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SESSIONS **17**

Time at blood pressure target and the risk of cardiovascular diseases and mortality

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On behave of S-C Chung and co-authors

Introduction

- Effective long term lifestyle and pharmacological interventions to lower blood pressure (BP) in reducing cardiovascular morbidity and mortality
- Suboptimal BP control is common (19-50%)
- The time a patient spends with BP at target level might be an important measure of hypertension care effectiveness
- However, this has not been evaluated in the general population

Study aims

- To describe the average **T**ime per year spent by newly identified hypertensive patients at BP care **TaRgEt** (**TITRE**)
- To investigate factors associated with TITRE
- To assess the relationship between TITRE and cardiovascular outcomes

Methods (I)

- **Design:** Population record-linkage cohort of patients newly identified with high BP in CALIBER, England
- **Study period:** Jan 1997 – March 2010
- **Primary endpoints:**
 - **CVD composite:** incident cardiovascular death, acute myocardial infarction and stroke
 - **incident heart failure**
 - **composite of any incident CVD and death**
- **Secondary endpoints:** incident stable angina, peripheral arterial disease and all-cause mortality

Methods (II)

Inclusion criteria:

- ≥ 18 years old
- ≥ 1 year CPRD registered
- No prior CVD or hypertension
- ≥ 6 months follow-up



Study entry

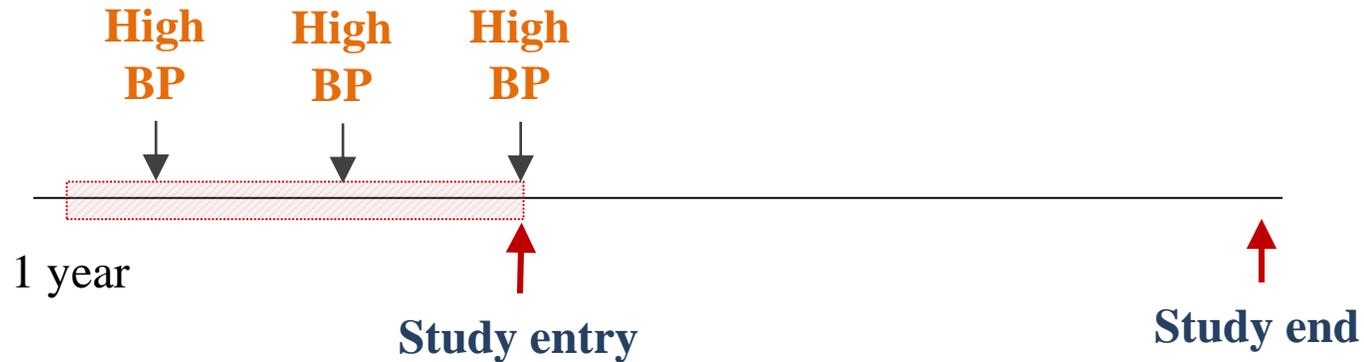
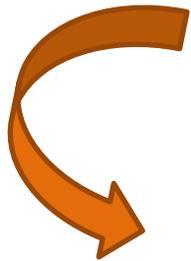


Study end

Methods (II)

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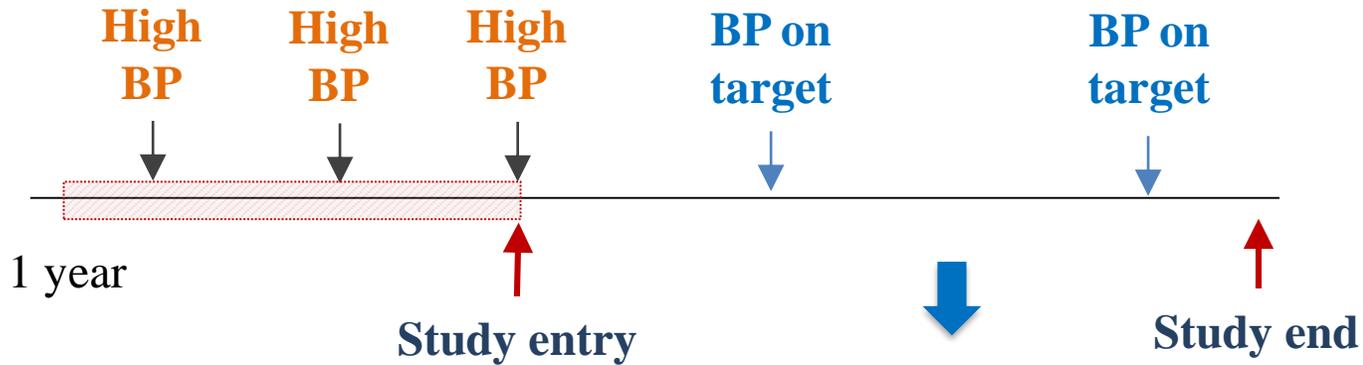
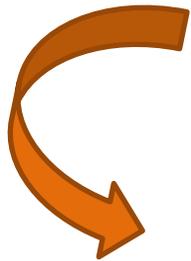


