Effectiveness and Cost-effectiveness of the Check Your Health Preventive Programme

NCT – 02028195

Approved 21-08-2018

Statistical Analysis Plan

Check Your Health Preventive Program

Evaluation of a preventive health promotion strategy performed in a primary care and municipality setting

2018

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Statistical analysis plan for evaluation of Check your Health Preventive Programme, 2018
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1. Introduction

The Check Your Health Preventive Program (CHPP) was set up to investigate the effectiveness on health outcomes of a preventive health check offered at a population-level to all individuals aged 30-49 years in a large municipality (approximately 26.000 citizens) (1).

Studies have indicated that preventive health checks are likely to reduce CVD risk (2) and to be cost effective (3,4). However, a recent Cochrane review found no reduction in mortality, CVD or cancer in follow-up of preventive health checks (5). Concerns have been raised that the review had significant methodological problems (e.g. weak package of screening tests, primary outcome not appropriate for the diverse set of screening tests) and was mainly based on 20 to 30 years old studies (6). Although, there was no consensus on the effect of preventive health checks e.g. the UK National Health Service Health Check program has been introduced to all citizens aged 40 to 74 years to assess individual disease risk in routine care (7,8).

The objective of the pragmatic household cluster-randomised controlled trial, Check Your Health Preventive Program, was to investigate the effectiveness on health outcomes of preventive health checks at a population level to all individuals aged 30 to 49 years in a primary care setting.
The trial is registered at ClinicalTrails.gov ID: NCT02028195 (7 March 2014).

This is the plan for statistical analysis of the impact of the population-based health check on health outcomes after a 4 years follow-up.

2. Aim

The aim is to evaluate:

Effectiveness of the population-based Check Your Health Preventive Programme conducted in primary care on CVD-risk, physical activity, self-rated health and functional capacity.

3. Outcome measures

Outcome measures are assessed based on information from self-reported questionnaire, from measurements at the health examination and from national registers.

3.1. CVD risk

CVD risk was assessed based on European Heart-SCORE ten-year-risk of fatal cardiovascular event (8). The score is derived from information on age, gender, smoking status, systolic blood pressure and total cholesterol for each individual. CVD risk will be analysed as a continuous measure.

3.2. Physical activity

a) Self-reported physical activity was assessed by the use of questionnaire as days/week with a minimum of 30 minutes moderate physical activity. It takes values in the range 0-7 days and will be analysed as a continuous measure.

b) Cardiorespiratory fitness (ml O_2/kg/min) was measured using Aastrand's submaximal bike-test and will be analysed as a continuous measure.

3.3. Self-rated health

Self-rated health was measured by the use of Short-form 12 (SF12) (10).

a) Self-rated health is assessed from the first question in SF12 ("In general, would you say your health is: excellent, very good, good, fair or poor") and will be dichotomized (1 = excellent, very good and good, 0 = fair and poor) and analysed as a binary measure.
b) Mental health was assessed by the Mental Component Score (MCS) from SF12 and analysed as a continuous measure.

3.4. Functional capacity

Functional Capacity (sick leave, working status), affiliation to the labour market (work participation in the last year) will be assessed based on the national register of social transfer payments (DREAM). Work participation will be described as a fraction of full-time employment in the 52 weeks before the invitation date and analysed as a continuous measure.
Sick leave will be measured as a dichotomous variable and as categories of number of sick-leave periods over 3 weeks during the last year before invitation date.

4. Analysis Population

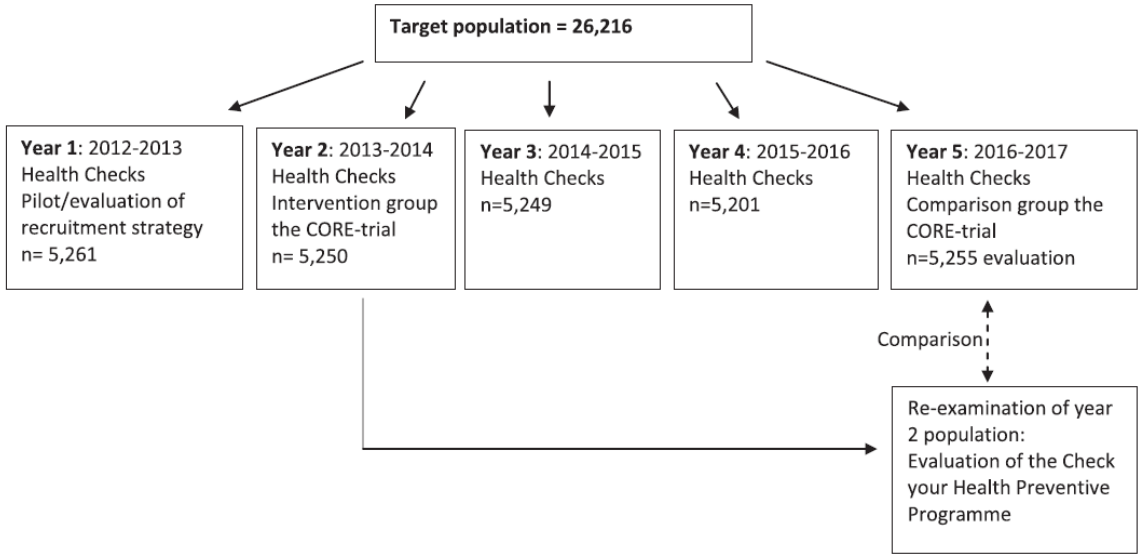

Figure 1. Participants in Check your Health Preventive Programme, Randers

All citizens aged 30-49 years in the municipality of Randers on January 1, 2012 were randomized into five groups (n=26,216) (Figure 1).

