

## Comparison of two Methods interpreting Blood Pressure Values obtained in School Health Care

Katharina Takken-Sahli\*, Stephan Christen\*\*

### **Background:**

Having used very old tables to evaluate blood pressure (BP) values for years, the tables presented in the "**4<sup>th</sup> Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents**" (1) were used in the last years. After the Dutch simplified version of these tables was presented by Kist & HiraSing (2012) in "**Bloeddruk meten bij kinderen met overgewicht in de jeugdgezondheidszorg**" (2), the question arose if these tables could be a better tool to evaluate blood pressure at regular school health screenings (see tables 1 to 3).

### **Method:**

For this study the 95<sup>th</sup> percentiles from both the American and the Dutch blood pressure tables were used.

In the American tables age, sex and percentile of height of the adolescent are needed each time. The Dutch tables simplify this to one value per age group, and use the same values for girls and boys. On this poster, only the parts of the tables providing the values for the age groups used in our sample are displayed.

In the School Health Service of Zurich (head: dr. med. Susanne Stronski Huwiler) blood pressure is measured at the regular health check in the second year of secondary school. Most of the adolescents are then 14-15 years old.

For the school year 2012/2013 the blood pressure values of 1747 adolescents were evaluated according to the two algorithms mentioned above.

This study compares the exactitude of detecting hypertension by applying the **American method** (1) to those results obtained using the simplified **Dutch method** (2).

What are the results? Do we need the complicated **American tables** all the time or is it possible to use the **simpler version "made in Holland"**?

### **Results:**

Both with the American and the Dutch levels, there was found that more overweight and, still more, obese adolescents had hypertension than the adolescents with normal weight in the same age group (table 4).

	normal weight	overweight	obese	total
US-levels	11.8%	23.3%	49.1%	16.4%
NL-levels	11.7%	25.5%	48.2%	16.6%

Tab 4: Percentage of hypertension in Zurich pupils 2012/13 in BMI-groups (our own data) compared to both 95<sup>th</sup> percentile values

But this is nothing new.

It is obvious, that the **Dutch tables** are easier to work with than the **American ones**: It is much simpler in a screening situation, when you only have to look at the age, and not also at the sex and the height percentile of the pupil in question, when checking in a table, if the pupil has got hypertension.

### **False positives and false negatives:**

25 (1.4%) of the values in our sample were false negative for hypertension when measured with the simplified method compared to the original method and 30 (1.7%) were false positive.

### **Conclusion:**

The Dutch algorithm has important advantages: it is much less time-consuming and less error-prone than the American one, yet gives similar results.

Measuring a second time the 1.7% with false positive results will not be a problem.

### **Food for thought:**

1. How many errors are made when using the complicated **original American values** in a screening situation?
2. However: Can we afford to lose the 1.4% of youngsters with high blood pressure (just over the limit) in our screening?

### **References:**

- (1) National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents (2004): 4<sup>th</sup> Report on the diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents, *PEDIATRICS* 114 (2), p 555-575.
- (2) Kist, J.E. and R.A. HiraSing (2012): Bloeddruk meten bij kinderen met overgewicht in de jeugdgezondheidszorg, *JGZ-blad* 44 (4), p 69-73.

\* Dr. med. ret., Fällanden

\*\* Dr. Stephan Christen, MPH, Arbeitsgemeinschaft Sozialwissenschaft, Gesundheitsforschung, Informatik ASGI

Age, years	Syst. Blood Pressure							Diast. Blood Pressure						
	Percentile of Height							Percentile of Height						
	5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
13	121	122	124	126	128	129	130	79	79	80	81	82	83	83
14	124	125	127	128	130	132	132	80	80	81	82	83	84	84
15	126	127	129	131	133	134	135	81	81	82	83	84	85	85
16	129	130	132	134	135	137	137	82	83	83	84	85	86	87

Tab. 1 BP Levels for boys by age and height percentile (only the 95<sup>th</sup> BP percentile displayed). After: The US 4<sup>th</sup> report on etc. (2004: p. 558) (1)

Age, years	Syst. Blood Pressure							Diast. Blood Pressure						
	Percentile of Height							Percentile of Height						
	5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
13	121	122	123	124	126	127	128	80	80	80	81	82	83	83
14	123	123	125	126	127	129	129	81	81	81	82	83	84	84
15	125	126	127	128	130	131	132	82	82	83	84	85	85	86
16	125	126	127	128	130	131	132	82	82	83	84	85	85	86

Tab. 2: BP Levels for Girls by Age and Height Percentile (only the 95<sup>th</sup> percentile displayed). After: The US 4<sup>th</sup> report on etc. (2004: p. 559) (1)

Age, years	Syst. Blood Pressure	Diast. Blood Pressure
13	126	81
14	128	83
15	131	83
16	134	85

Tab. 3: BP-Levels for Boys and Girls by Age by Kist et al. (2012: p. 71) (2)