

70 years of cardiac rehabilitation in Switzerland and Europe – from history to new horizons

Saner Hugo

University Clinic for Cardiology, University Hospital, Inselspital, Bern

Summary

The main focus of CR has moved from the restoration of a patient's health following an acute event towards a more pronounced long-term targeted secondary prevention intervention.

Exercise-based, multidisciplinary CR with a minimum of 24-36 sessions is recommended as a Class IA indication by European Guidelines for patients hospitalized for an acute coronary event or revascularization and for patients with heart failure to improve outcome.

Physical exercise is the cornerstone and the main evidence-based intervention in secondary prevention programmes ("Exercise is Medicine").

Rehabilitative and preventive care is provided by a team of professionals including preventive cardiologists, exercise experts (physiotherapists and sports scientists), nurses, dieticians, psychologists, occupational therapists and social services experts

eHealth and telemedicine have the potential to increase patient participation, to offer greater flexibility and options for activities and to support behavior changes.

Keywords: cardiac rehabilitation, cardiovascular prevention, eHealth

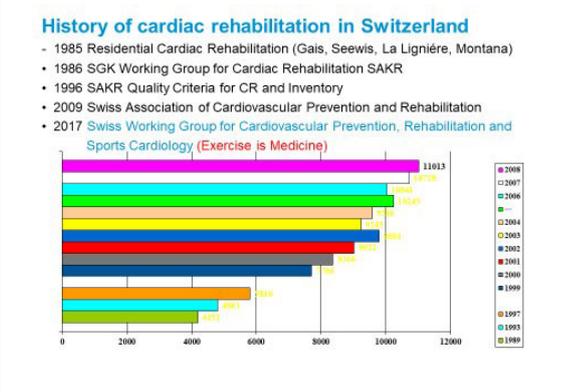
Evolution of cardiac rehabilitation in Switzerland

Structured cardiac rehabilitation (CR) goes back to the late 1960s in Switzerland and elsewhere, and was, in the beginning, given only in rehabilitation clinics [1]. In 1972, the first ambulatory CR programmes became available for patients in Zurich and Bern. In 1989 the Swiss Working Group for CR (SAKR) was founded as an official working group of the Swiss Cardiology Society. In 1992, the SAKR established its first quality criteria to be applied in order to receive the official recognition of the institutions for CR in Switzerland (fig. 1). In 2017, sports cardiology joined the SAKR and the working group was named Swiss Working Group for Cardiovascular Prevention, Rehabilitation and Sports Cardiology (SCPRS). According to www.SCPRS.ch, there are actually 64 outpatient and 13 inpatient CR programmes.

Traditionally, CR services aim to restore the physical, psychological, and vocational status of cardiac patients [1–7]. In recent times, the main focus has moved from the restoration of a patient's health following an acute event towards a more pronounced long-term, targeted, secondary prevention intervention. Over time, a slow but constant increase of ambulatory CR programmes occurred and a few new inpatient programmes started in recent years. Today, exercise-based, multidisciplinary CR with a minimum of 24–36 sessions is recommended as a class IA indication by the European Guidelines for patients hospitalised for an acute coronary event or revascularisation and for patients with heart failure to improve outcome.

Rehabilitative and preventive care is provided by a team of professionals including preventive cardiologists, exercise experts (physiotherapists and sports scientists), nurses, dieticians, psychologists, occupational therapists and social services experts. Primary and secondary prevention of cardiovascular disease both require specialist knowledge and a wide range of professional skills in order to provide successful evidence-based preventive and rehabilitative care. Because primary and secondary prevention have common approaches in terms of lifestyle and risk factor intervention and some drug treatments, and are founded on a strong evidence base, it seems reasonable to combine professional efforts by integrating prevention and rehabilitation for all high risk patients.

Figure 1: Development of structured cardiovascular rehabilitation and prevention in Switzerland.



Correspondence:
Prof. Dr. med. Dr. h.c.
Hugo Saner, Kohliweid-
strasse 12, CH-4656 Star-
kirch, hugo.saner[at]in-
sel.ch

Exercise is medicine

Physical exercise is the cornerstone and the main evidence-based intervention in secondary prevention programmes.