The trial was performed as a pragmatic household-cluster randomized controlled trial and included 10,505 individuals. The Intervention group (IG) was defined as the population invited to attend the health check in year 2 and re-invited in year 5, whereas the comparison group (CG) was defined as the population invited to attend in year 5.
A total of 55% of the invited population participated in the health check in year 1, 2012-2013 (11). We expect a similar proportion of the population will participate in the following years.

The actual study population will differ according to the different outcome measures:

CVD risk and cardiorespiratory fitness: The study population is all individuals from the IG, who participated in both baseline and re-examination, and all individuals from the CG, who participated in the examination.

Self-reported health and self-reported physical activity: The study population is all individuals from the IG, who completed both the baseline and the re-examination questionnaire, and all individuals from the CG, who completed the questionnaire.

Functional capacity: The study population is all individuals from IG, who participated in both baseline and re-examination, and all individuals from the CG, who participated in the examination.

5. Descriptive Analysis

To investigate participation patterns in the initial health check we analyze the binary participation status for the first invitation with respect to characteristics of the invited cohort (age, sex, socio-economic status, etc) in a logistic regression.

Intervention and comparison group will be characterized with respect to baseline demographics. For continuous variables, we report their means and standard deviations (SD), when their distribution is approximately normal, whereas for variables with skewed distributions we report medians and interquartile range (IQR). For categorical variables, we report frequencies and their percentage of the total.

6. Analysis of study outcome measures

For the outcomes, which are only measured for participants in the re-examination (CVD risk, physical activity and self-rated health), we will in addition use a multiple imputation and propensity score based analytic strategy as follows. In the first step, we will use multiple imputation to impute missing values for all who participated in the health checks when randomized to receive it (IG or RG).

Missing data

Frequency and patterns of missing outcome data will be reported with information on reasons (did not receive health check, did not answer question). Missing data are not assumed to be 'missing completely at random', so excluding individuals with missing information will likely introduce selection bias. Multiple imputation will be performed for missing outcomes as described in section 4 by inclusion of baseline characteristics that can explain the missingness. Subsequently, we will treat the missingness mechanism as

at random given the observed information (the Missing At Random (MAR) assumption) and use MICE (12) for multiple imputation and perform analyses after Rubin's rules (13). We will explore the robustness of estimates towards violations of the MAR by conducting sensitivity analyses by, for example, assuming that individuals with an unreported level of physical activity on average have one day less of 30 minutes activity than would have been predicted from their observed covariates. The mimicked analysis based on outcomes available from register-data also allows assessment of the potential violation of the MAR assumption.

Propensity score

Among all individuals in IG who participated in year 2 examination, we predict the likelihood of participation in the re-examination in year 5. For the participants of the IG in their first health check, we will estimate how their participation in the re-examination depends on their individual characteristics and measurements obtained in the first health check (sex, age, CVD risk, physical activity, etc). This logistic regression will rely on the multiply imputed datasets. Based on the obtained estimates, the propensity for participating in a re-examination is predicted for all in the IG and the CG who participated in the initial health check they were invited to. We will examine the balancing properties of the propensity score obtained, before we use it to weigh the analysis of treatment effect for the various outcomes (CVD risk, physical activity and self-rated health). The model will be developed based on IG and used in CG to perform effect estimation among comparable groups. All analyses will estimate average treatment effects expressed as mean differences for continuous outcomes and absolute risk differences for binary outcomes. We will finally assess the capacity of the propensity score to remove bias in estimated treatment effects by mimicking this analytic strategy for the functional capacity outcomes, and comparing with the estimates obtained for these outcomes when considering the entire invited population.

The treatment effects associated with participation in CHPP will be reported for each outcome measure with 95% confidence intervals. All analyses will account for clustering at household level.

7. Timescale

Analyses plan will be uploaded to clinicaltrials.gov before 15th September 2018.

Preliminary analyses will be performed before 1st April 2019 and final analysis during 2019.

8. Perspectives

The following analyses are planned and will be described separately:
a) Comparison of health outcomes in CHPP with other municipalities matched on sex, age and educational level.
b) Cost-effectiveness analysis (direct and total costs, live-years saved, expected life-years gained, GP utilization/hospital admissions)
c) CHPP effect on CVD and mortality

9. References

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