

Do clinicians prescribe exercise according to clinical guidelines in patients with cardiovascular disease? Findings from the European Association of Preventive Cardiology EXPERT (EXercise Prescription in Everyday practice & Rehabilitative Training) working group survey

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INTRODUCTION

Disease-specific exercise guidelines for the secondary prevention of cardiovascular disease (CVD) are widely available. However, how to integrate different disease-specific exercise recommendations within a single patient with different CVD's or risk factors remains to be clarified.

It remains therefore uncertain whether exercise is prescribed similarly by clinicians to patients with multiple presentations of CVD's and risk factors.

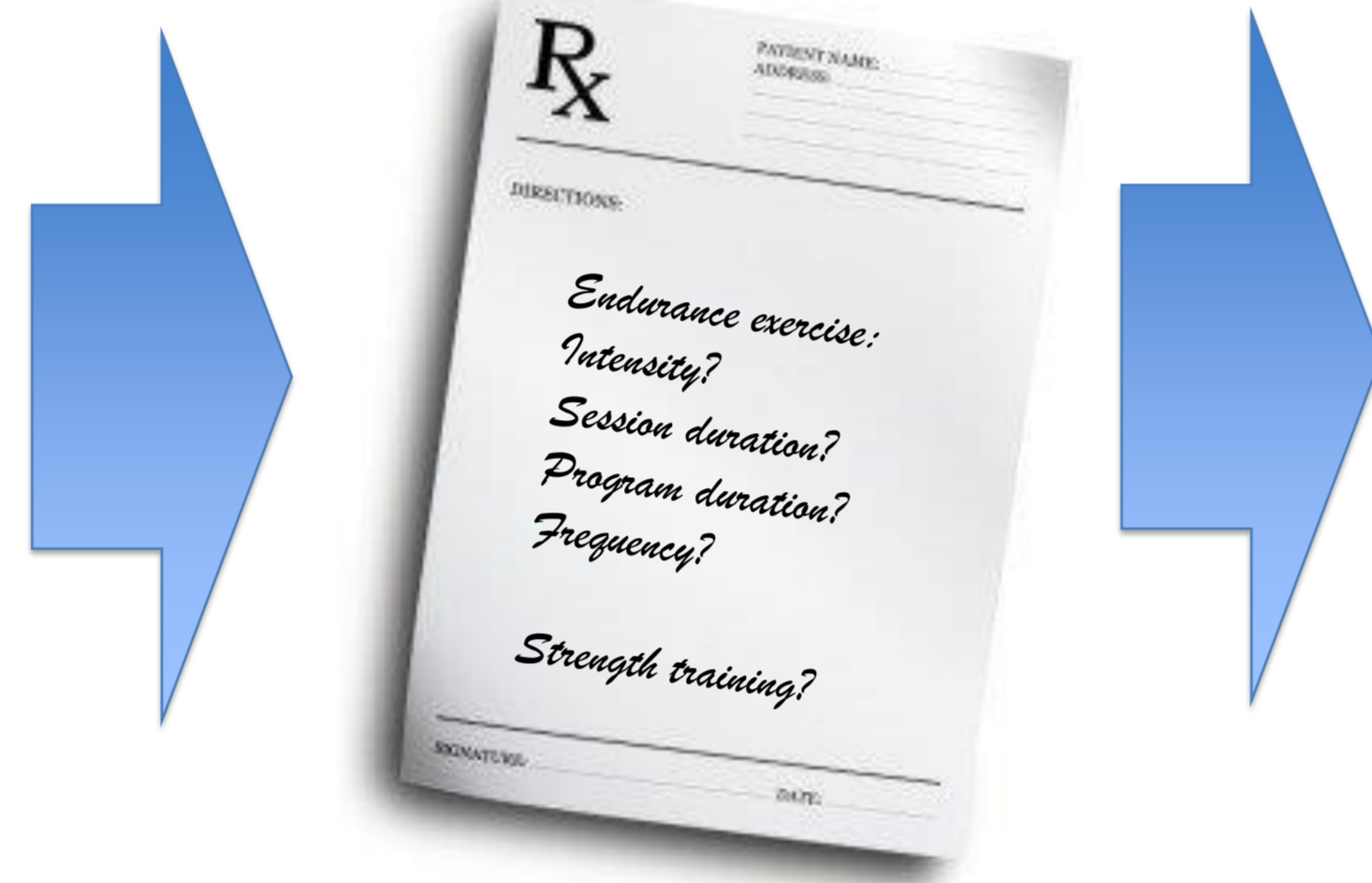
AIM

To assess the inter-clinician variance in exercise prescription for CVD (risk) patients.

To compare these prescriptions with advices from the EXPERT tool, an integrated digital decision support system for state-of-the-art exercise prescription in CVD.

