Response to Indices of Blood Pressure Variability and Cardiovascular Risk

We reported that, with the 24-hour blood pressure level in the multivariable-adjusted Cox models, average real variability over 24 hours (ARV24) added only 0.1% to the explained risk of a composite cardiovascular end point.1 Pierdomenico2 requested a similar analysis for the SD over 24 hours weighted for the time interval between consecutive readings (SD24) and the average of the daytime and nighttime SDs weighted for the duration of the daytime and nighttime intervals (SDdn). Results for adding to the basic Cox model first the 24-hour blood pressure alone and next the 24-hour blood pressure plus SD24, SDdn, or ARV24 appear in the Table. In line with our findings for ARV24, adding SD24 or SDdn did not or only weakly improved the risk stratification already provided by the 24-hour blood pressure.

Figure 3 of our article1 emphasizes that the relative contribution of the 24-hour blood pressure level to the 10-year absolute cardiovascular risk was substantially greater than that of ARV24, which in our hands best captured blood pressure variability. In the last sentence of our article’s Perspectives section,1 we made the point that both ARV24 and SDdn are useful measures of blood pressure variability but not SD24. A major problem is that SD24 also reflects the day-night blood pressure difference. Pierdomenico et al3 and other investigators1,4 demonstrated that, for the same SD in distinct blood pressure recordings, ARV24 can be widely different.

Table. Risk of a Composite Cardiovascular Event Explained in Cox Regression

<table>
<thead>
<tr>
<th>Models</th>
<th>Systolic Blood Pressure</th>
<th>Diastolic Blood Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Likelihood Ratio</td>
<td>P</td>
</tr>
<tr>
<td>Basic model*</td>
<td>10 307.0</td>
<td>9.95</td>
</tr>
<tr>
<td>+ 24-h blood pressure</td>
<td>10 213.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>+ 24-h blood pressure and SD24</td>
<td>10 212.1</td>
<td>0.25</td>
</tr>
<tr>
<td>+ 24-h blood pressure and SDdn</td>
<td>10 211.2</td>
<td>0.14</td>
</tr>
<tr>
<td>+ 24-h blood pressure ARV24</td>
<td>10 209.4</td>
<td>0.046</td>
</tr>
</tbody>
</table>

*P values are for the improvement of the fit across nested models.
*The basic Cox model was stratified for cohort and included as covariables sex, age, 24-hour heart rate, body mass index, smoking and drinking, serum total cholesterol, history of cardiovascular disease, diabetes mellitus, and treatment with antihypertensive drugs.
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