The researchers found that the ratio of the CV event rates to the CV death rate varied with disease severity, with CV death representing a larger fraction of major CV events when the risk of CV mortality was higher (Table 1). When the rate of CV death was 2.5 per 1000 patient-years, the rate of major CV events was 3.86, but when the rate of CV death rose to 7.5 per 1000 patient-years, the rate of major CV events decreased to 2.69. Furthermore, when the CV death rate was 12.5 per 1000 patient-years, the rate of major CV events declined to 2.28.

Table 1. Ratios of Various Types of Events to CV Mortality According to Level of CV Risk

	Outcome/CV Mortality Rate Ratio With 95% CIs		
CV mortality rate per 1000 person-years	2.5	7.5	12.5
Total mortality			
≤65 years	2.17 (2.13 to 2.20)	1.91 (1.89 to 1.94)	1.81 (1.78 to 1.84)
>65 years	3.07 (3.00 to 3.13)	2.24 (2.21 to 2.26)	1.93 (1.91 to 1.95)
Major CV events	3.86 (3.80 to 3.93)	2.69 (2.67 to 2.72)	2.28 (2.25 to 2.31)
Extended CV events			
Active as reference	8.39 (8.17 to 8.62)	5.56 (5.45 to 5.68)	4.59 (4.48 to 4.71)
Placebo as reference	15.78 (5.53 to 6.05)	3.83 (3.70 to 3.97)	3.16 (3.05 to 3.28)

CV=cardiovascular.

Determining Inter-Arm Blood Pressure Is Important in New Patients with Diabetes

Written by Muriel Cunningham

Christopher E. Clark, PhD, University of Exeter Medical School, Devon, United Kingdom, presented results from a study of inter-arm differences (IAD) in systolic blood pressure (BP) in patients with diabetes. Simultaneous measurements, often impractical in a clinical setting, were obtained and compared with calculated sequential pairs. Associations between IAD and vascular disease and mortality were also explored.

Once they had provided informed consent, patients with diabetes and nondiabetic control patients underwent 4 pairs of bilateral simultaneous automated BP measurements. After 2 simultaneous measurements were conducted in a random order, cuffs were switched to the opposite arms and another pair of measurements was obtained. For the simultaneous measurements, IADs were calculated for each pair by subtracting the left BP from the right BP. Sequential pairs were modeled by subtracting the second or fourth left BP from the first right BP, for best and worst case sequential pairs. Demographic information was collected from each participant. Patient records were flagged in the National Health Service Information Centre to acquire mortality data from death certificates.

A total of 727 patients with diabetes and 285 controls were enrolled. Of these, 514 (71%) of the patients with diabetes and 238 (84%) of the controls had 4 pairs of BP results ($p<0.001$). Prof. Clark attributed the smaller number of diabetes patients with complete results to the larger number of patients with atrial fibrillation in the diabetes group.

The control group was younger and two-thirds were hypertensive versus 90% of the patients with diabetes. In the diabetes population, 8.6% had a systolic IAD ≥10 mm Hg compared with 2.9% of the controls. Prof. Clark stated that he and his colleagues could not attribute the reason for this difference in systolic IAD entirely to diabetes. Both the simultaneous and sequential single pair measurements were significant ($p<0.001$ for both) in a receiver operating characteristics curve, indicating that a sequential single pair is a useful way to determine IAD in place of simultaneous measurements.

A systolic IAD ≥10 mm Hg was associated with peripheral artery disease (OR, 3.1; 95% CI, 1.2 to 8.0; $p=0.03$) and retinopathy (OR, 1.8; 95% CI, 1.0 to 3.4; $p=0.056$). A systolic IAD ≥15 mm Hg was associated with retinopathy (OR, 6.5; 95% CI, 1.7 to 24.4; $p=0.003$) and chronic kidney disease (OR, 5.4; 95% CI, 1.4 to 21.1; $p=0.033$). Additionally, preliminary survival data showed a significant difference in cardiovascular mortality in patients with systolic IAD ≥10 mm Hg (HR, 4.6; 95% CI, 1.2 to 17.6; $p=0.028$) and systolic IAD ≥15 mm Hg (HR, 10.9; 95% CI, 2.3 to 51.3; $p=0.003$).

Prof. Clark emphasized that "there [were] relatively few [adverse] events included in this [study and that they] intend to return to this in the future when a significant number of events have been collected." He advised clinicians to measure BP in both arms when initially evaluating patients with diabetes as systolic IADs are associated with vascular disease and possibly related to increased cardiovascular mortality.