High BP: $\geq 140/90$ mmHg
($\geq 150/90$ if ≥ 60 years without diabetes
and CKD)

Methods (II)

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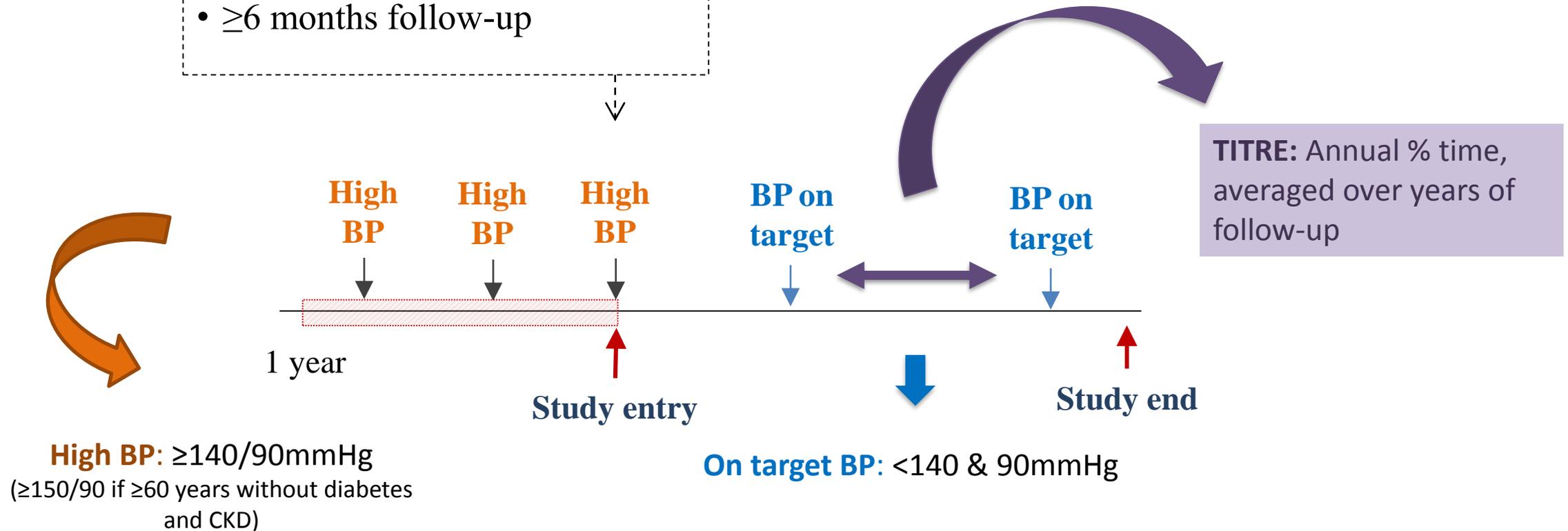
High BP: $\geq 140/90$ mmHg
($\geq 150/90$ if ≥ 60 years without diabetes
and CKD)

On target BP: < 140 & 90 mmHg

Methods (II)

Inclusion criteria:

- ≥ 18 years old
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Methods (III)