Over recent decades, scientific evidence has accumulated that proves the role of physical activity and exercise in the prevention and treatment of cardiovascular disease beyond any reasonable doubt [8, 9]. Few treatment strategies in medicine have been evaluated so rigorously in large patient groups as regular physical exercise. Exercise training has been shown to have direct benefits on the heart and coronary vasculature, including on endothelial function, autonomic tone, coagulation and clotting factors and inflammatory markers, the development of coronary collateral vessels and the mobilisation of endothelial progenitor cells (fig. 2). Physical activity also helps to correct many established atherosclerotic risk factors, including elevated blood pressure, insulin resistance and glucose intolerance, elevated triglyceride concentration, low high-density lipoprotein (HDL) cholesterol concentrations and obesity. Exercise in combination with weight reduction can decrease low-density lipoprotein cholesterol concentrations and limit the reduction in HDL cholesterol that often occurs with a reduction in dietary saturated fat. Reduction in mortality may also be mediated through improvements in risk factors for atherosclerotic disease. Therefore, physical activity and exercise training are promoted in most government health initiatives for primary and secondary prevention of cardiovascular disease, and have become a cornerstone in secondary prevention programmes. Physical activity is a class IB recommendation for primary prevention. Exercise training is a class IA recommendation for all eligible patients with acute coronary syndrome (ACS), for patients immediately after coronary artery bypass grafting or percutaneous coronary intervention and for patients with peripheral artery disease. It is a class IB recommendation for patients with stable chronic angina in most national and international guidelines. Exercise training is also a recognised treatment modality in clinically stable heart failure patients and contributes to an improvement of exercise tolerance, an increase in health related quality of life and a reduction of re-hospitalisation rates, with a trend towards reduction of mortality in trials where follow-up was longer than 12 month. Physical activity is also considered a main component of neurovascular, diabetes and pulmonary rehabilitation programmes. Indications for exercise training are rapidly expanding to include many other diseases such as cancer, rheumatic diseases and mental disorders.

In order to provide exercise therapy appropriately, the first training courses for cardiac rehabilitation therapists were organised in Switzerland in the year 1999. In the year 2002, formal postgraduate training in cardiovascular exercise therapy was established by the Cardiovascular Prevention and Rehabilitation Unit at the Inselspital Bern in cooperation with the Swiss Sports School in Magglingen for physiotherapists and sports teachers. In the year 2006, a formal postgraduate teaching programme for exercise and sports therapy in internal medicine was established at the University of Bern in close cooperation between the faculty of Medicine and the Philosophic-Historic Faculty (Institute for Sports Sciences). Since then, postgraduate training courses are offered for cardiac, peripheral arterial disease (PAD) and diabetes rehabilitation, with the opportunity to

qualify for the diploma of advanced sciences (DAS) in cardiovascular and diabetes therapy (Swiss Cardiovascular Therapist). During the past few years, additional courses have been established for oncology patients and for patients with orthopaedic diseases.

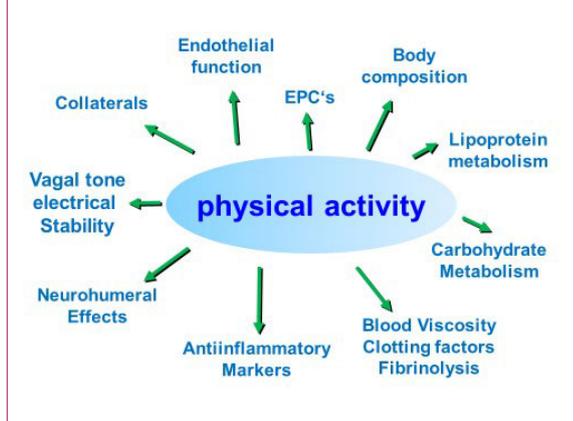
From cardiac rehabilitation to secondary prevention

Over the last years, CR rehabilitation services have expanded their indication to include not just patients after myocardial infarction or surgery, but also a variety of non-acute cardiovascular disease states like stable coronary artery disease, peripheral artery disease, neurovascular disease as well as asymptomatic patients with no history of cardiovascular disease but with a constellation of cardiovascular risk factors, especially metabolic syndrome and diabetes [10–12].

