

PRoF Award abstract – Call 2015

EXPERT ('EXercise Prescription in Everyday practice & Rehabilitative Training') Flowchart Project

1. Research Outline

Acronym	EXPERT flowchart
Project name in English	EX ercise P rescription in E veryday practice & R ehabilitative T raining Flowchart Project
Pitch (1 sentence)	In this project proposal, a digital algorithm is developed that assists healthcare professionals and physicians across a broad range of disciplines, in different countries, and in different settings to be able to prescribe clinically effective and medically safe exercises for patients with metabolic and cardiovascular diseases.
Executive summary (max. 10 lines)	<p>Our current society experiences an epidemic of metabolic (obesity, diabetes,...) and cardiovascular (heart diseases, peripheral arterial disease) diseases. In the treatment of these diseases, exercise training is a cornerstone. However, due to the complexity of how to decide what exercises to prescribe within each different disease and combination of different diseases, nobody knows how to prescribe optimal clinically effective and medically safe exercises for all these patients. In this project, a digital algorithm is developed that assists healthcare providers across a broad range of disciplines and in different settings to achieve this goal. By the implementation of this flowchart, the morbidity/mortality and healthcare costs from these diseases will be lowered significantly due to a correct prescription of exercises.</p>

2. Cause and context of the research

In the treatment of individuals with metabolic (obesity, diabetes, dyslipidemia) and cardiovascular disease (heart diseases, peripheral arterial disease) the implementation of exercise training or rehabilitation is a cornerstone. Such intervention leads to improvements in physical and mental health, reductions in mortality, morbidity and hospitalisation frequency, and cost savings for the community (1,2,3). This is endorsed by clinical guidelines from many international instances (4,5).

Evidence is accumulating that exercise should be considered/approached as a medication, and therefore that a different exercise prescription is required when different goals are aimed at (for example reducing fat mass, or improving blood lipid profile, or improving exercise tolerance, or improving glycemic control, etc.) (6). Tailoring the exercise training programme to each single patient according to his/her specificity is thus a crucial aspect in this endeavour.

It is however difficult to select proper training modalities (exercise intensity and duration, type of exercise, exercise frequency and volume) in presence of a combination of different cardiovascular disease (CVD) risk factors (hypertension, dyslipidemia, obesity, glucose intolerance/diabetes) and other diseases (e.g. pulmonary arterial hypertension, sarcopenia/frailty, COPD, chronic kidney disease, type 1 diabetes). In current guidelines specific training modalities are proposed for each individual CVD risk factor and cardiovascular pathology separately (7,8), but how to combine different exercise prescriptions in case of combinations of CVD risk factors and cardiovascular pathologies is too complex and unknown. This difficulty is however common in clinical medicine.

It is therefore believed that the current exercise and rehabilitation programmes for metabolic and cardiovascular disease patients can be improved significantly, thus leading to greater secondary prevention (and thus cost savings for the community). In fact, it is speculated that despite the currently detected impressive impact of exercise training in the treatment of metabolic and cardiovascular diseases, the maximal clinical benefits resulting from exercise training are far from reached in these patients.

The aim of the current project proposal (which is ongoing, see section 6) is therefore to develop a digital flowchart that assists healthcare professionals, across a wide range of disciplines (family physicians, rehabilitation physicians, endocrinologists, cardiologists, sports physicians, physical therapists, etc.), in different countries, and in different settings (private practices, rehabilitation centres, hospitals) to select maximally clinically effective and medically safe training modalities for exercise training and rehabilitation of patients with cardiovascular and metabolic diseases.

We thus aim to:

1. Develop a flowchart that assists physicians and healthcare professionals to choose and adopt the optimal exercise intervention in metabolic and cardiovascular disease patients with various CVDs or other chronic internal diseases.

2. Implement the flowchart as an e-learning tool/web application, which shall assist physicians and healthcare professionals to choose and implement effective exercise interventions in patients with CVD's and/or other chronic internal diseases.
3. Provide the theoretical framework of the actual state of the art in exercise prescription and to promote its application by e-learning platform or educational activities.
4. To update this flowchart on regular basis the upcoming years, based on new scientific evidence and experiences from its clinical use.

3. Innovation results achieved

The project is currently ongoing. The flowchart will be used for exercise prescription for, and based on, following CVD risk factors and diseases:

DISEASE	
Coronary artery disease (with PCI, CABG)	primary indication
Heart failure	primary indication
Obesity	CVD risk factor
Type 1 diabetes	CVD risk factor
Type 2 diabetes & insulin resistance	CVD risk factor
Hypertension	CVD risk factor
Dislipidemia	CVD risk factor
Pulmonary hypertension	exercise modification
Claudicating intermittens	primary indication
Pacemaker & ICD	primary indication/exercise modification
Assist devices	primary indication
Cardiac transplantation	primary indication
Sarcopenia	exercise modification
COPD/fibrosis/restrictive/interstitial lung disease	exercise modification
Renal failure (patients on dialysis)	exercise modification
Valve disease/surgery (without CABG)	primary indication

Congenital heart disease

primary indication

Expected deliverable will be a digital rehabilitation flowchart. This flowchart can be prepared to applications on PC's, smartphones or i-pad's. In addition, 4 European position statements will result out of this project. These statements will be published in the European Heart Journal or European Journal of Preventive Cardiology.

Furthermore, this programme will constitute the background and the basis for the development of a subsequent larger web-based programme dedicated to the general population to promote the implementation of healthy lifestyle based on exercise prescription.

As a result, it is expected that by the implementation of this flowchart in current healthcare, a significantly greater prevention of morbidity, premature death, but also greater costs savings, will be achieved.

