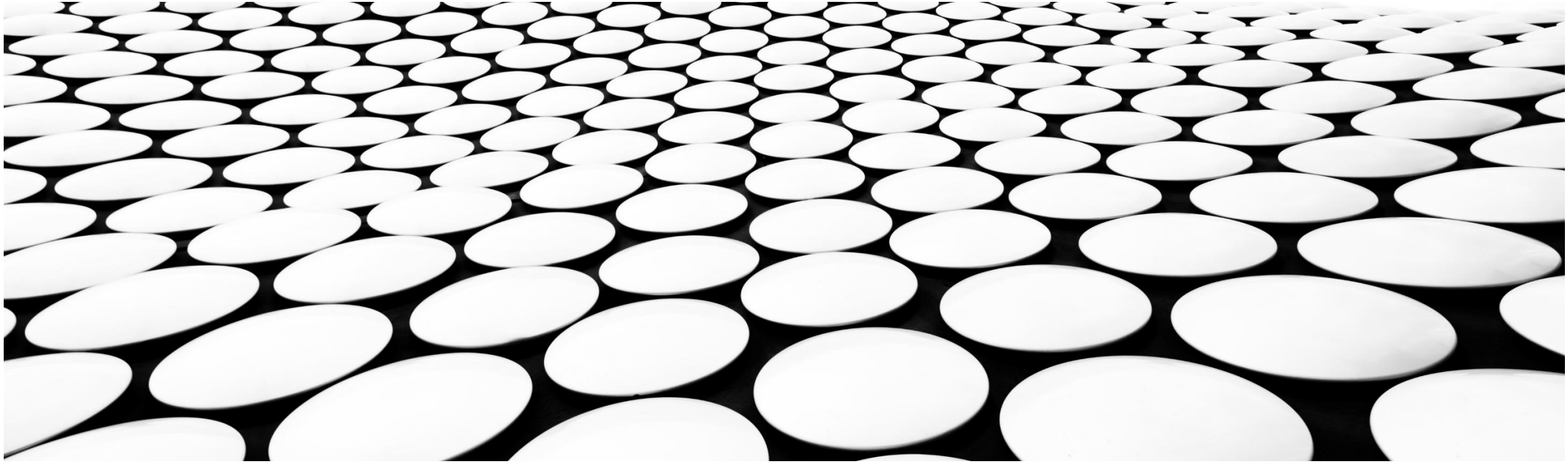
MESURE DE LA PRESSION ARTERIELLE: OÙ EN SOMMES NOUS?

PROF BELEN PONTE - RESPONSABLE DE L'UNITÉ D'HYPERTENSION

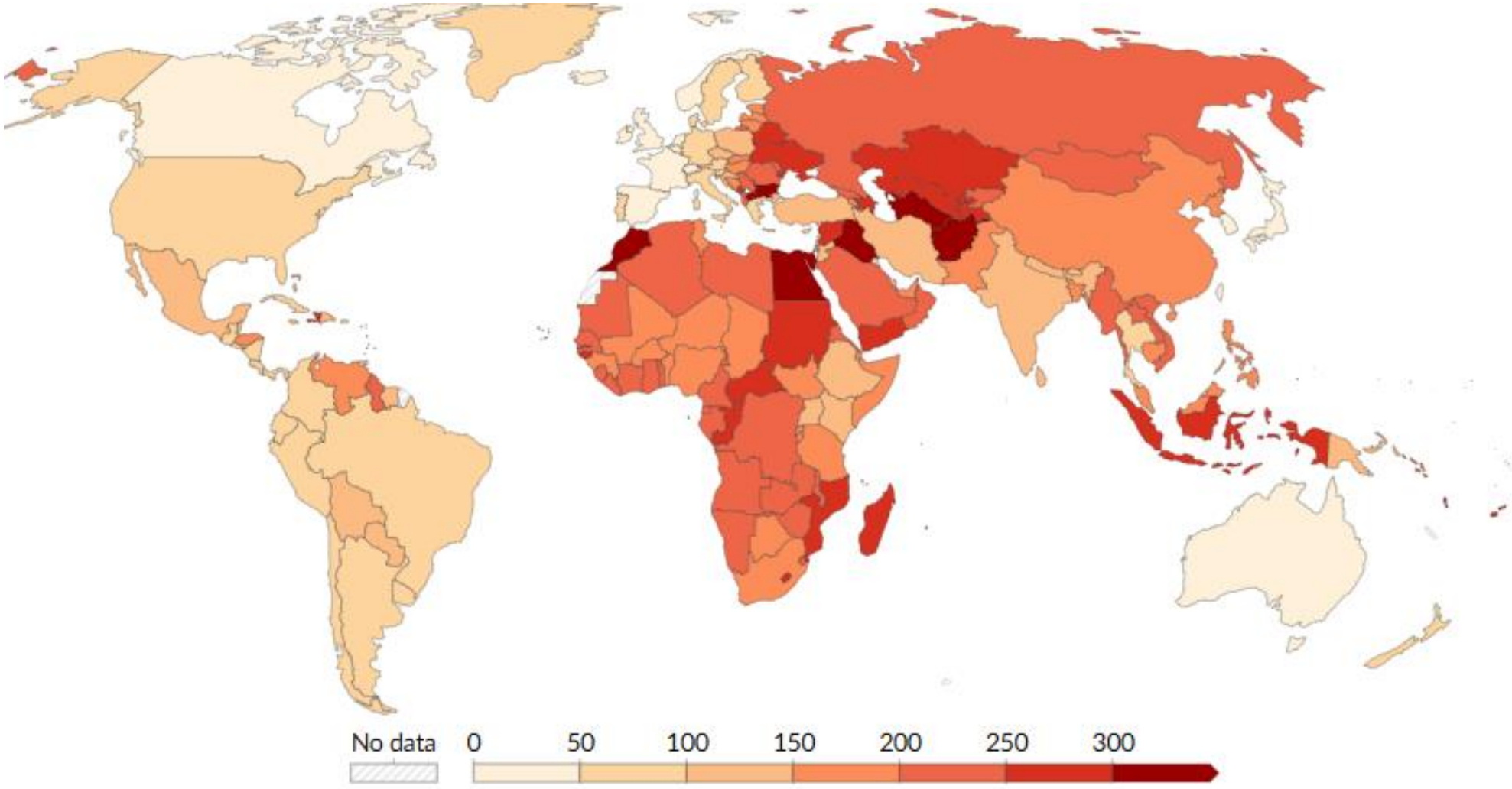
SERVICE DE NEPHROLOGIE ET HYPERTENSION



PLAN

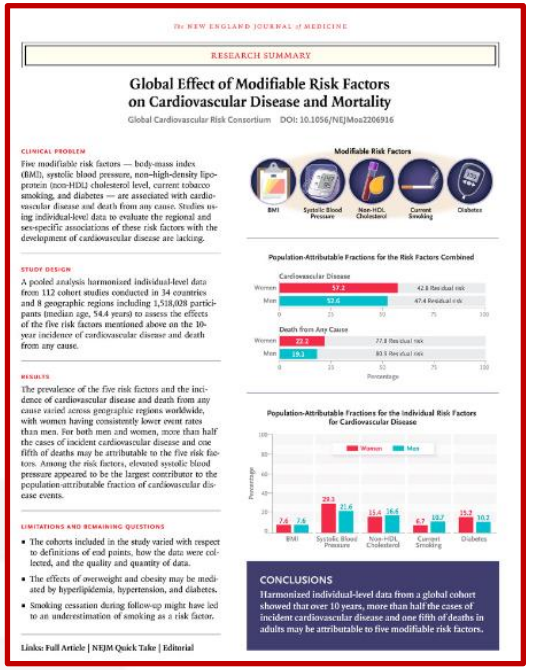
- Epidémiologie Hypertension
- Comment mesurer la pression artérielle?
- Mesures «standards»
- Le future de la mesure de PA
- Challenges, conclusions

HTA= 1ER FACTEUR DE RISQUE DE MORTALITÉ ENVIRON 9.4 MILLIONS MORTS/ AN (OMS).