In 1998, a first step from cardiac to cardiovascular rehabilitation was made at the Inselspital Bern by including a PAD rehabilitation programme with a special emphasis on walking exercises. Minimal standards and quality criteria were established during the following years. The PAD rehabilitation programme structure was accepted by the Federal Health Department BAG in the year 2009, with the consequence that programme costs are covered by health insurance. The number of PAD rehabilitation programmes is slowly growing to a current number of 17 programmes throughout Switzerland. There is a trend to integrate PAD patients at least partially into the cardiac rehabilitation programmes, as most of the programme components are similar and can be provided in common [10].

In 2003, the first ambulatory diabetes rehabilitation programme was established at the Inselspital Bern, again based on the structure of the multidisciplinary ambulatory cardiac and the PAD rehabilitation programme. Target patients are those with early stages of type 2 diabetes and in need of a comprehensive risk factor and lifestyle intervention programme [11]. Minimal standards and quality criteria have been established. Since 2010, the diabetes rehabilitation programme is also recognised by the BAG and costs are covered by health insurance. Today, there are 36 ambulatory diabetes rehabilitation programmes, all of them connected to a diabetologist and/or a specialised diabetes care centre. Many of these programmes are also linked to ambulatory obesity intervention programmes.

Figure 2: Multiple physiological and metabolic effects of exercise: exercise is medicine.



In 2006, the first ambulatory neurovascular rehabilitation programme was established at the Inselspital Bern. Patients with transient ischaemic attacks or minor strokes without need for a specific neurological rehabilitation programme are included and attend a programme with a structure to those of the other prevention and rehabilitation programmes, including not only lifestyle and risk factor interventions but also specific components targeting specific psychological needs and treating minor neuromotor deficits. First results are encouraging and it is planned to submit the programme to the BAG for recognition and reimbursement [12].

In 2017, 117 ambulatory cardiovascular prevention and rehabilitation programmes existed in Switzerland: 64 for cardiac, 17 for peripheral artery disease and 36 for diabetes rehabilitation.

Underutilisation of cardiac rehabilitation in Switzerland

Although CR is highly recommended for all types of cardiovascular disease, CR referral is still low around the world, including in Switzerland. According to a recent analysis of data from the AMIS Plus (Acute Myocardial Infarction in Switzerland) registry, only 57% of cases of acute myocardial infarction were referred for CR in the years 2005–2017 [13]. Patients referred to CR were younger, more often male, presented more often with ST elevation myocardial infarction, and, apart from smoking, had fewer risk factors, such as dyslipidaemia, hypertension and diabetes. Patients referred for CR had a lower crude 1-year all-cause mortality (1.7 vs 5.8%, $p < 0.001$), and a lower rate of re-infarction, rehospitalisation or cardiovascular disease or intervention (all $p < 0.001$). In a multivariable logistic regression analysis, CR was an independent predictor for lower mortality rate (odds ratio 0.65, 95% confidence interval 0.48–0.89; $p = 0.007$). If patients are referred to a structured CR programme and attend the first sessions, the adherence rate is in general $>80\%$. Urgent action is needed to improve referral. Therefore, all caregivers involved in the treatment of patients with cardiovascular disease are requested to refer eligible patients to CR programmes as recommended by current guidelines.

Multidisciplinary care: call for prevention centres

The provision of preventive cardiology services requires an integrated professional multidisciplinary approach. This must include cardiologists, other medical specialists, nurses and allied health professionals, and general practitioners, all with appropriate professional training and experience. Uniting these professionals in one centre is both an efficient and effective way of delivering comprehensive prevention and rehabilitation services (fig. 3). Therefore, the European Association for Cardiovascular Prevention and Rehabilitation is calling for the creation of modern cardiovascular prevention centres across Europe [14]. The term “cardiovascular prevention centre” is generic and these institutions may take different forms in different health settings, although with common principles: (1) leadership in prevention and rehabilitation; (2) excellence in preventive and rehabilitative care for all high risk patients; (3) evaluation of lifestyle, risk factors and other outcomes