- **Baseline covariates:**

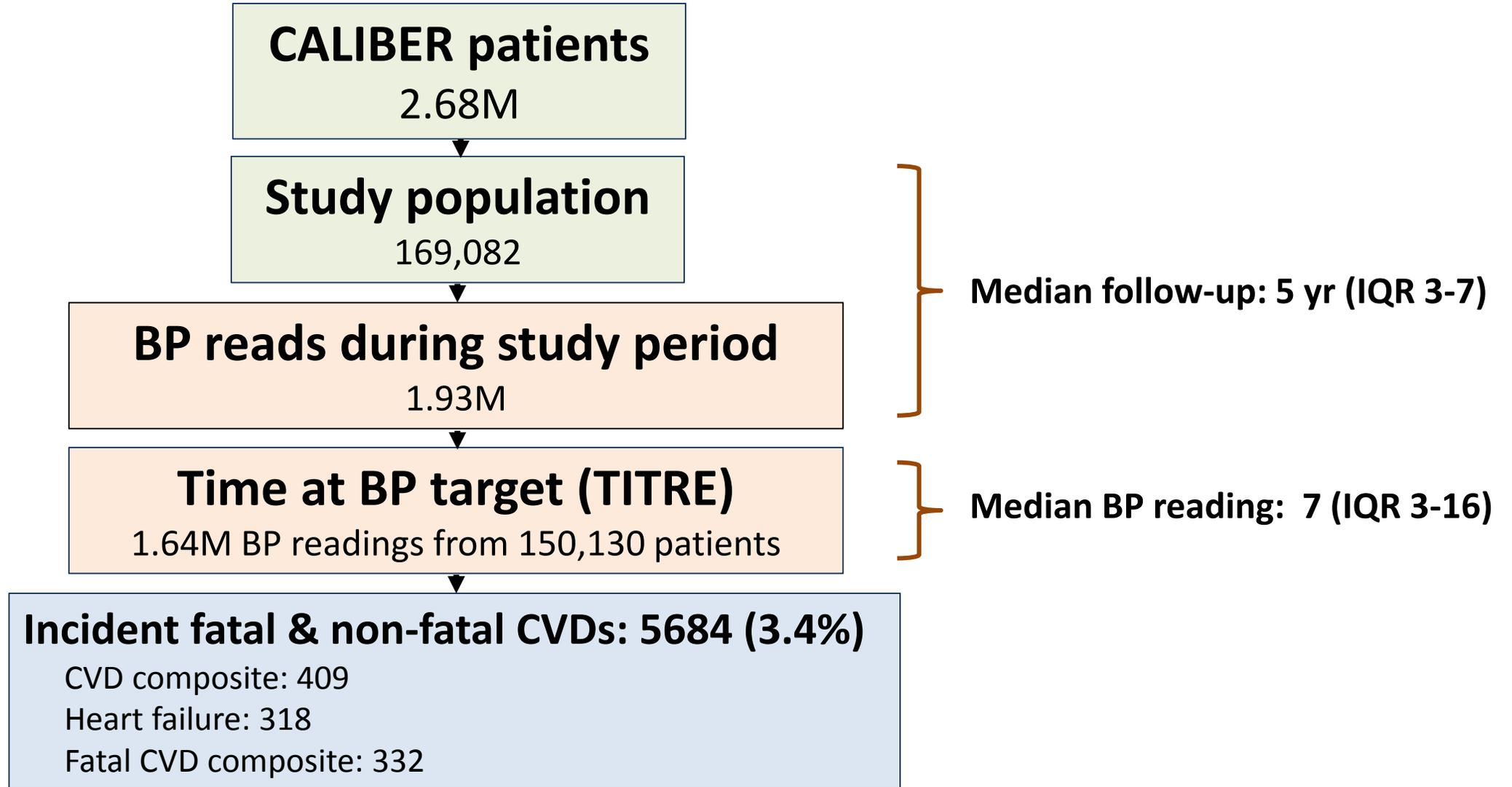
- **Demographic:** age, sex, year of study entry, ethnicity, index of multiple deprivation
- **Cardiovascular:** smoking, BMI, diabetes mellitus, total cholesterol, renal dysfunction (eGFR < 60 mL/min/1.73m²)
- **Hypertension severity:** stage 2 (SBP ≥ 160 or DBP ≥ 100 mmHg)
- **Treatment:** statin, aspirin

Covariates during follow-up:

- **Lifestyle interventions:** nutritional and smoking cessation
- **Treatment:** initial BP lowering drug class

