to 70 years who are at higher CV risk but not at increased bleeding risk [63, 64]. On the other hand, European Guidelines propose a case-by-case decision high-risk subjects, taking both ischaemic risk and bleeding risk into consideration [26].

New recommendations

Prolongation of DAPT beyond 12 months should be considered for ≤ 3 years in patients with diabetes at very high risk who have tolerated DAPT without major bleeding complications

DAPT duration can be shortened to < 12 months after an ACS when haemorrhagic risk exceeds the risk of atherothrombotic events on the basis of individual clinical judgement

Low dosages of rivaroxaban (2.5 mg b.i.d.) in combination with aspirin may be used for long-term extended antithrombotic treatment in a secondary prevention setting of CAD patients with PAD

Low-dose aspirin aspirin might be considered in primary prevention in high-risk subjects taking both ischaemic risk and bleeding risk into consideration

8 Obesity

The prevalence of obesity worldwide has increased in recent decades not only among adults, but also in children and adolescents [65]. This phenomenon contributes to an increased risk of CVD, since several studies have shown that body mass index (BMI), waist-to-hip ratio and waist circumference are continuously associated with MACES in different age categories, also after the adjustment for conventional RFs [66]. Indeed, risk-related sequelae of obesity include hypertension, dyslipidaemia, insulin resistance, systemic inflammation, a prothrombotic state, albuminuria, and the development of type 2 diabetes, heart failure and atrial fibrillation [67].

It should be considered that, although obesity is defined on the basis of BMI > 30 kg/m², this parameter is not a
measure of fat mass and it does not convey any information on fat distribution and regional fat depots. In order to phenotype obese patients beyond BMI, the EOSS (Edmonton Obesity Staging System) has been created and stratifies the CV related to obesity on the basis of the presence and severity of concomitant RFs, physical symptoms, psychopathology or functional limitations and/or impairment of well-being [68].

With regard to the suggested therapeutic actions on the basis of waist circumference, weight reduction is recommended for values ≥ 102 cm in men and ≥ 88 cm in women. In case of waist circumference ≥ 94 cm in men and ≥ 80 cm in women, further weight gain should be highly discouraged [26].

Energy restriction is the cornerstone of weight loss, particularly when associated to physical activity. With this aim, several types of dietetic strategies may be suggested:

- Hypocaloric diets such as plant-based and hypocaloric Mediterranean diets;
- Changes to the fat and carbohydrate macronutrient composition of the diet, including low or very low carbohydrate diets, moderate carbohydrate diets, and low-fat diets (< 30% of energy from fat).
- High-protein diets to preserve lean muscle mass and enhance satiety;
- Diets focusing on specific food groups (e.g. increasing fruit and vegetables or avoiding refined sugars);
- Diets that restrict energy intake for specified time periods such as intermittent fasting or time-restricted eating.

Among the proposed strategies, the benefits of the Mediterranean diet tend to persist. Low or very low carbohydrate diets may have advantages regarding appetite control, lowering triglycerides, and reducing medications for diabetes. However, such diets may be ketogenic and should be supervised [69].

Medications approved in Europe for weight loss in obese subjects currently include the lipase inhibitor orlistat at the dosage of 120 mg, the GLP1-RA liraglutide 3 mg administered daily or semaglutide 2.4 mg administered weekly and the combination of naltrexone and bupropione. Recent studies with GLP1-RA (liraglutide and semaglutide) have produced positive and sustained effect of body weight reduction and metabolic impact [70]. If drug intervention is not satisfactory, bariatric surgery may be considered, representing a very effective treatment option for extreme obesity or obesity with comorbidities. In this view, a recent meta-analysis has shown that patients undergoing bariatric surgery had over 50% lower risks of all-cause, CV, and cancer mortality compared with people of similar weight who did not have surgery [70].

## 9 Promotion of Healthy Dietary Habits

In the last decades the prevalence of obesity and overweight is increasing among adults and children and the diffusion of unhealthy behaviors during the COVID-19 pandemic may further contribute to this phenomenon [71, 72]. The unregulated marketing of unhealthy products and the installation of vending machines stocked with unhealthy snacks in public venues play an important role in this context. To counteract this process, some European countries have introduced specific laws to regulate the nutritional quality of food and beverages sold in vending machines in schools. As an alternative feasible solution, until mandatory regulation is enforced it has been also proposed that all new tenders for vending machines must ensure that at least 50% of the products sold have a medium-to-small portion size, are low in saturated fat, salt, calories, and have no added sugar, such as mineral water, unsweetened tea, low-fat milk, low-fat yogurt, low-fat drinking yogurt, natural fruit juices, crispbread and crackers with no saturated fat and trans fatty acids, crisps and vegetable chips that have not been fried, dried fruit and nuts (30 g packet), low-calorie fitness bars (less than 80–90 kcal), with zero cost increase to the retailer [73, 74]. Moreover, the introduction of cooling systems may allow the sell of fresh fruit, healthy sandwiches filled with salad and/or tomato and boiled ham without fat, salad and/or tomato and low-fat cheese, salad and/or tomato and turkey, tomato and tuna. This strategy, called “A vending machine for a friend”, developed at National Research Council of Italy (CNR) of Rome, and with the support of the SIPREC, and the European Heart Network (EHN) is being introduced in some Italian and Lithuanian high schools and is being extended to other public workplaces [75]. This initiative will be further reinforced by the active involvement of teachers and nutrition experts through presentations, information sharing and trainings.
10 CV Rehabilitation and Exercise Programmes

CV rehabilitation consists in a multidisciplinary intervention which includes exercise training, diet/nutritional counselling and psychosocial support. Indeed, it has been largely demonstrated that prevention and rehabilitation programmes after CV events reduce the recurrence of MACEs, CV hospitalizations and CV mortality and quality of life. In this view, CV rehabilitation should be started as soon as possible after a CV event and should be carried out by adequately trained health professionals [76, 77].