The following steps have been taken or are foreseen:

1. Project proposal (endorsed by the EACPR), **completed**
2. Project proposal official presentation (at EuroPrevent Congress, Rome, 2013), **completed**
3. Steering group formation (experts in the field of exercise prescription, based on publication record and/or clinical experience), **completed**
4. Critical review analysis of the evidences by group members (6 months). Writing group members first consult existing clinical guidelines, and further consider specific studies analysing the impact of different exercise modalities on CVD risk factors/diseases. **completed**
5. Summary of literature outcomes, as delivered by steering group members, by project leader (discussed on EuroPrevent Amsterdam and ESC Amsterdam, 2014): **completed**
6. Development of preliminary flowchart, and its validation: 2015
7. Proposal of preliminary flowchart to group members with the aim to achieve final consensus (EuroPrevent 2015, Lisbon).
8. Definition and development of e-learning tool on website (May to September 2015)
9. Pilot test phase of implementation and use of first flowchart by a selected group of physicians and healthcare professionals: data on feasibility will be collected (6 months)
10. Development of final flowchart and e-learning tool on website (2016)
11. Further refinement of the flowchart and implementation of final flowchart in Europe (anticipated before EuroPrevent 2016).

4. Link to the PRoF values

- o minimal comfort

By the use of this flowchart, patients with metabolic and/or cardiovascular disease will receive a training prescription with optimal clinical effectiveness (they will train very effective but also tailored to their own capabilities) and medical safety (low risk for complications due to exercise training). In this respect, exercise will be prescribed with greater comfort to the patient.

o privacy

This digital flowchart will be used by a healthcare professional or physician in presence of the patient (during consultation or meeting). Therefore, information that is shared between the healthcare professional and patient remains restricted to these parties only. In addition, the input of data on the website to generate a training program for a patient is always anonymously (the name is not requested on the application or website). These steps guarantee optimal privacy for the patient.

o security

Data that are inputted on the website or application are always anonymous. In addition, the website/application will receive protection from anti-virus and anti-hacking programs.

o anti-loneliness

Patients with metabolic and cardiovascular disease will receive greater social contact when following an exercise program, whether this is in a hospital, private practice, sports club, or organization. Therefore, prescribing exercise by this flowchart will lead to exposure of patients with a certain disease to other people with the same disease/symptoms/limitations, and give rise to an anti-loneliness effect.

o non stigmatising solutions

In this project, not the disease is the central theme, but the capability of the patient to exercise and to overcome certain barriers and (physical) limitations (on the long term). As a result, by prescribing exercise to a patient with a metabolic or cardiovascular disease, the patient will become 'less patient' due to improvements in physical fitness, muscle strength and independency. This will lead to 'de-stigmatisation' of the patient.

o inter generational

The current product can be used by younger and older patients simultaneously, but also by younger and older healthcare professionals.

o respect

By using this flowchart, exercise prescription on individual level will be achieved (instead of general level as currently executed throughout Europe), based on underlying disease, presence of risk factors, and physical limitations. In this way, the symptoms and limitations of the patient is respected maximally. This will be perceived by the patient as a greater respect for their individual needs.

o flexibility

The flowchart can be used in many different circumstances, settings and situations, and the exercise recommendations can adapt according to changes in symptoms or risk factors of the patient. It thus follows that this product is highly flexible and easy to implement.

5. Applicable IPR rules

The intellectual property of this flowchart belongs to the EACPR EXPERT flowchart group (mentioned in point 6), under the coordination of prof. dr. Dominique Hansen. There will be no patent application, and no royalties will be paid to any party. EDM, who develops and maintains the flowchart, will be paid for this service on contract basis. The flowchart is placed on a website with very strict safety features.

6. Information on the partners

In this project, which is currently on-going, 32 experts in the rehabilitation of chronic internal diseases (with their connections to the hospitals and universities they work at), out of 11 European countries, coordinated by the EACPR (European Association for Cardiopulmonary rehabilitation, section of the European Society of Cardiology), collaborate and participate:

Prof. dr. Dominique Hansen (BE, project chair), dr. Jean-Paul Schmid (CH), prof. dr. Paul Dendale (BE), prof. dr. Luc Vanhees (BE), prof. dr. Bernhard Rauch (DE), prof. dr. Patrick Doherty (UK), prof. dr. Massimo Piepoli (IT), dr. Ugo Corra (IT), Prof. dr. Paul Beckers (BE), prof. dr. Frank Edelmann (DE), prof. dr. Olga Barna (UKR), dr. Christoph Stettler (CH), dr. Cajsja Tonoli (BE), prof. dr. Joseph Niebauer (AUT), prof. dr. Veronique Cornelissen (BE), prof. dr. Robert Fagard (BE), dr. Eugenio Greco (IT), dr. Pompilio Faggiano (IT), dr. Michel Lamotte (BE), prof. dr. Heinz Voller (DE), prof. dr. Carlo Vigorito (IT), prof. dr. Ana Abreu (POR), prof. dr. Martijn Spruit (NL), dr. Evangelia Koudi (GR), dr. Tim Takken (NL), dr. Constantinos Davos (GR), dr. Esteban Garcia-Porrero (ESP), dr. Roberto Pedretti (IT), dr. Maurizio Bussotti (IT), dr. Rona Reibis (DE), dr. Simona Sarzi Braga (IT), dr. Daniel Neunhauserer (IT).

In addition, a close collaboration with EDM, Hasselt University, (under coordination of Prof. dr. Karin Coninx) is present. The Expertise centre for Digital Media (EDM) is the

ICT research institute of Hasselt University, and performs research in computer science since 1987. EDM is appointed to create the digital flowchart.

It thus follows that a strong interuniversity and intra-university collaboration network is present in this project.

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Addendum: Contact information

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