Study flow chart

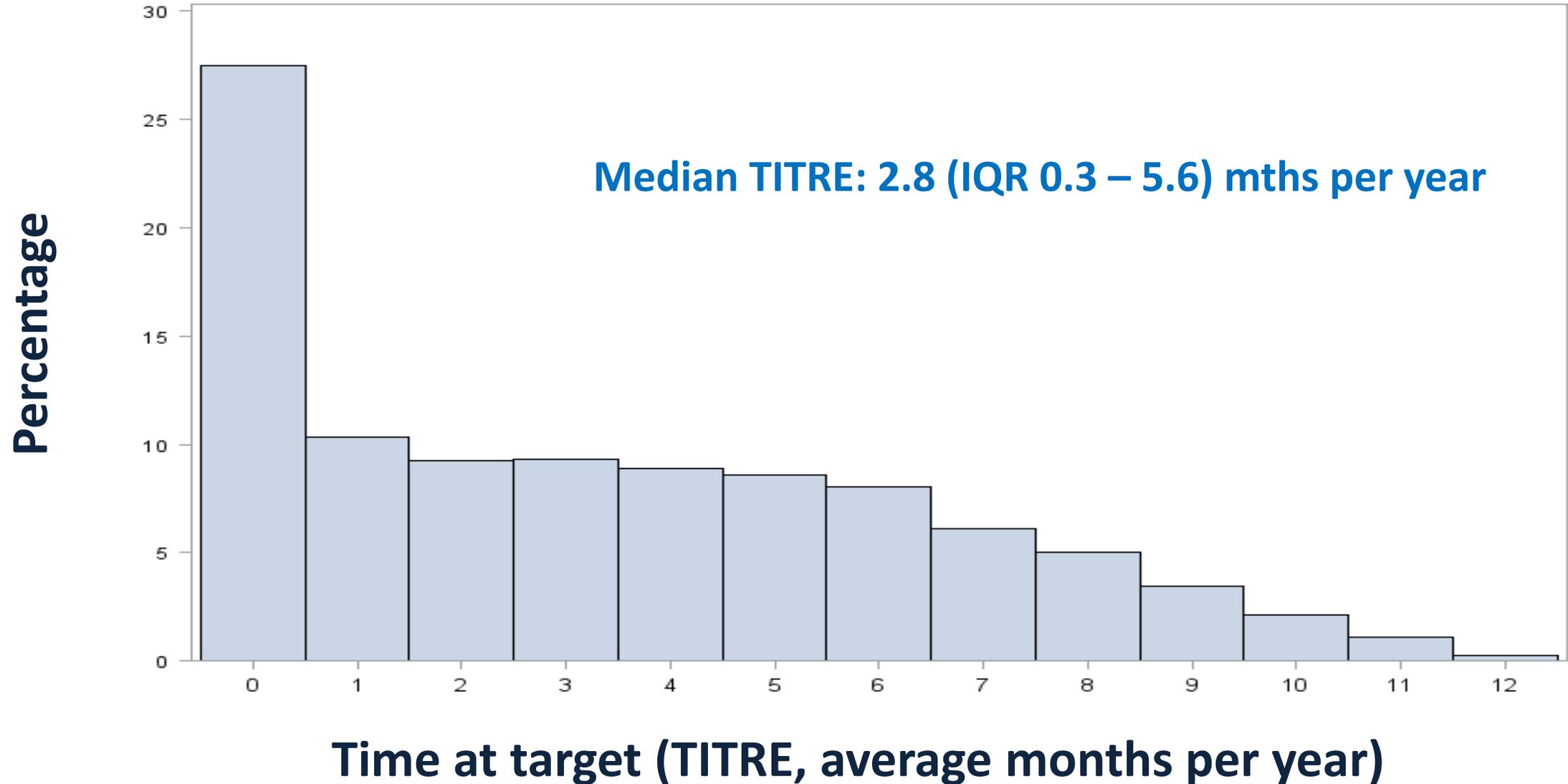
Cohort definition
Follow-up BPs
End-points