Data source: IHME, Global Burden of Disease (2024). Annual death rate due to hypertension per 100’000p

Effet majeur par rapport aux autres FRCV sur la maladie et mortalité CV



The NEW ENGLAND JOURNAL of MEDICINE

RESEARCH SUMMARY

Global Effect of Modifiable Risk Factors on Cardiovascular Disease and Mortality

Global Cardiovascular Risk Consortium DOI: 10.1056/NEJMoa2206916

CLINICAL PROBLEM

Five modifiable risk factors — body-mass index (BMI), systolic blood pressure, non–high-density lipoprotein (non-HDL) cholesterol level, current tobacco smoking, and diabetes — are associated with cardiovascular disease and death from any cause. Studies using individual-level data to evaluate the regional and sex-specific associations of these risk factors with the development of cardiovascular disease are lacking.

STUDY DESIGN

A pooled analysis harmonized individual-level data from 112 cohort studies conducted in 34 countries and 8 geographic regions including 1,518,028 participants (median age, 54.4 years) to assess the effects of the five risk factors mentioned above on the 10-year incidence of cardiovascular disease and death from any cause.

RESULTS

The prevalence of the five risk factors and the incidence of cardiovascular disease and death from any cause varied across geographic regions worldwide, with women having consistently lower event rates than men. For both men and women, more than half the cases of incident cardiovascular disease and one fifth of deaths may be attributable to the five risk factors. Among the risk factors, elevated systolic blood pressure appeared to be the largest contributor to the population-attributable fraction of cardiovascular disease events.

LIMITATIONS AND REMAINING QUESTIONS

- The cohorts included in the study varied with respect to definitions of end points, how the data were collected, and the quality and quantity of data.
- The effects of overweight and obesity may be mediated by hyperlipidemia, hypertension, and diabetes.
- Smoking cessation during follow-up might have led to an underestimation of smoking as a risk factor.

Links: Full Article | NEJM Quick Take | Editorial

Modifiable Risk Factors

BMI | Systolic Blood Pressure | Non-HDL Cholesterol | Current Smoking | Diabetes

Population-Attributable Fractions for the Risk Factors Combined

Cardiovascular Disease

Women 52.2 42.8 Residual risk

Men 52.6 47.4 Residual risk

Death from Any Cause

Women 22.3 77.8 Residual risk

Men 19.1 80.9 Residual risk

0 25 50 75 100

Percentage

Population-Attributable Fractions for the Individual Risk Factors for Cardiovascular Disease

Women Men

Percentage

100 80 60 40 20 0

7.6 7.6 | 29.3 21.6 | 15.4 16.6 | 6.7 10.7 | 15.2 10.2

BMI | Systolic Blood Pressure | Non-HDL Cholesterol | Current Smoking | Diabetes

CONCLUSIONS

Harmonized individual-level data from a global cohort showed that over 10 years, more than half the cases of incident cardiovascular disease and one fifth of deaths in adults may be attributable to five modifiable risk factors.

Population-Attributable Fractions for the Individual Risk Factors for Cardiovascular Disease

