

Baseline Determinants of Cardiovascular Risk Factor Profile Change in Middle-Aged Adults with Multimorbidity

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Introduction. Despite decades of preventive investment, cardiovascular disease remains the leading cause of premature mortality in Europe. National screening programmes offer a structured opportunity to identify and address modifiable risk factors at scale, yet the patient-level determinants of individual response, particularly among people with multimorbidity, remain poorly characterised. This study aimed to determine the demographic, clinical, and behavioural determinants of longitudinal change in cardiovascular risk factor profile among middle-aged adults with multimorbidity and polypharmacy.

Methods. A retrospective cohort study was conducted across two family doctor centers in Lower Silesia, Poland. From consecutive patients completing the Profilaktyka 40+ preventive examination, 174 met the inclusion criteria; 23 were excluded due to missing follow-up data, yielding a final cohort of 151 participants with multimorbidity (≥ 2 chronic ICD-10 diagnoses) and polypharmacy (≥ 5 chronic medications), all followed for 6–8 months. SCORE2 was applied not as a formal clinical risk classifier but as a continuous composite indicator integrating simultaneous changes in systolic blood pressure, non-HDL cholesterol, smoking status, age, and sex. Predictors of follow-up SCORE2 and net change (Δ SCORE2) were examined using LASSO-selected quantile regression models.

Results. Median baseline SCORE2 was 3.0% [IQR 2.0–4.0], decreasing to 2.8% at follow-up ($\Delta = -0.15$ [−0.48 to 0.10]). In the median model ($\tau = 0.50$), higher age ($\beta = 0.131$; 95% CI 0.084–0.177), male sex ($\beta = 0.551$; 0.232–0.870), and smoking ($\beta = 1.314$; 0.692–1.937) predicted higher follow-up SCORE2 (all $p \leq 0.001$). Greater reductions in SCORE2 were associated with higher baseline systolic pressure ($\beta = -0.032$; $p < 0.001$) and non-HDL cholesterol ($\beta = -0.011$; $p < 0.001$), and secondary or vocational education ($\beta = -0.376$; $p = 0.003$). Comorbid mental and injury-related diagnoses were associated with less favourable change (both $p = 0.013$).

Discussion. Structured preventive care within the Profilaktyka 40+ programme produced measurable, if modest, composite improvements in cardiovascular risk factor profile. Age, male sex, and smoking dominated residual risk at follow-up, while higher baseline cardiometabolic burden and vocational or secondary education predicted the greatest gains. These findings argue for embedding precision-oriented, behaviour-focused strategies within population-level screening frameworks for adults with multimorbidity.

Keywords: Cardiovascular Risk Assessment, Preventive Health Programmes, Polypharmacy

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