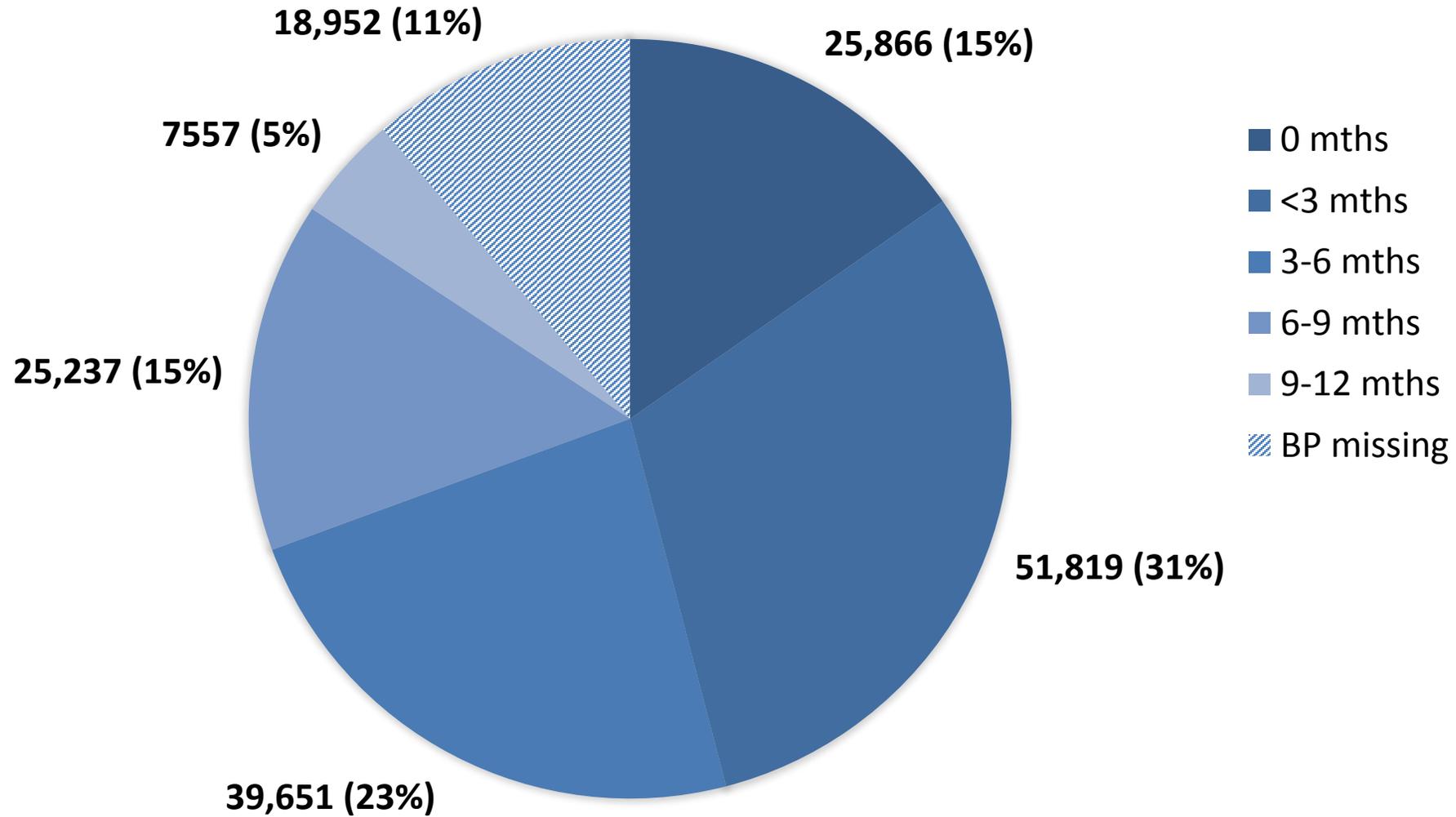
Patient characteristics

Baseline characteristics	N=169,082
Age, mean (years)	52
Women	56%
Stage 2 hypertension	38%
Diabetes	5%
Characteristics during follow-up	
BP lowering medication	46%
Thiazide diuretics	16%
Angiotensin-converting enzyme inhibitors	15%
Dietary advice	29%
Smoking cessation	2%
Snapshot 'control' during the first year	47%