Women Men

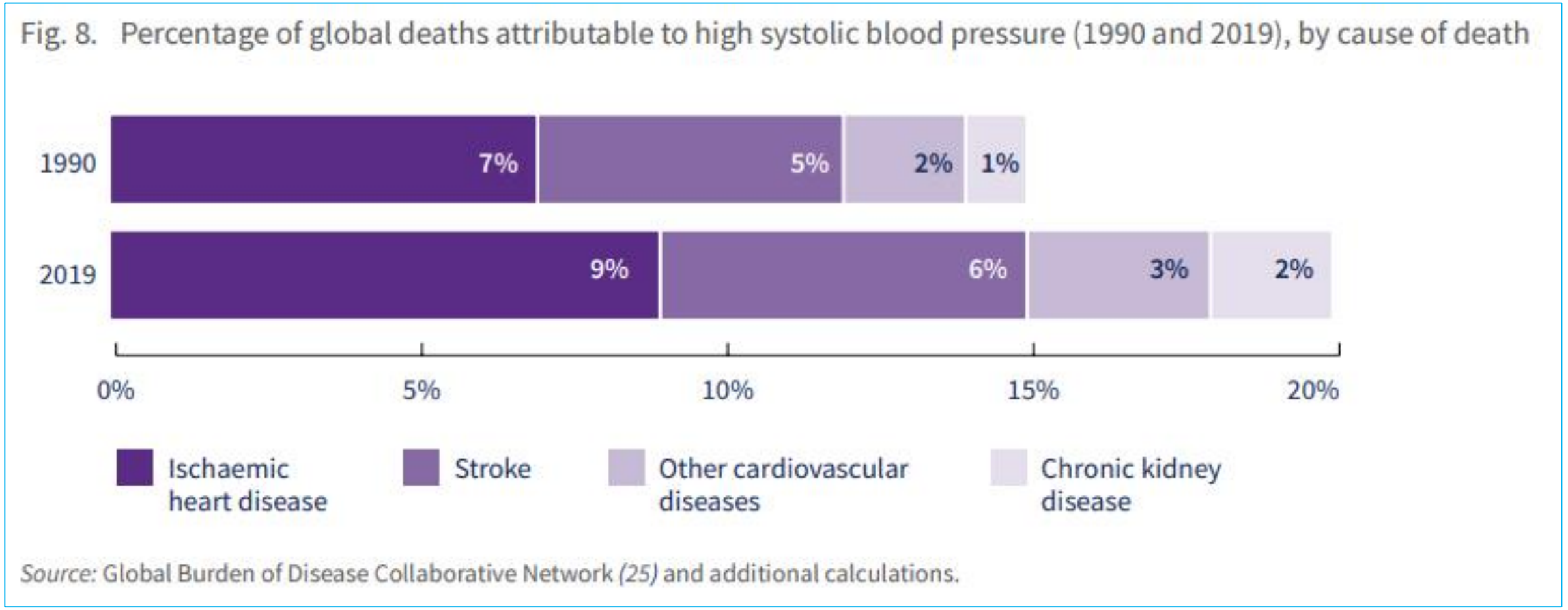
Percentage

100 80 60 40 20 0

7.6 7.6 | 29.3 21.6 | 15.4 16.6 | 6.7 10.7 | 15.2 10.2

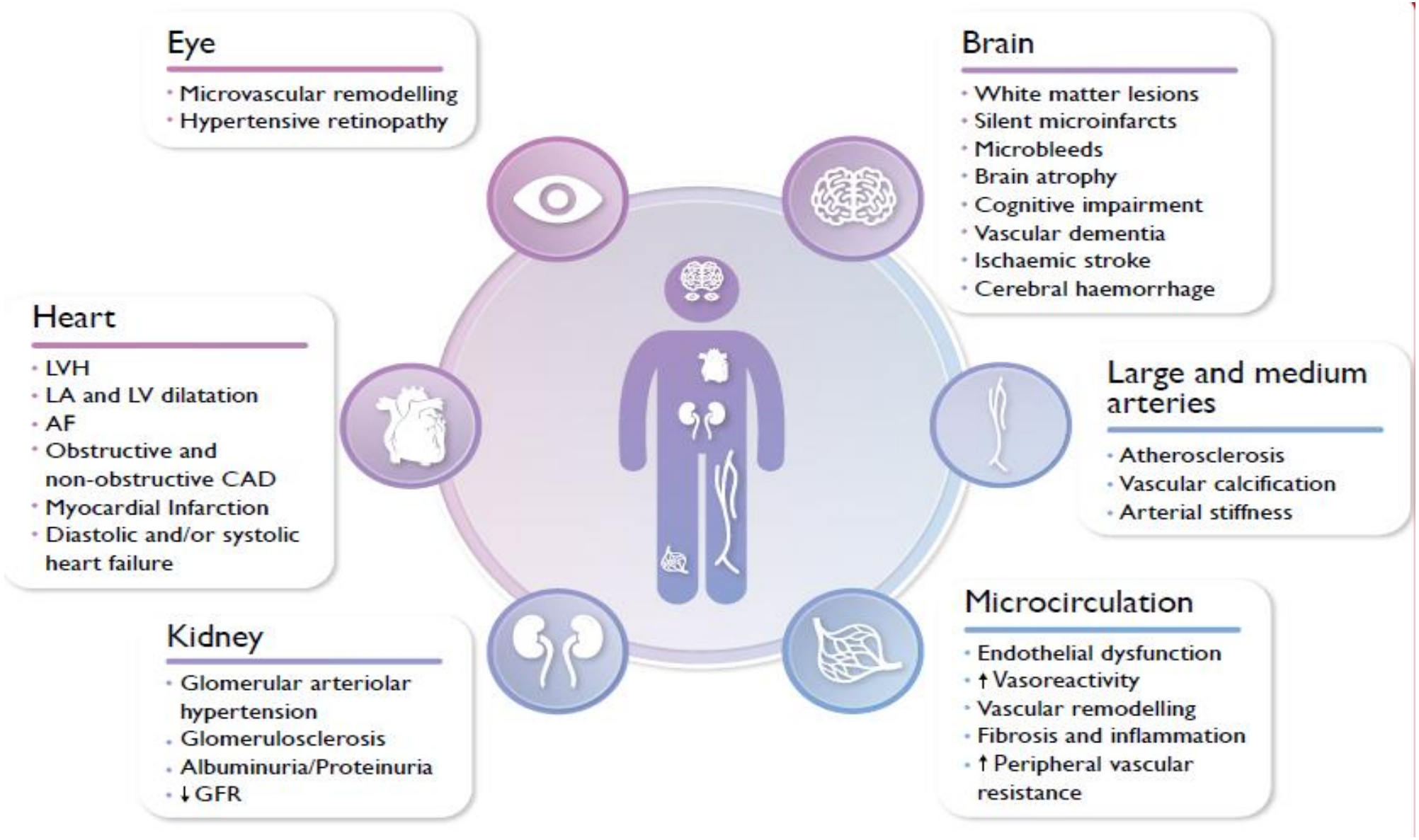
BMI | Systolic Blood Pressure | Non-HDL Cholesterol | Current Smoking | Diabetes

GLOBAL BURDEN OF CV DISEASE



Global Burden of Disease Collaborative Network. 2019 Global Burden of Disease study results. Seattle: Institute for Health Metrics and Evaluation; 2020 (http:// ghdx.healthdata.org/gbd-results-tool, accessed 2 August 2023) and additional calculations.