Success With Self-monitoring: Results From the TASMIN-SR Trial

Written by Muriel Cunningham

The Telemonitoring and Self-Management in the Control of Hypertension trial [TASMINH2], a large study of patients with hypertension, found that those randomized to self-management had significantly lower blood pressure (BP) than controls [McManus RJ et al. *Lancet* 2010]. Subgroup analyses from TASMINH2 suggested a smaller treatment effect in higher risk patients. The purpose of the subsequent Targets and Self-Management for the Control

of Blood Pressure in Stroke and Other At-Risk Groups trial [TASMIN-SR; ISRCTN87171227] was to determine if self-management, consisting of self-monitoring with self-titration of antihypertensives, effectively lowers BP in patients with high-risk conditions such as stroke and diabetes [O'Brien C et al. *BMC Cardiovasc Disord* 2013]. Richard J. McManus MA, PhD, University of Oxford, Oxford, United Kingdom, presented key results from this study.

Eligible patients were aged >35 years with hypertension plus stroke, diabetes mellitus, coronary heart disease or chronic kidney disease, with a BP >130/80 mm Hg, not currently taking >3 antihypertensives, and willing to self-monitor and self-titrate their medication. Pregnant women and patients with dementia or terminal disease were excluded.

Participants were randomized to self-management or standard care as determined by their physician. BP targets were 130/80 mm Hg in office and 120/75 mm Hg for home. A color-coded system instructed patients on what actions to take based on their BP readings (Table 1). Patients returned for follow-up at 6 and 12 months. The primary outcome measure was systolic BP, with secondary outcomes of diastolic BP, costs, anxiety, health behaviors, and patient preferences. The study was powered to detect a 5 mm Hg difference between treatment groups.

Table 1. Traffic Light System to Adjust Medication

Color	Level	Blood Pressure	Action
Red	HIGH	SBP ≥181 mm Hg OR DBP ≥101 mm Hg	Your BP is too high. Records a **RED** reading. Make an appointment within 48 hours to see the study GP or nurse.
Amber	RAISED you may need to alter your medication	SBP 121 to 180 mm Hg OR DBP 76 to 100 mm Hg	Your BP is raised. Record an **AMBER** reading. If you have FOUR or more **AMBER** readings in 1 week or 2 consecutive months then look at your medication change instructions.
Green	NORMAL	SBP 101 to 120 mm Hg AND DBP ≤75 mm Hg	Your BP is normal. Record a **GREEN** reading. This is fine provided you have no side effects.
Blue	LOW	SBP ≤100 mm Hg	Your BP is too low. Record a **BLUE** reading. Make an appointment within 48 hours to see the study GP or nurse.

BP=blood pressure; DBP=diastolic BP; GP=general physician; SBP=systolic BP.

A total of 552 patients were enrolled; 276 per treatment group. At the 12-month follow-up, data from 220 (78%) from the self-management group and 230 patients (83%) in the standard care group were available for analysis. Forty-five percent had diabetes, 32% had chronic kidney disease, 31% had coronary heart disease, and 17% had cerebrovascular disease. The mean number of antihypertensive drugs at baseline was 1.6.

In the primary analysis, the self-management group had lower unadjusted mean systolic BP (128.2 mm Hg; 95% CI, 125.9 to 130.4) compared with the standard care group (137.8; 95% CI, 135.4 to 140.3) at 12 months. At the 12-month time point, the self-management group was taking more antihypertensive medications (mean, 2.24; 95% CI, 2.09 to 2.39) than the standard-care group (1.75, 95% CI, 1.62 to 1.88). There were no significant differences between the two groups in the occurrence of side effects. "We have data on health behaviors and resource costs. Both of these will be important in understanding our trial fully," Prof. McManus noted.

In this study, self-monitoring with self-titration of antihypertensive medication resulted in lower systolic BP compared with standard care. It is expected that this reduction in BP would significantly lower stroke and coronary heart disease risk. While there was evidence of greater use of antihypertensive medications in the self-management group, this was not accompanied by increased side effects. Prof. McManus concluded that self-management may not be suitable for every patient but should be offered to those willing to try.

Meta-Analysis of Hypertension Trials Confirms Benefits of Blood Pressure Lowering

Written by **Muriel Cunningham**

Costas Thomopoulos, MD, San Luca Hospital, IRCCS Istituto Auxologico, Milan, Italy, presented the results of a meta-analysis of blood pressure (BP)-lowering trials that have been published over the past 47 years. Dr. Thomopoulos and colleagues conducted this meta-analysis of hypertension randomized trials to determine the effect of differential BP lowering on hard clinical outcomes.

BP-lowering randomized controlled trials can utilize an intentional or nonintentional design. Intentional design trials can be further subdivided into the following classifications: active treatment versus placebo or no treatment; more intensive versus less intensive active treatment; or a more intensive lowering strategy versus a less intensive lowering strategy, including predefined