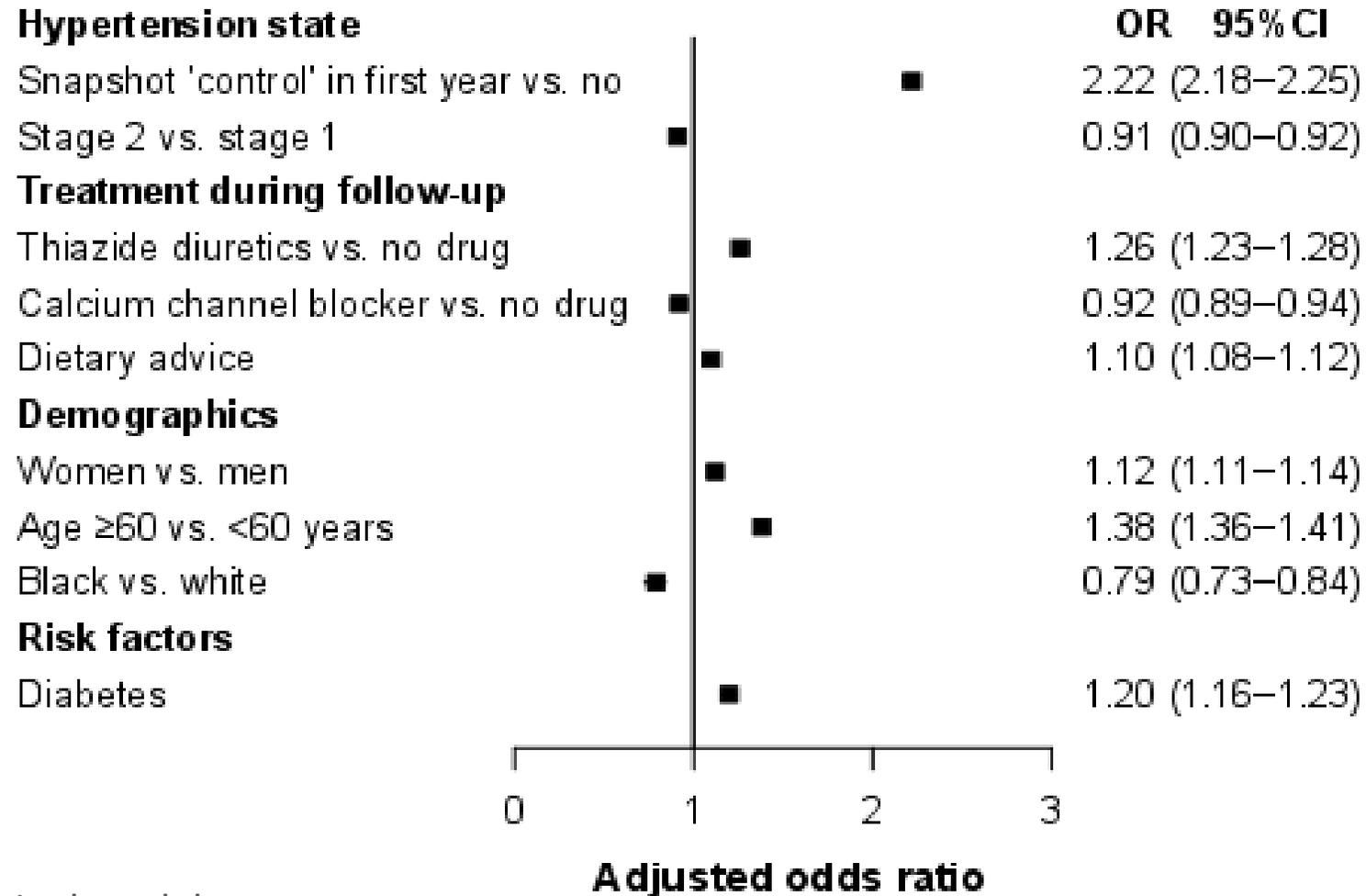
Time at target (TITRE) distribution (N=150,130)



Distribution of study patients by TITRE category