CONSÉQUENCES HTA NON TRAITEE



PREVALENCE HTA 30-79 ANS - 2024

Définition HTA ≥ 140/90mmhg

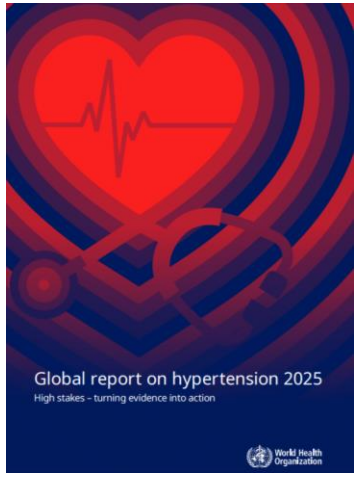
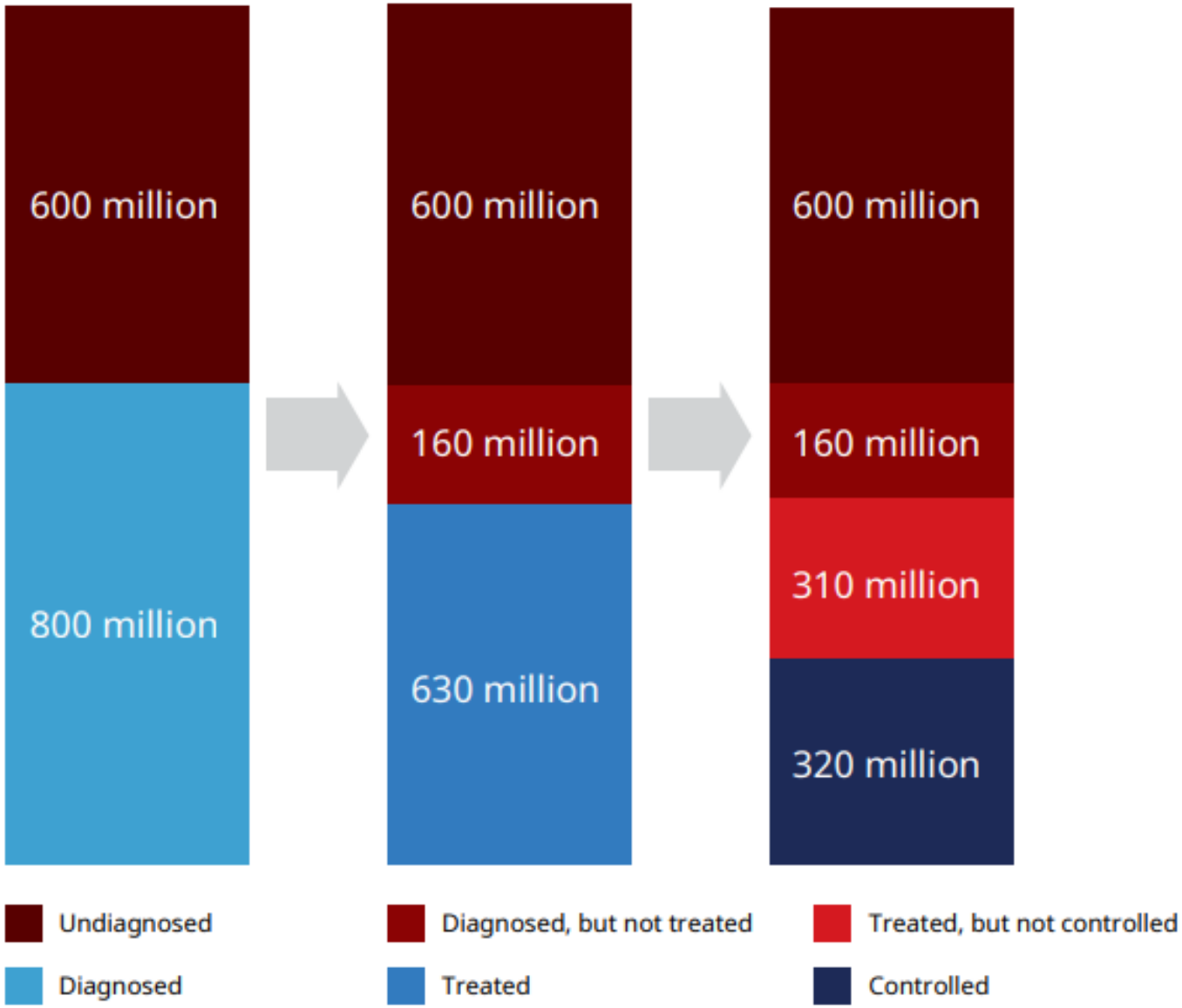
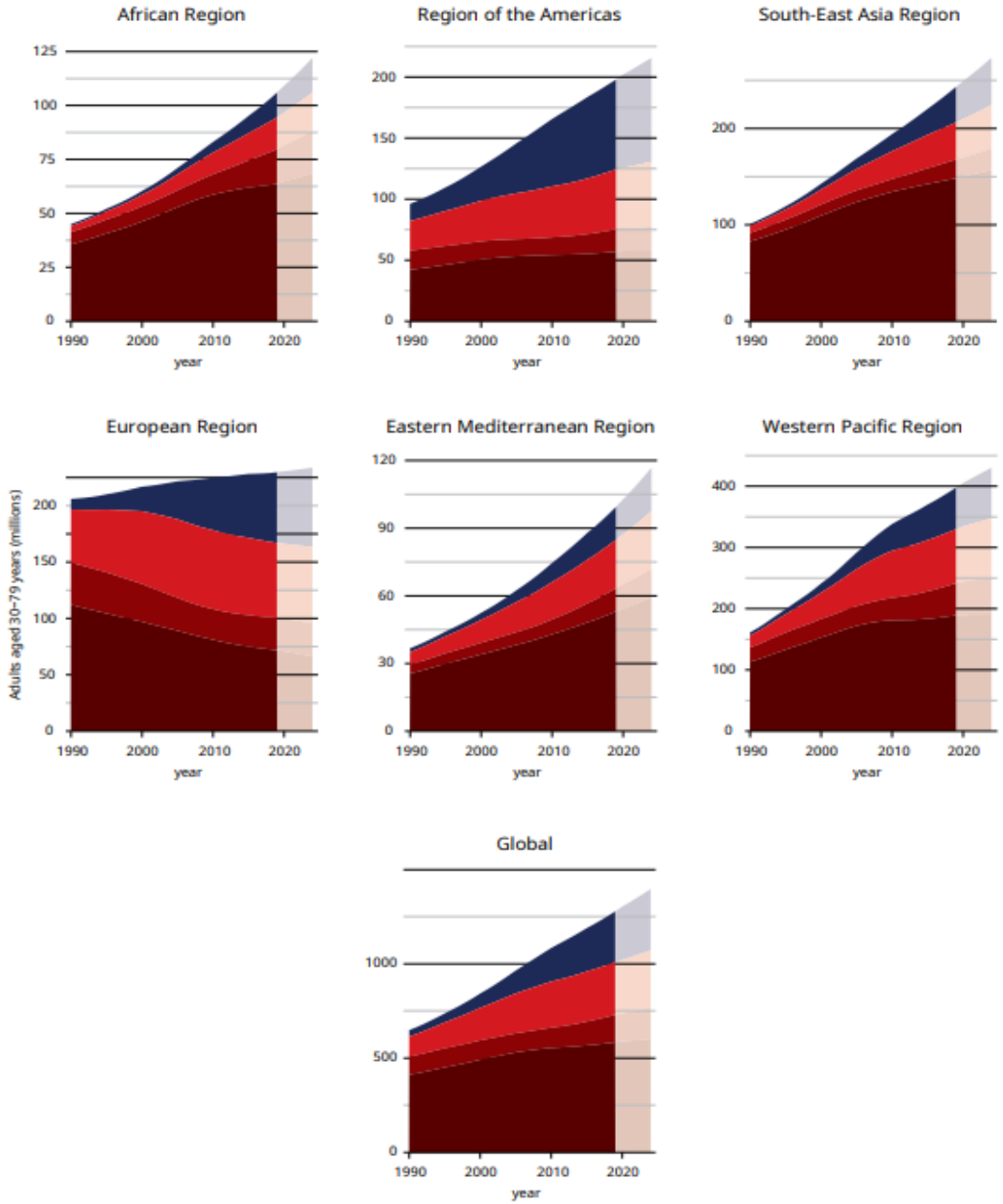


Fig. 2. Number of adults aged 30–79 years with hypertension in 2024, by diagnosis, treatment and control status globally



Source: Projected from NCD Risk Factor Collaboration (NCD-RisC) data (*13*)

Fig. 3. Global and regional trends in number of adults aged 30–79 years, with hypertension, 1990–2024, disaggregated by control, treatment, and diagnosis status