MATERIALS & METHODS

First, 53 (out of 75) CV rehabilitation clinicians out of nine European countries fulfilled to prescribe exercise intensity (based on heart rate (HR)), frequency, session duration, program duration and exercise type (endurance or strength training) for the same five patient cases.



| Case 1 | Case 2 | Case 3 | Case 4 | Case 5 |
|--|--|---|---|---|
| Age: 65 years Body height: 171 cm Body weight: 65 kg Sex: male VO ₂ max: 2500 ml/min, 38.5 ml/kg/min (116% of predicted normal value) Resting HR: 55 beats/min Peak exercise HR: 123 beats/min Total cholesterol: 180 mg/dl Fasting glycaemia: 92 mg/dl Blood pressure: 145/82 mmHg Medication intake: beta-blocker, nitrate, statin, antiplatelet. | Age: 55 years Body height: 160 cm Body weight: 85 kg Sex: female VO ₂ max: 1600 ml/min, 18.8 ml/kg/min (108% of predicted normal value) Resting HR: 102 beats/min Peak exercise HR: 151 beats/min Total cholesterol: 267 mg/dl Fasting glycaemia: 108 mg/dl Blood pressure: 115/72 mmHg Medication intake: statin, ACE-inhibitor, orlistat, antiplatelet, metformin, sulfonyleurea. | Age: 70 years Body height: 182 cm Body weight: 80 kg Sex: male VO ₂ max: 1500 ml/min, 18.7 ml/kg/min (73% of predicted normal value) Resting HR: 52 beats/min Peak exercise HR: 112 beats/min Total cholesterol: 189 mg/dl Fasting glycaemia: 102 mg/dl Blood pressure: 125/80 mmHg Medication intake: statin, antiplatelet, beta-blocker, digitalis, mucolytics, bronchodilators. | Age: 65 years Body height: 165 cm Body weight: 90 kg Sex: female VO ₂ max: 1450 ml/min, 16.1 ml/kg/min (90% of predicted normal value) Resting HR: 52 beats/min Peak exercise HR: 100 beats/min Total cholesterol: 234 mg/dl Fasting glycaemia: 115 mg/dl Blood pressure: 135/75 mmHg Medication intake: beta-blocker, statin, exogenous insulin, nitrate, erythropoietin. | Age: 79 years Body height: 170 cm Body weight: 59 kg Sex: male VO ₂ max: 1250 ml/min, 21.2 ml/kg/min (88% of predicted normal value) Resting HR: 56 beats/min Peak exercise HR: 111 beats/min Total cholesterol: 178 mg/dl Fasting glycaemia: 125 mg/dl Blood pressure: 135/87 mmHg Medication intake: beta-blocker, bronchodilator, antiplatelet. |
| Referred to rehabilitation for: acute myocardial infarction with PCI. Co-morbidities: None. | Referred to rehabilitation for: obesity. Co-morbidities: type 2 diabetes. Additional information: gonarthrosis present. | Referred to rehabilitation for: AMI with CABG. Co-morbidities: Heart failure with preserved ejection fraction, mild COPD. | Referred to rehabilitation for: stable myocardial ischemia (threshold at 87 beats/min) Co-morbidities: renal failure, type 1 diabetes. Additional information: chronic aspecific low back pain present. | Referred to rehabilitation for: peripheral vascular disease. Co-morbidities: cachexia and frailty, COPD. |

Second, these exercise prescriptions were compared between clinicians and with advices from the EXPERT tool.

RESULTS

The majority of the participating clinicians (from Belgium, The Netherlands, Germany, France, United Kingdom, Italy, Spain, Austria, Portugal) were cardiologists (68%), followed by physiotherapists (11%), CV rehabilitation scientists (7%), physiatrists (6%) and sports physicians, general practitioners, rehabilitation physicians and exercise physiologists (2% in each category), and had an experience of (median) 10 (interquartile range (IQR) 15) years.

A large inter-clinician variance was found for prescribed exercise intensity, frequency, session duration, program duration, total exercise volume and prescription of strength training exercises (see Table 1 and Figure 1).