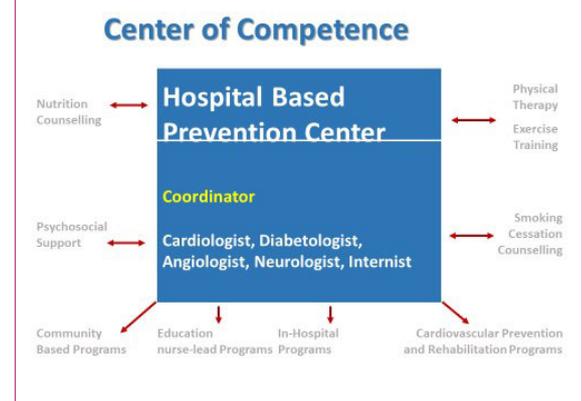
at end of programme and over the long term; (4) research into the clinical and cost-effectiveness of innovative models of service delivery in prevention and rehabilitation (including eHealth and Telemedicine); and (5) teaching and training health professionals in all aspects of prevention and rehabilitation.

In Switzerland, the organisation swissprevent.ch is a multidisciplinary organisation of medical societies with the aim to promote and support cardiovascular prevention and rehabilitation in Switzerland. A major task of swissprevent.ch is to support a network of multidisciplinary and multiprofessional hospital-based Swiss cardiovascular prevention centres which are working in close cooperation with primary care providers. The professional societies involved in swissprevent.ch are the ECPRS, the Swiss Angiology Society, the Swiss Neurology Society and Swiss Stroke Society, the Swiss Society for Endocrinology and Diabetes, the Swiss Society for General and Internal Medicine and the Swiss Cardiovascular Therapists. More professional organisations will be invited to join this initiative.

New horizons

Our society is rapidly changing and new megatrends are coming. Digitalisation is emerging and entering all aspects of our life. The use of smartphones and all kinds of apps is widespread even among elderly people. With this, digitalisation will also have a great impact on the way cardiovascular prevention and rehabilitation will be delivered. We have to become more flexible in offering different programmes in a modular system, because it is evident that one size does not fit all. Lifestyle tracking by smartphones, motivational and educational text messaging, distant monitoring of vital signs, blood pressure and glucose levels, and centre based monitoring of home training will soon become clinical reality. eHealth and telemedicine have the potential to increase patient participation offering greater flexibility and options for activities and to support behavioural changes. First studies using telemedicine for home-based cardiac rehabilitation are promising [15]. These changes are challenging, but at the same time carry great chances for cardiovascular prevention and rehabilitation programmes to reach out to more persons at risk and to more patients with established disease, and to help to keep adherence and long-term maintenance of a healthy lifestyle.

Figure 3: The concept of multidisciplinary hospital based cardiovascular prevention and rehabilitation centres.



Disclosure statement

No financial support and no other potential conflict of interest relevant to this article was reported.