Switzerland

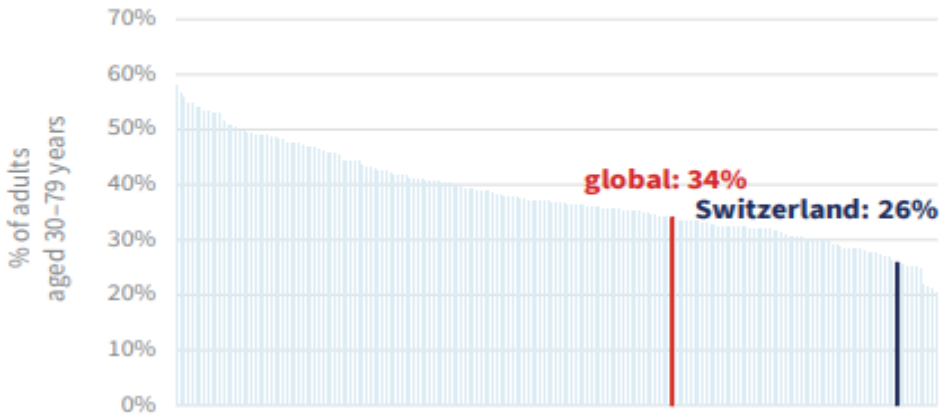
Hypertension profile

Total population (2024): 8 922 000

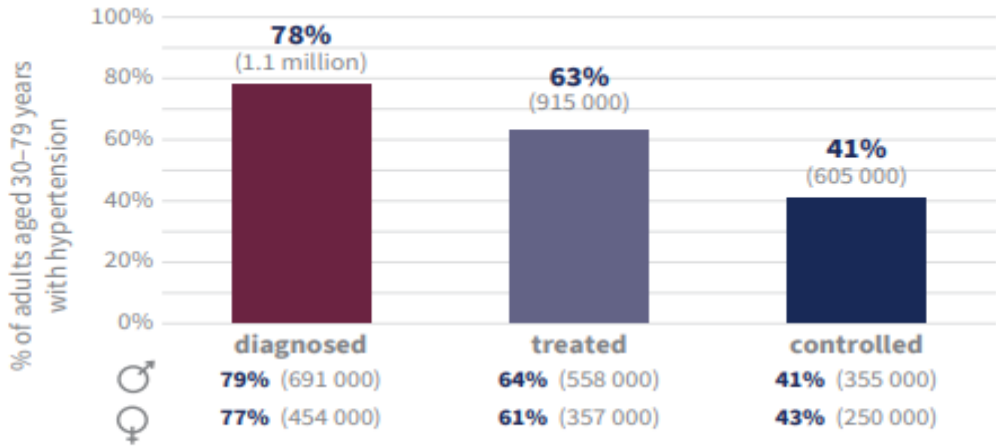
Prevalence of hypertension among adults aged 30–79 years (2024)[a]

26% ♂ 31% ♀ 21%

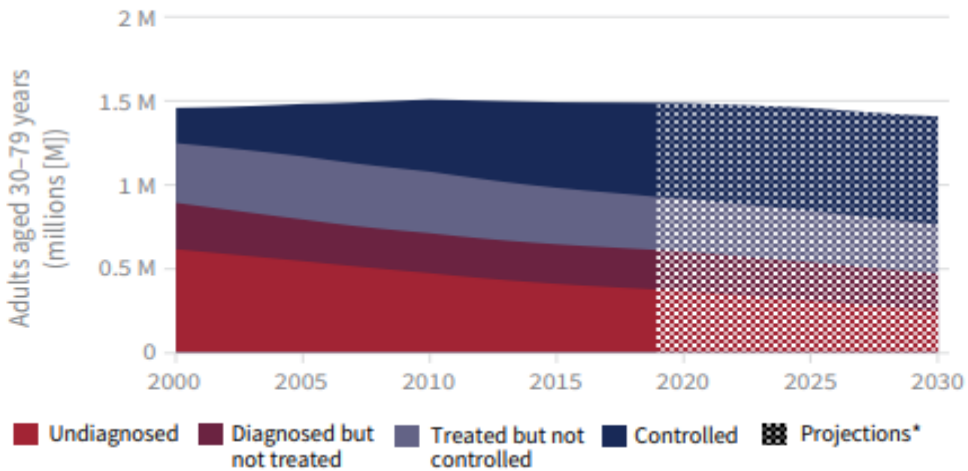
Prevalence of hypertension (adults aged 30–79 years) – country comparison (both sexes)[a]



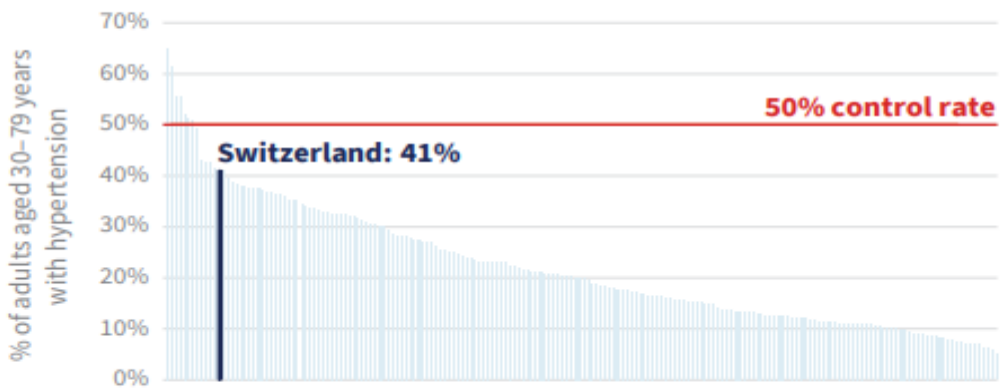
Of the 1.5 million adults aged 30–79 years with hypertension, approximately 855 000 do not have the condition controlled[b]



Trends in hypertension disaggegated by diagnosis, treatment and control (both sexes)



Hypertension control rates – country comparison (both sexes)[b]



Mortality

	both sexes	males	females	year
Total deaths	71 490	35 280	36 210	2021
Cardiovascular disease deaths	20 470	9530	10 940	2021
Cardiovascular disease deaths attributable to high systolic blood pressure (%)	46	45	47	2021
Risk of premature death from NCDs (%)[c]	8	9	6	2021

Risk factors

	both sexes	males	females	year
Mean population salt intake, adults aged 25+ years (g/day)	8	10	7	2021
Current tobacco use, adults aged 15+ years (%)[d]	26	28	23	2022
Obesity, adults aged 18+ years (%)	14	17	11	2022
Total alcohol per capita consumption, adults aged 15+ years (litres/year)	9	no data	no data	2022
Physical inactivity, adults aged 18+ (%)	19	18	20	2022

National response

Targets

National target for blood pressure	**No**
National target for salt consumption	**No**

Policies

Operational cardiovascular disease policy	**Yes**
Operational salt reduction policy	**Yes**