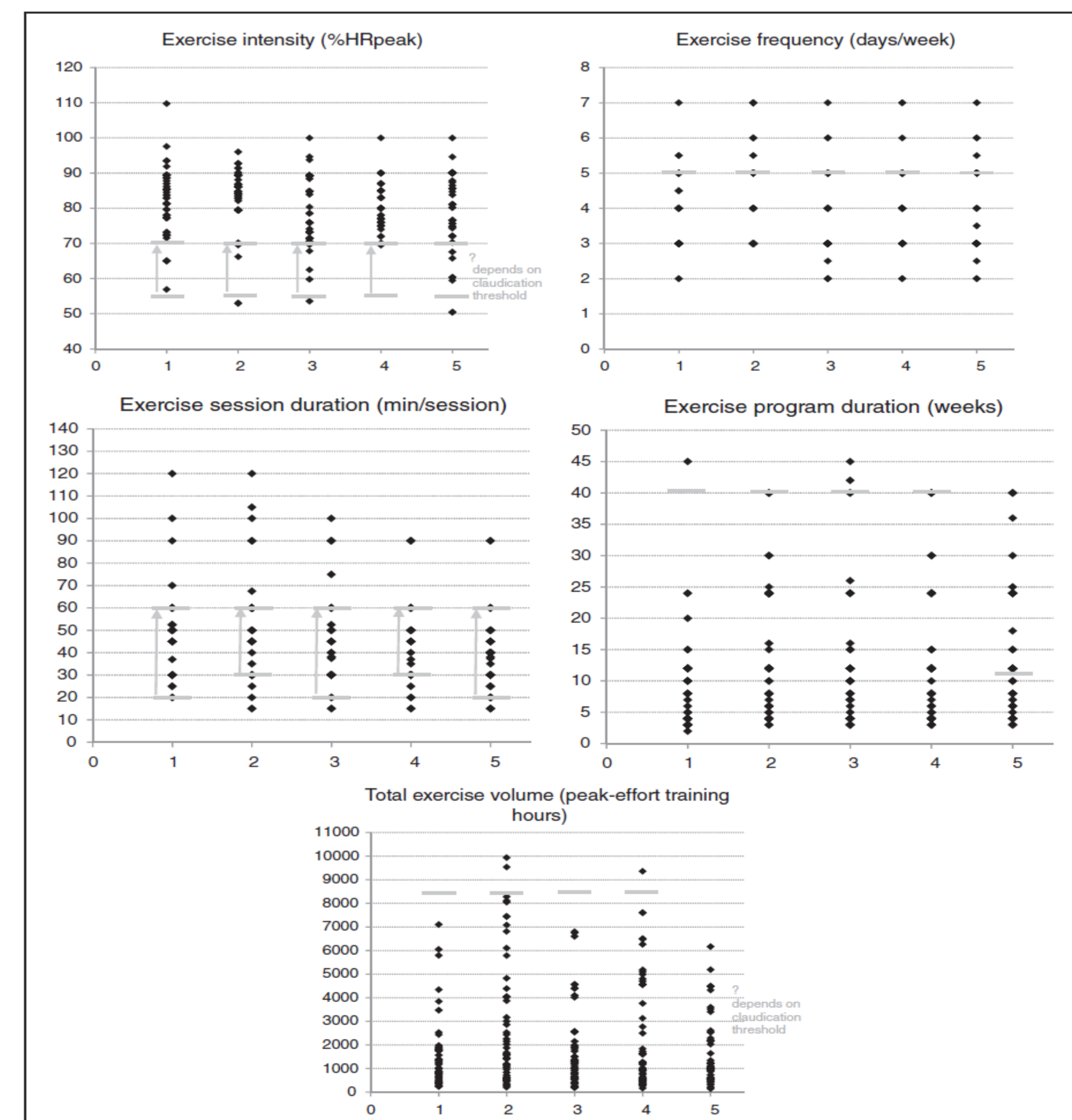
Moreover, clinicians' exercise prescriptions were significantly different from the EXPERT tool advices ($p < 0.001$).

Table 1 Exercise prescriptions, as generated by clinicians, for the same five patient cases

| Exercise modality | Patient case | | | | | P-value between cases |
|--|--------------|-------------|-------------|-------------|-------------|-----------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Intensity (%HR _{peak}) | 83 (14) | 85 (7) | 76 (17) | 78 (9) | 80 (16) | 0.033 |
| Variance | 87 | 72 | 92 | 47 | 122 | |
| Frequency (days/week) | 4 (2) | 4 (2) | 3 (2) | 4 (2) | 3 (2) | 0.047 |
| Variance | 1.3 | 1.3 | 1.6 | 1.2 | 1.2 | |
| Session duration (min/session) | 45 (30) | 50 (30) | 38 (30) | 45 (30) | 40 (20) | 0.047 |
| Variance | 367 | 507 | 392 | 305 | 258 | |
| Program duration (weeks) | 8 (50) | 12 (18) | 12 (9) | 12 (18) | 12 (17) | 0.081 |
| Variance | 127 | 145 | 180 | 194 | 134 | |
| Total exercise volume (peak-effort training hours) | 1024 (1231) | 1669 (3538) | 1205 (1392) | 1215 (4013) | 1034 (1680) | 0.054 |
| Variance | 2231179 | 7662867 | 3060335 | 5621496 | 2178928 | |
| Strength training (yes/no) | 41/12 | 38/15 | 45/7 | 35/18 | 48/5 | 0.012 |
| Strength training (% yes) | 77 | 72 | 86 | 66 | 78 | |

Data are expressed as median (IQR) or number of observations. Abbreviations: HR, heart rate.

Figure 1 Inter-clinician variance in exercise prescription for the same 5 patient cases (on x-axis)



One point in these figures may reflect multiple clinicians as similar exercise modality selections may have occurred between clinicians

CONCLUSION

This study reveals a significant inter-clinician variance in exercise prescription for CVD patients and disagreement with an integrated version of exercise guidelines, reiterating the need of decision support systems/practical tools for integrated state-of-the-art exercise prescription.

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Declaration of interest
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