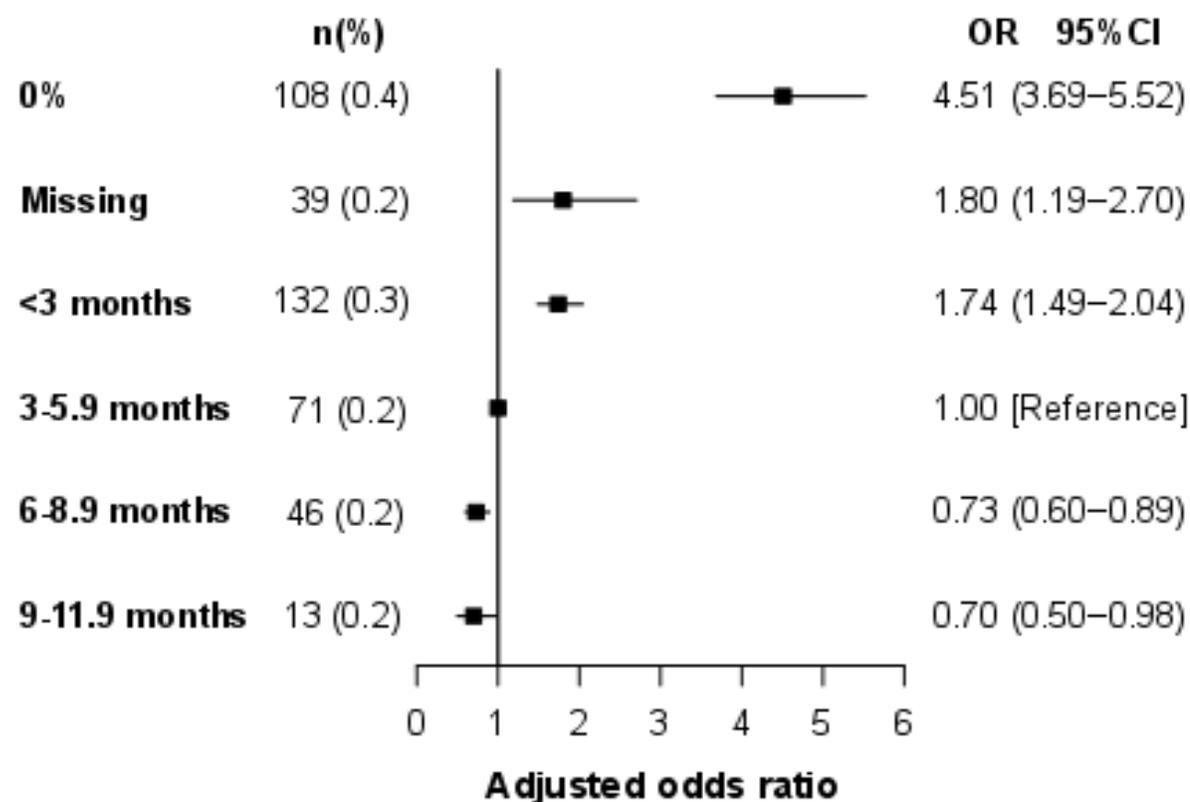
Associations between patient characteristics & greater TITRE categories (6-8 mths vs. 3-5.9 mths)