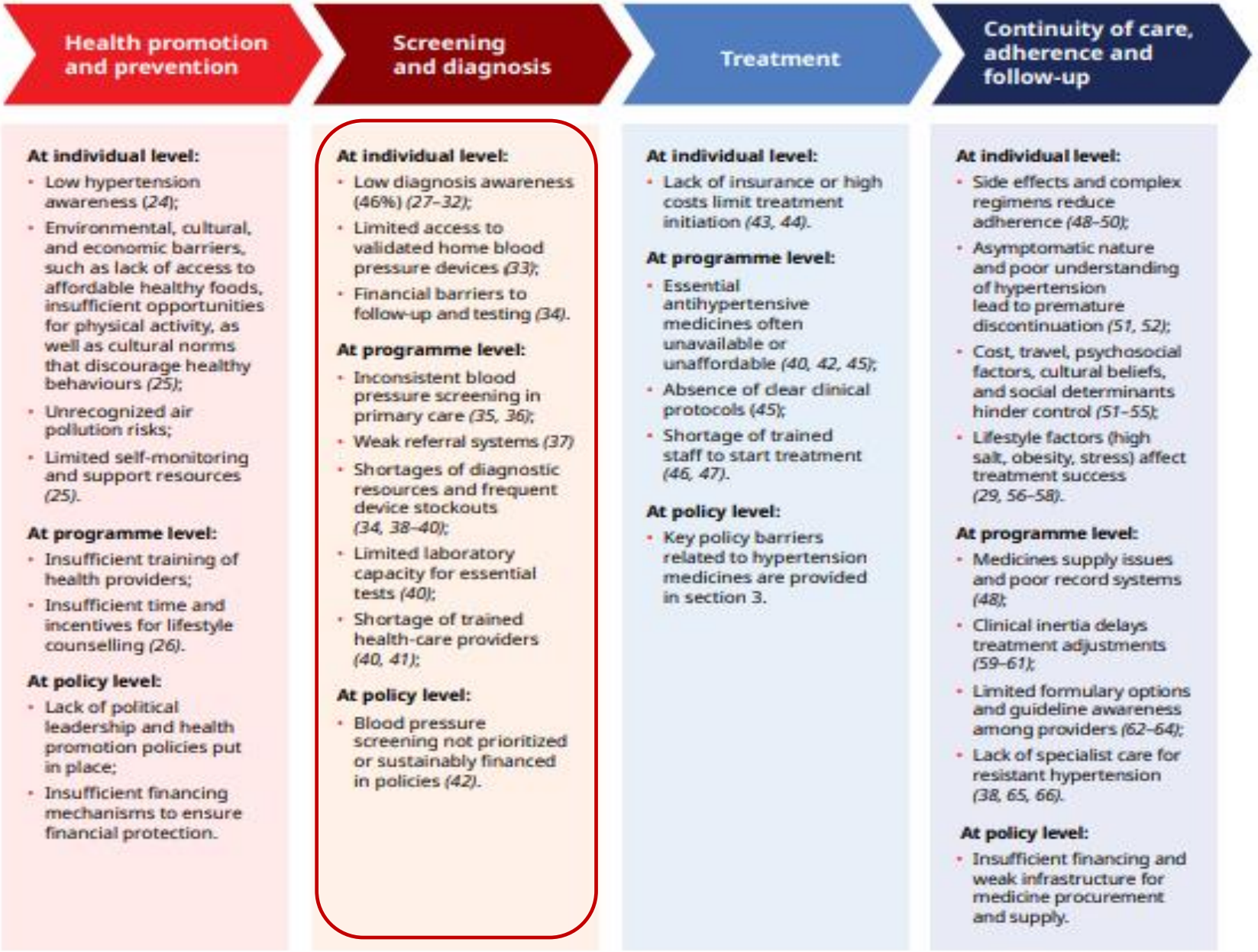
Treatment

Guidelines for management of hypertension	**Yes**

Surveillance

Conducted recent, national survey measuring raised blood pressure/hypertension	**Yes**
Conducted recent, national survey on salt/sodium intake	**Yes**
Functioning system for generating reliable cause-specific mortality data on a routine basis	**Yes**
Standardized patient information system broadly available at the primary health carelevel that captures CVD-related patient data	**No**

Fig. 8. Key barriers along the continuum of hypertension care



Box 5. Access to validated automated blood pressure measurement devices (BPMDs)

Why measuring blood pressure matters

Accurate blood pressure measurement is foundational to the diagnosis, treatment, and long-term control of hypertension. However, in many health systems – particularly at the primary care level – blood pressure continues to be measured using outdated or non-validated devices, which may lead to systematic misdiagnosis, undertreatment, or overtreatment.

Validated automated blood pressure measurement devices (BPMDs), defined as those which have undergone clinical accuracy testing under internationally-accepted protocols, address this critical gap. They reduce observer variability, eliminate terminal digit bias, and are easy to use, thus enabling wider task-sharing among non-physician health staff. Ensuring that only validated devices are used across the health system is essential for delivering reliable and equitable hypertension care.

Blood pressure measurements should be conducted by a trained staff member in a standardized way, with an appropriate cuff, and the patient comfortably seated with their back supported, an empty bladder and legs uncrossed. It is efficient and acceptable to conduct two blood pressure readings at first and use results of the second reading to guide decisions about the need to schedule a follow-up visit to complete the diagnostic work.

Advantages of validated automated BPMDs

Accuracy: Validated BPMDs are rigorously tested through standardized clinical protocols to ensure accurate readings across diverse populations.

Ease of use: The devices simplify the measurement process; they require minimal training and enable task-sharing among nurses, accredited social health activists, and other non-physician providers.

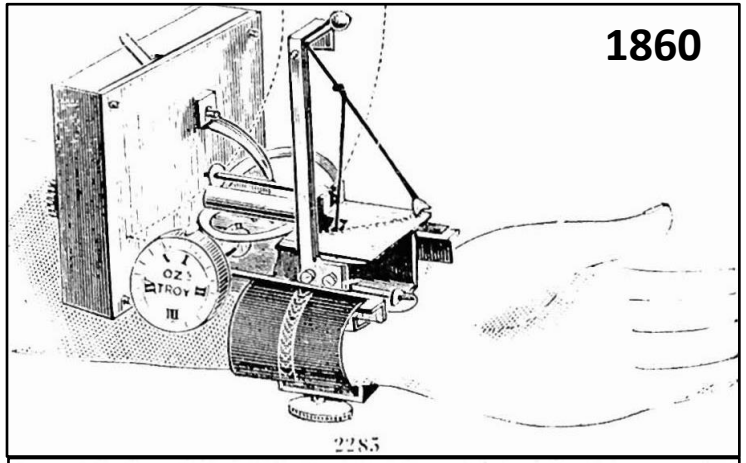
Scalability: The devices are suitable for use at all levels of care, including primary health centres and community clinics.

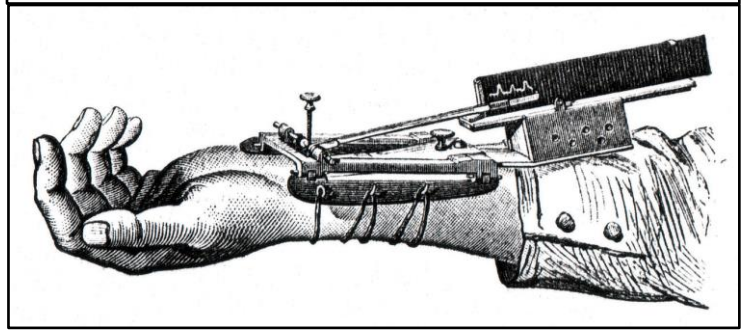
Reduced human error: The devices eliminate observer bias, hearing-related inaccuracies, and inconsistent inflation–deflation techniques.

