Tlme at BP TaRgEt (TITRE) and Cardiovascular Outcomes

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TITRE defined: “Annual percent TiMe on BP at treatment TaRgEt, averaged over follow-up years”:

Following first detection of hypertension (based on 3+ qualifying readings within 1 year) –
- each subsequent BP reading is paired with the next
- a linear interpolation represents interim BP levels
- the line may be continuously above the threshold of BP control = 0% of months at target
- or continuously below the threshold of BP control = 100% of months at target
- or if one reading is above and the other is below the threshold of BP control = ___% of months at target
- when the BP measurement interval crosses from one follow-up year to the next, the percentage of months at target is apportioned between the two years
- the percentage for a given follow-up year is converted to months
- the average number of months per year (0-12/12) over the entire follow-up period = TITRE
Key points: Data source, observations, outcomes

**Data source:**
1.64 million BP readings for 150,130 newly identified hypertensive patients, mean age 52 years, followed in 225 primary care practices in England within the period 1/97 – 3/10 (www.caliberresearch.org/portal)
Median follow-up = 5 years
Median BP measurements = 7

**Observations:**
Treatment with antihypertensive medications recorded for 46%
“Snapshot control” in first year = 47%
TITRE of 0 months/year = 27%
TITRE of 9-12 months/year = 5%

**Outcomes:**
Lower TITRE = poorer CVD outcomes
Average TITRE = better predictor than average BP levels
Context

- Liu et al. 2015, MESA and CARDIA
  25-year cumulative SBP – average SBP between 2 exams x years between exams over 20 years – range ~ 2200-3600 mm Hg-years: lower BP levels attained by treatment still carry higher risks than the same levels without treatment

- Kishi et al. 2015, CARDIA
  25-year cumulative SBP and DBP – similar method: higher cumulative SBP and DBP associated with incipient LV systolic and diastolic dysfunction in middle age

- Kramer et al. 2017, CARDIA
  20-year cumulative SBP – similar method: higher cumulative SBP associated with higher albumin-to-creatinine ratio during midlife

- Tedla et al. 2017, MESA
  Continuity of BP control over multiple visits, up to 3-4 occasions over 9.5 years: more favorable outcomes associated with more consistent BP control
Comment

- Growing interest in the longitudinal course of blood pressure levels, both as continuous measures and relative to BP control thresholds
- Observations on a variety of cardiovascular outcomes indicate the value of cumulative measures of blood pressure burden, beyond the typical episodic cross-sectional evaluations
- The actual extent of sustained blood pressure control in a population can be appreciated much better when strategies are utilized to fill in the blanks between assessments months or years apart – and may be much less than assumed from our conventional “awareness, treatment, and control”
- Exploitation of large health system records to assess and improve true long-term population-level BP control may have great potential as suggested by the present study
- Such an approach could be applied in clinical trials and its applicability in clinical practice should be explored.