References

- 1 Pfiffner D, Saner H. Aktuelle Situation der kardialen Rehabilitation in der Schweiz [The current status of cardiac rehabilitation in Switzerland]. *Schweiz Med Wochenschr.* 1990;120(42):1565–8. German. [PubMed](https://pubmed.ncbi.nlm.nih.gov/1011161/).
- 2 Saner H, Saner B, Stäubli R. Erste Erfahrungen mit einem komprehensiven ambulanten Rehabilitationsprogramm für Herzpatienten [Initial results with a comprehensive ambulatory rehabilitation program for heart patients]. *Schweiz Med Wochenschr.* 1994;124(46):2075–82. German. [PubMed](https://pubmed.ncbi.nlm.nih.gov/104414/).
- 3 Saner H, Pfiffner D. Ambulante Rehabilitation von Herzpatienten in der Schweiz [Ambulatory rehabilitation of cardiac patients in Switzerland]. *Wien Klin Wochenschr.* 1995;107(24):771–3. German. [PubMed](https://pubmed.ncbi.nlm.nih.gov/101007/).
- 4 Saner H. Ambulante kardiologische Rehabilitation in der Schweiz. *Dtsch Z Sportmed.* 2002;53(5):130–4.
- 5 Saner H. Der Schweizer Weg der kardiologischen Rehabilitation [The Swiss approach for cardiac rehabilitation]. *Herz.* 2012;37(1):38–43. German. doi: [http://dx.doi.org/10.1007/s00059-011-3571-z](https://dx.doi.org/10.1007/s00059-011-3571-z). [PubMed](https://pubmed.ncbi.nlm.nih.gov/101007/).
- 6 Schmid JP, Saner H. Ambulatory preventive care: outpatient clinics and primary care. In: *The ESC Textbook of Preventive Cardiology*, Oxford University Press, Oxford 2015, p 294 – 302.
- 7 Saner H. From Cardiac Rehabilitation to Ambulatory Preventive Care: The Swiss Way. *Swiss Sports & Exercise Medicine.* 2016;64(2):26–30.
- 8 Shiroma EJ, Lee IM. Physical activity and cardiovascular health: lessons learned from epidemiological studies across age, gender, and race/ethnicity. *Circulation.* 2010;122(7):743–52. doi: [http://dx.doi.org/10.1161/CIRCULATIONAHA.109.914721](https://dx.doi.org/10.1161/CIRCULATIONAHA.109.914721). [PubMed](https://pubmed.ncbi.nlm.nih.gov/109914721/).
- 9 Gielen S, Schuler G, Adams V. Cardiovascular effects of exercise training: molecular mechanisms. *Circulation.* 2010;122(12):1221–38. doi: [http://dx.doi.org/10.1161/CIRCULATIONAHA.110.939959](https://dx.doi.org/10.1161/CIRCULATIONAHA.110.939959). [PubMed](https://pubmed.ncbi.nlm.nih.gov/110939959/).
- 10 Schumacher A, Gretener S, Saner H. Gehtraining als suffiziente Therapiemethode bei Patienten mit peripherer arterieller Verschlusskrankheit (PAVK). *Schweiz Med Forum.* 2012;12(3):30–1. doi: [http://dx.doi.org/10.4414/smfm.2012.07749](https://dx.doi.org/10.4414/smfm.2012.07749).
- 11 Puder J, Grimm JJ, Hagon-Traub I, Ruiz J, Saner H. DIAfit, ein Schweizer Programm zur Förderung der körperlichen Aktivität bei Patienten mit Diabetes mellitus. *Schweiz Med Forum.* 2011;11(27):478–80.
- 12 Kamm CP, Schmid JP, Müri RM, Mattle HP, Eser P, Saner H. Interdisciplinary cardiovascular and neurologic outpatient rehabilitation in patients surviving transient ischemic attack or stroke with minor or no residual deficits. *Arch Phys Med Rehabil.* 2014;95(4):656–62. doi: [http://dx.doi.org/10.1016/j.apmr.2013.10.013](https://dx.doi.org/10.1016/j.apmr.2013.10.013). [PubMed](https://pubmed.ncbi.nlm.nih.gov/101016/).
- 13 Hermann M, Witassek F, Erne P, Rickli H, Radovanovic D. Impact of cardiac rehabilitation referral on one-year outcome after discharge of patients with acute myocardial infarction. *Eur J Prev Cardiol.* 2019;26(2):138–44. doi: [http://dx.doi.org/10.1177/2047487318807766](https://dx.doi.org/10.1177/2047487318807766). [PubMed](https://pubmed.ncbi.nlm.nih.gov/101177/).
- 14 Saner H, Wood D. Practical organisation of preventive cardiology programmes: integrating prevention and rehabilitation. *Eur J Cardiovasc Prev Rehabil.* 2009;16(2_suppl, Suppl 2):S37–42. doi: [http://dx.doi.org/10.1097/01.hjr.0000359234.65646.7a](https://dx.doi.org/10.1097/01.hjr.0000359234.65646.7a). [PubMed](https://pubmed.ncbi.nlm.nih.gov/101097/).
- 15 Frederix I, Vandijck D, Hens N, De Sutter J, Dendale P. Economic and social impact of increased CR uptake and cardiac telerehabilitation in Belgium – a cost-benefit analysis. *Acta Cardiol.* 2018;73:222–9. doi: [http://dx.doi.org/10.1080/00015385.2017.1361892](https://dx.doi.org/10.1080/00015385.2017.1361892). [PubMed](https://pubmed.ncbi.nlm.nih.gov/101080/).