Exercise programmes should include aerobic and muscular resistance exercise, which should be individually prescribed based on pre-exercise screening and eventually on exercise testing. The number of sessions per week and the average duration of each session of exercise should be tailored on the basis of the CV risk and CV history of each patient [78, 79].

To optimize exercise training, digital and interactive decision support tools may be used, also to implement adherence. Indeed, home-based CV rehabilitation with or without telemonitoring or mobile device-based healthcare delivery through smartphones may increase participation and maintenance of long-term healthy behaviours [79, 80].

New recommendations

Participation in a medically supervised, structured, comprehensive, multidisciplinary rehabilitation and exercise programmes patients may improve outcomes of patients with CVD

Methods to increase exercise activity should be promoted, including electronic prompts or automatic referrals, structured follow-up by nurses or health professionals, and early programme initiation after discharge

Home-based cardiac rehabilitation and telehealth may be considered to increase patient participation and long-term adherence to healthy behaviours

11 Conclusions

In this updated consensus document for CV prevention special consideration has been given to the estimation of CV risk, both in apparently healthy subjects and in those affected by CVD, and to the different new recommendations introduced in the last three years for the management of the principal CV RFs, such as hypertension, dyslipidaemia and diabetes, with the aim to pursue an integrated and multifactorial preventive strategy for reducing the burden of MACEs. In this view, interventions at both individual (physical activity, diet, control of RFs) and at the population level (vaccination campaigns, laws to regulate the nutritional quality of food and beverages) should be promoted and should become as a fundamental part of the clinical activity of each physicians and of programmes of Healthcare Systems. This multidisciplinary approach has acquired increasing importance in the last two years in which COVID-19 pandemic has favored a widespread diffusion of behaviors with detrimental effects on the CV system and a relevant number of programmed follow-up visits and screening procedures have been cancelled with a potential increase in fatality and complication rates in the next future.

Acknowledgements We wish to thank the following authors who contributed to the paper “Prevenzione Italia 2021. Un update del Documento di consenso e raccomandazioni per la prevenzione cardiovascolare in Italia [Prevention Italy 2021—An update of the 2018 Consensus document and recommendations for the prevention of cardiovascular disease in Italy]”: Allegra Battistoni (Roma), Caterina Oriana Aragona (Messina), Fabio Barchiesi (Roma), Alessio Basolo (Pisa), Paolo Belotti (Savona), Andrea Bianco (Cagliari), Claudio Borghi (Bologna), Arrigo Francesco Giuseppe Cicero (Bologna), Barbara Di Giacinto (Roma), Fredrick Fernando (Roma), Leonardo Galiuto (Roma), Davide Grassi (L’Aquila), Guido Grassi (Milano), Giancarlo Icardi (Genova), Ciro Indolfi (Catanazzo), Elisa Lodi (Modena), Maria Lorena Musi (Brescia), Andrea Orsi (Genova), Stefano Palermi (Napoli), Gianfranco Parati (Milano), Andrea Passantino (Barri), Alessandra Patelli (Roma), Antonio Pelliccia (Roma), Martino Pengo (Milano), Pasquale Pierone Filardi (Napoli), Gianluca Perseghin (Milano), Roberto Pontremoli (Genova), Giuseppe Rengo (Napoli), Roberta Ricotti (Novara), Damiano Rizzoni (Brescia), Bianca Rocca (Roma), Carlo Rotella (Firenze), Guido Salvetti (Pisa), Angela Sciacqua (Catanazzo), Andrea Serdò (Roma), Felice Sirico (Napoli), Maria Rosaria Squeo (Roma).

We wish to thank the following Scientific Societies who shared the paper “Prevenzione Italia 2021. Un update del Documento di consenso e raccomandazioni per la prevenzione cardiovascolare in Italia [Prevention Italy 2021—An update of the 2018 Consensus document and recommendations for the prevention of cardiovascular disease in Italy]”: Società Italiana di Cardiologia; Società Italiana di Diabetologia; Società Italiana di Medicina Interna; Società Italiana dell’Ipertensione Arteriosa; Società Italiana per lo Studio dell’Aterosclerosi; Società Italiana di Nefrologia; Società Italiana dell’Obesità; Società per la Salute Digitale e la Telemedicina; Società Italiana di Nutraceutica; Associazione Italiana di Cardiologia Clinica, Preventiva e Riabilitativa; Istituto di Medicina e Scienza dello Sport—Sport e Salute; Società Italiana di Gerontologia e Geriatria; Consiglio Nazionale delle Ricerche; Fondazione Dieta Mediterranea; Associazione Medici Diabetologi; Fondazione Italiana Vascolare; Società Italiana di Angiologia e Patologia Vascolare; Società Italiana di Diagnostica Vascolare; Società Italiana Studio Emotassi e Trombosi, Società Italiana di Statistica Medica ed Epidemiologia Clinica.

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Declarations

Conflicts of interest The members of the Writing Committee have no conflicts of interest to disclose.

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