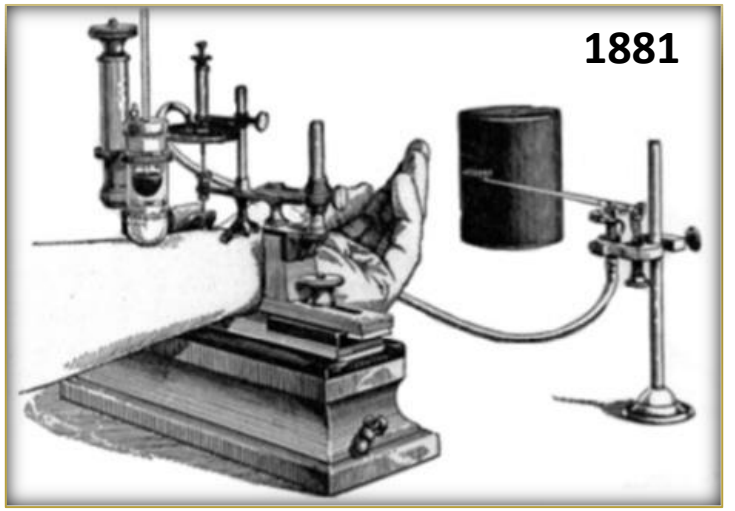
How to advance the use of BPMDs

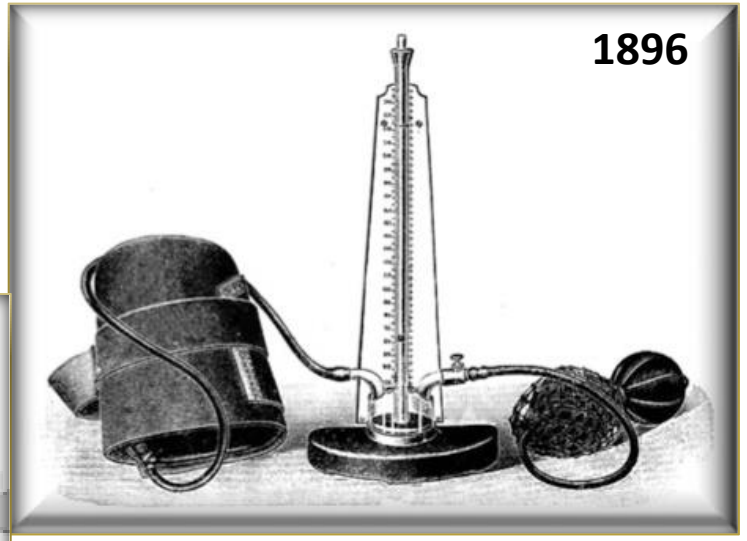
- *Develop clear policy mandates*: The exclusive use of validated BPMDs should be a requirement in national NCD programmes and standard treatment guidelines.
- *Define technical specifications*: Issue national-level guidance to standardize specifications for device selection, prioritizing durable, battery-operated models suitable for low-resource settings.
- *Integrate validation status in procurement processes*: Establish rate contracts or framework agreements that screen for ISO 81060–2:2018 compliance.
- *Budget for quality*: Allocate dedicated funds to procure validated BPMDs and phase out non-validated models across all levels of care.
- *Build awareness and capacity*: Conduct orientation for procurement officers, programme managers, and clinicians on the importance of using validated devices.

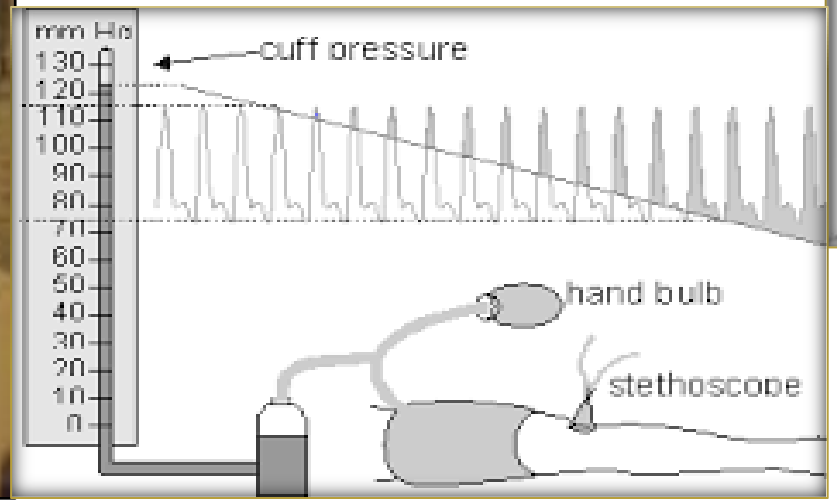
LA MESURE DE LA PRESSION ARTERIELLE
HISTOIRE







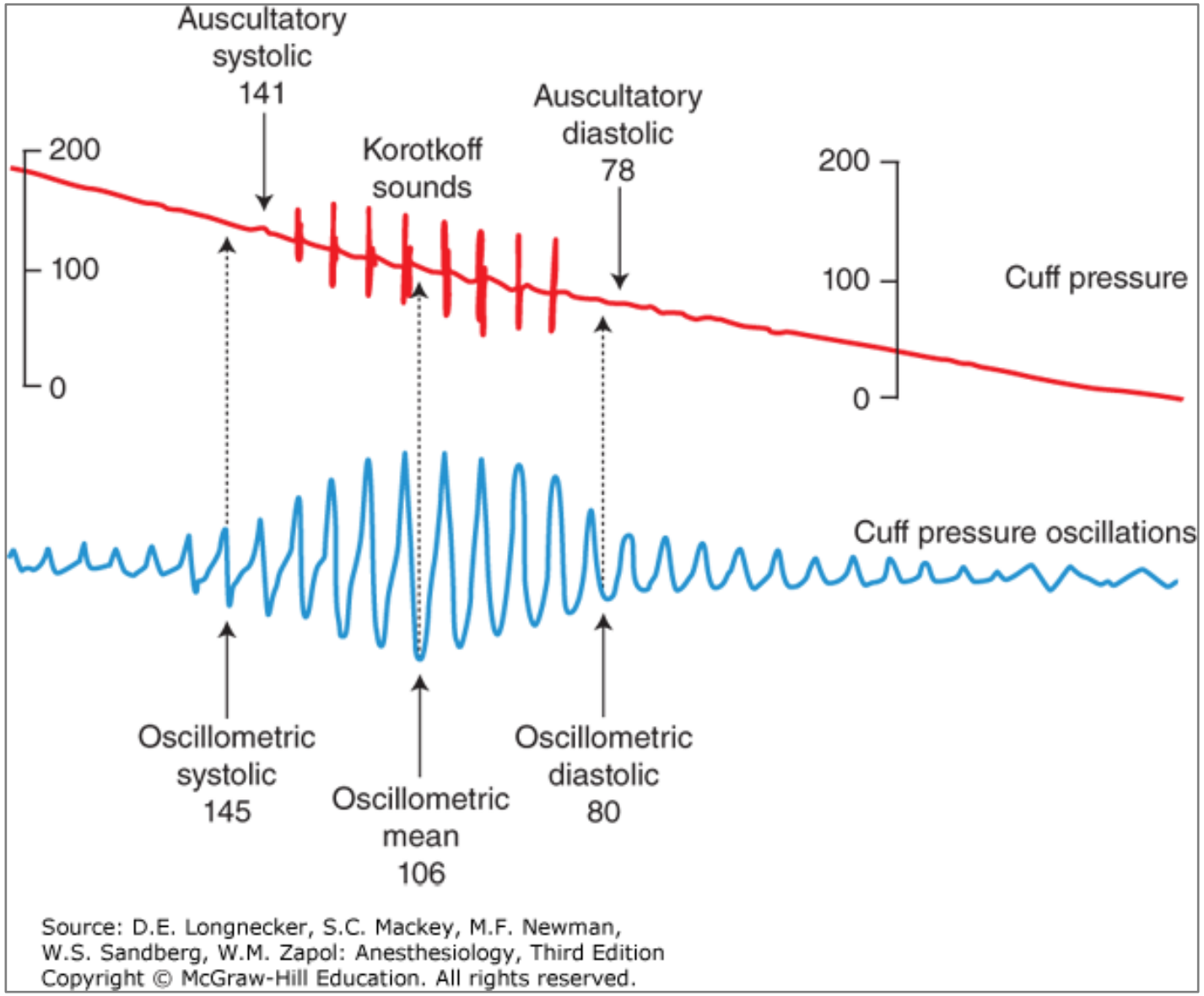




1905

MESURE DE LA PRESSION ARTERIELLE “MODERNE”