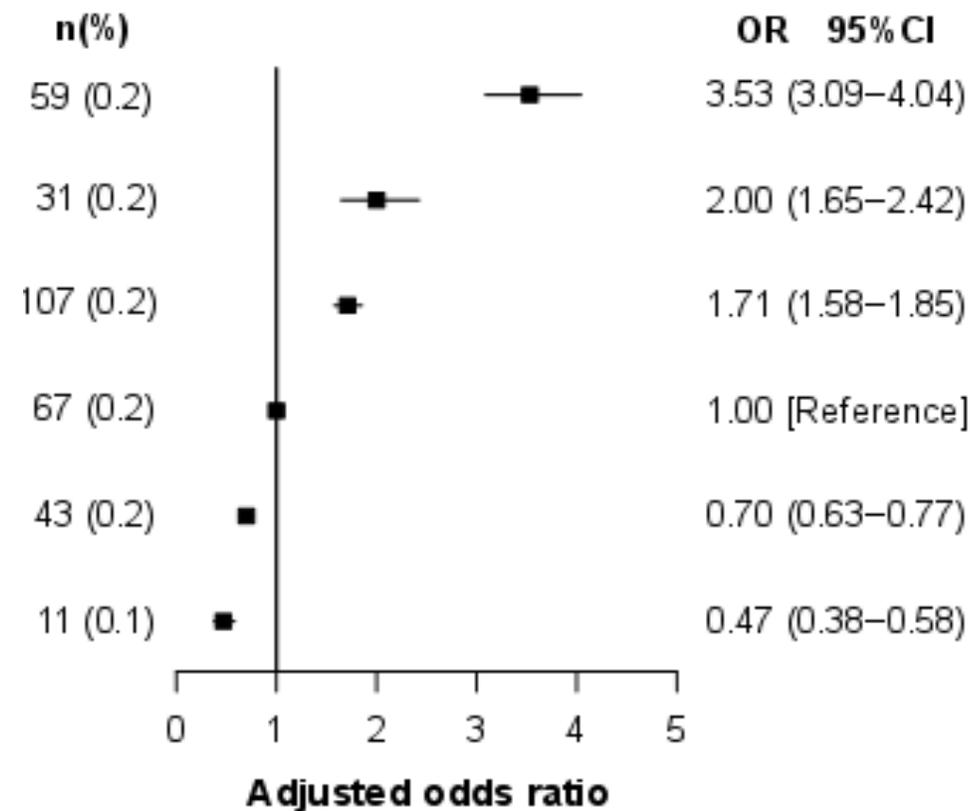
Note: Generalised nominal models

Association between TITRE and endpoints

CVD composite



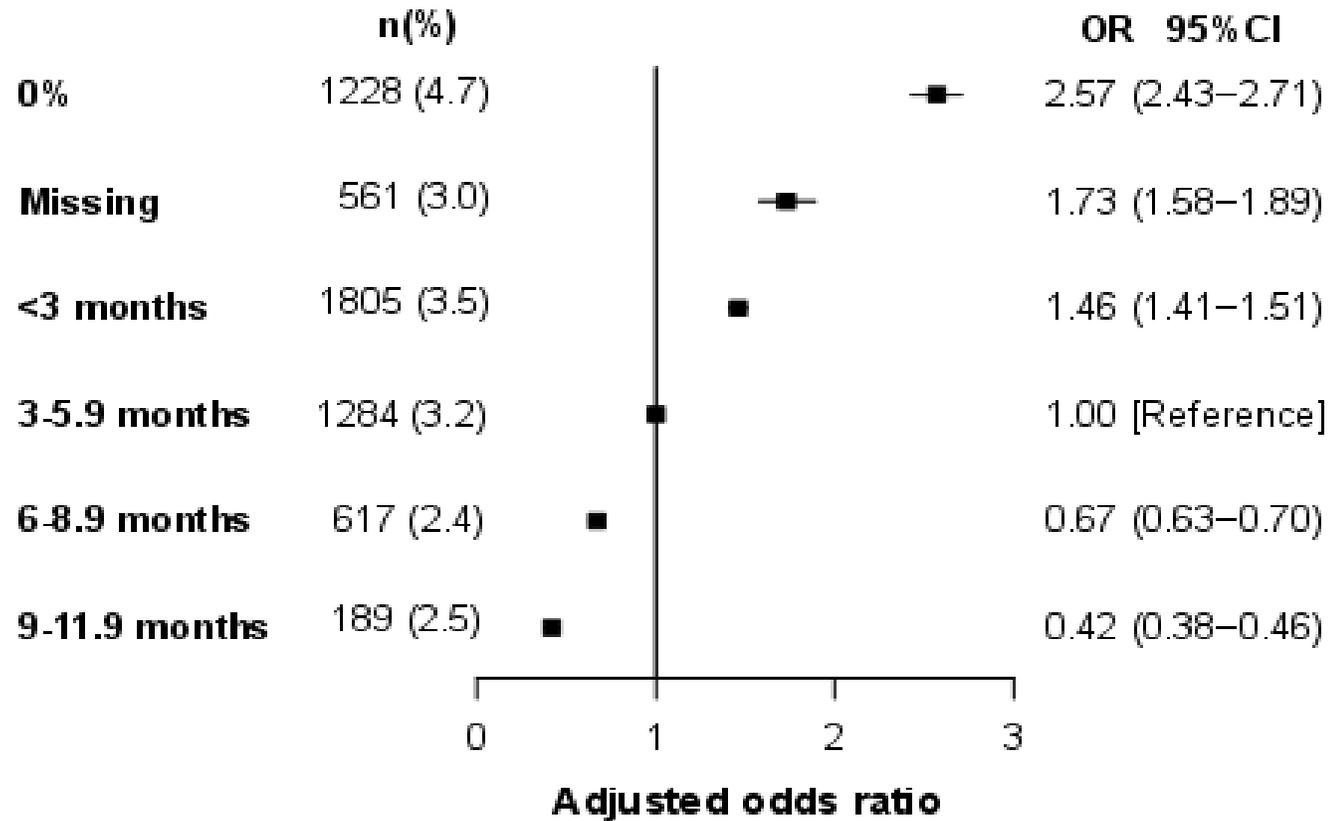
Heart failure



Note: n(%) indicates the no. of events in each category of TITRE; generalised mixed effects models weighted for duration of follow-up

Association between TITRE and endpoints

Any CVD and death



Note: n(%) indicates the no. of events in each category of TITRE; generalised mixed effects models weighted for duration of follow-up

Results of sensitivity analyses

- Consistent findings:
 - amongst patients who achieved or not 'snapshot' control
 - across groups defined by the average no. of BP readings
 - models additionally adjusted for the no. of BP readings or SBP visit-to-visit variability
- Close to null associations observed when alternative BP measures replaced TITRE:
 - averaged BP value
 - SBP visit-to-visit variability

Summary and conclusions

- Few newly identified hypertensive patients sustained a complete, year-round on-target BP over time
- A higher time at target was associated with a lower risk of incident CVDs, independent of widely used BP control indicators
- Stronger CVD dose-response associations with TITRE than with other BP measures
- Need to compare interventions to increase a person's time spent at BP target with those aimed at achieving lower BP target