How blood pressure predicts frailty transitions in older adults in a population-based cohort study: a multi-state transition model

Daniela Anker[1,2], Cristian Carmeli[1], Marcel Zwahlen[3], Nicolas Rodondi[4,5], Valérie Santschi[6], Yves Henchoz[7], Christina Wolfson[8], Arnaud Chiolero[1,4,8]

[1]*Population Health Laboratory (#PopHealthLab), University of Fribourg, Switzerland ;* [2]*Graduate School for Health Sciences, University of Bern, Switzerland ;* [3]*Institute of Social and Preventive Medicine (ISPM), University of Bern, Switzerland ;* [4]*Institute of Primary Health Care (BIHAM), University of Bern, Switzerland ;* [5]*Department of General Internal Medicine, Inselspital, Bern University Hospital, University of Bern, Switzerland ;* [6]*La Source, School of nursing sciences, HES-SO University of Applied Sciences and Arts Western Switzerland, Switzerland;* [7]*Center for Primary Care and Public Health (Unisanté), University of Lausanne, Switzerland ;* [8]*Department of Epidemiology and Biostatistics and Occupational Health, School of Population and Global Health, McGill University, Montréal, Canada*

BACKGROUND: Hypertension is the leading risk factor for premature death worldwide in the general population and in older adults. Currently the optimal blood pressure (BP) to target in older adults is highly debated and how to account for frailty in hypertension management is not clear. Frailty is a geriatric syndrome of vulnerability and loss of adaptability to stress, characterized by an increased risk of adverse health outcomes such as falls, hospitalization, and premature death. Several studies reported that, on average, measured BP is lower in frail compared to non-frail older adults. Additional studies are needed to better characterize the relationship between BP and frailty taking into account the highly dynamic nature of frailty because it may help to guide hypertension management in older adults. Our aim was to explore how BP predicts transitions between frailty states in older adults.

METHODS: We used data from the Lausanne cohort Lc65+, a population-based cohort of older adults randomly drawn from a population registry in Switzerland, in 2004, 2009 and 2014. BP was measured using a clinically validated oscillometric automated device and frailty was defined using Fried's phenotype, every three years. We used an illness-death discrete multi-state Markov model to estimate hazard ratios of forward and backward transitions between frailty states (outcome) in relation to BP categories (predictor of interest) with adjustment for sex, age, and antihypertensive medication (other predictors).

RESULTS: Among 4200 participants aged 65-70 years (58% female) at baseline, 70% were non-frail, 27% pre-frail, and 2.0% frail. Over an average follow-up of 5.8 years, 2422 transitions were observed, with 1575 (65%) forward and 847 (35%) backward. Compared to systolic BP (SBP) < 130 mmHg, the hazard ratio (95% confidence interval) of the transition from non-frail to pre-frail was 0.86 (0.74 to 1.00) for SBP 130-150 mmHg, and 0.89 (0.74 to 1.06) for SBP ≥ 150 mmHg. Compared to SBP < 130 mmHg, the hazard ratio of the transition from pre-frail to frail was 0.71 (0.50 to 1.01) for SBP 130-150 mmHg, and 0.90 (0.62 to 1.32) for SBP ≥ 150 mmHg. Diastolic BP was a weaker predictor of forward transitions.

CONCLUSION: BP categories had no strong relationship with either forward transitions or backward transitions in frailty states. If our findings are confirmed with greater precision and assuming a causal relationship, they would suggest that there is no well-defined optimal BP level to prevent frailty among older adults.

Presented at the Swiss Public Health conference, 25th/26th August 2021, Bern