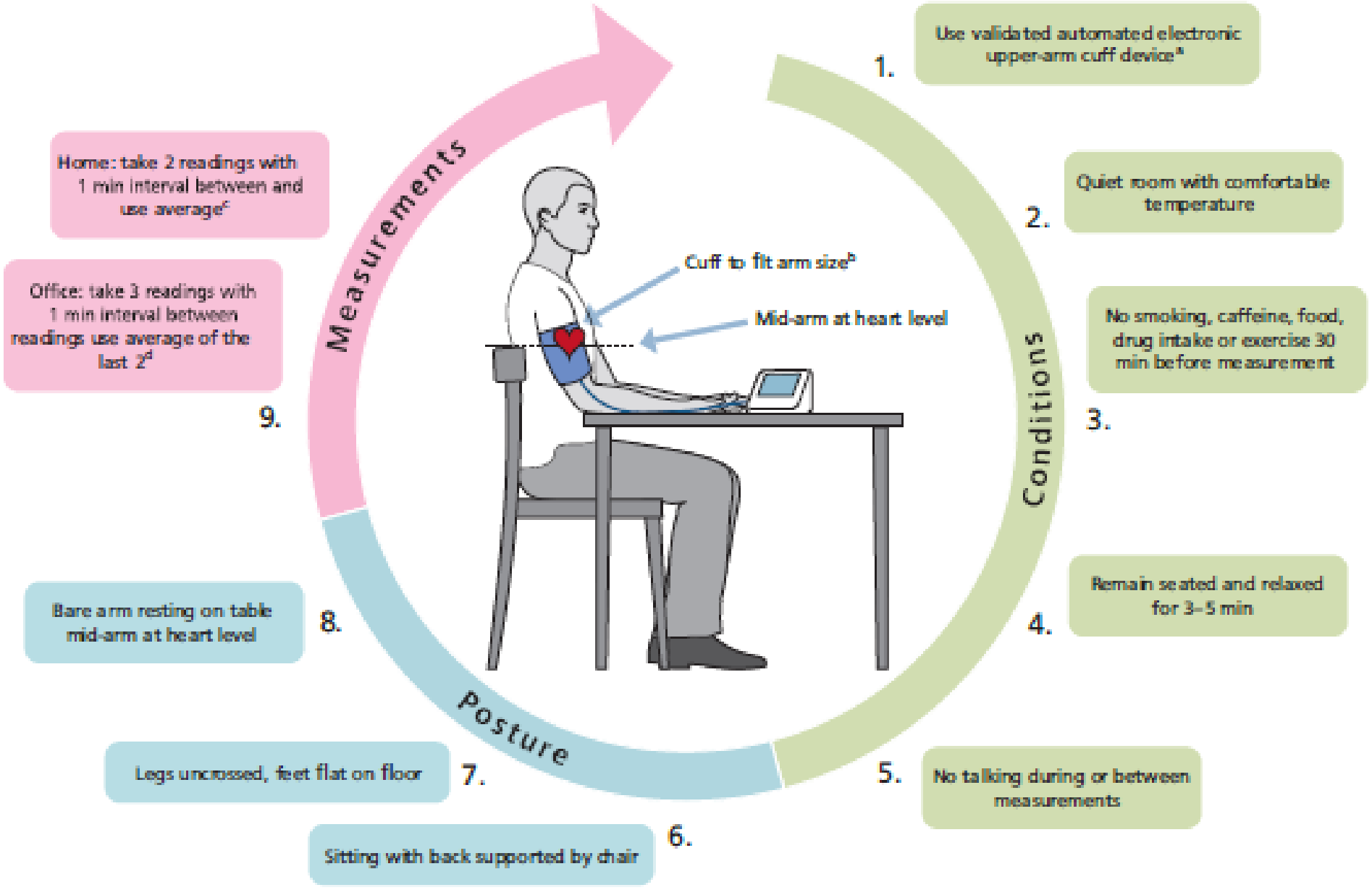
- **1974** : **1er appareil oscillométrique numérique**.
- Mesure la pression exercée sur le brassard par le sang
- Données utilisées pour estimer les pressions systoliques et diastoliques par des algorithmes.



MESURE ET MONITORING

Devices for BP measurement

Recommendations and statements	CoR	LoE
Automatic electronic, upper-arm cuff devices are recommended for office and out-of-office BP measurement (home and ambulatory).	I	B
Hybrid manual auscultatory devices with LCD or LED display, or digital countdown, or shock-resistant aneroid devices can be used for office BP measurement if automated devices are not available.	I	B
Only properly validated devices should be used. www.stridebp.org	I	B
Cuffless BP devices should not be used for the evaluation or management of hypertension in clinical practice.	III	C


Measurements
Conditions
Posture
1. Use validated automated electronic upper-arm cuff device[a]
2. Quiet room with comfortable temperature
3. No smoking, caffeine, food, drug intake or exercise 30 min before measurement
4. Remain seated and relaxed for 3–5 min
5. No talking during or between measurements
6. Sitting with back supported by chair
7. Legs uncrossed, feet flat on floor
8. Bare arm resting on table mid-arm at heart level
9. Office: take 3 readings with 1 min interval between readings use average of the last 2[d]
Home: take 2 readings with 1 min interval between and use average[c]
Cuff to fit arm size[b]
Mid-arm at heart level

2021 European Society of Hypertension practice guidelines for office and out-of-office blood pressure measurement

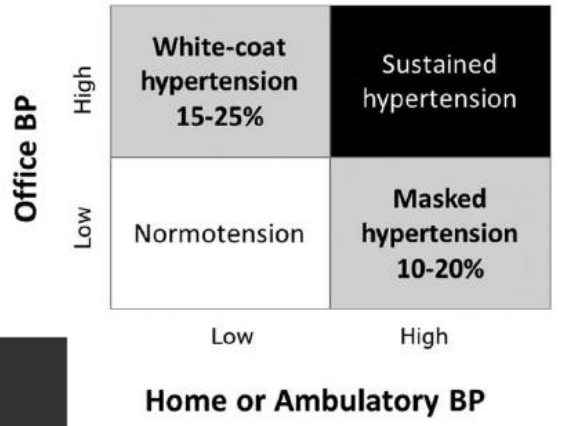


TABLE 4. Interpretation of average OBP (at least 2-3 visits with 2-3 measurements per visit)

	Normal-optimal BP (<130/85 mmHg)	High-normal BP (130–139/85–89 mmHg)	Hypertension Grade 1 (140–159/90–99 mmHg)	Hypertension Grade 2 and 3 (≥160/100 mmHg)
Diagnosis	Normotension highly probable	Consider MH	Consider WCH	Sustained hypertension highly probable
Action	Remeasure after 1 year (6 months in those with other risk factors)	Perform HBPM and/or ABPM. If not available confirm with repeated office visits		Confirm within a few days or weeks[a]. Ideally use HBPM or ABPM

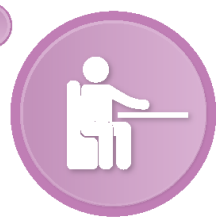
[a]Treat immediately if OBP is very high (e.g. ≥180/110 mmHg) and there is evidence of target organ damage or CVD.

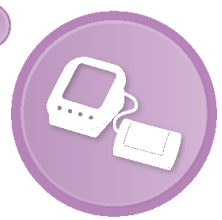
TABLE 12. Clinical utility of office and out-of-office BP measurement methods

Clinical use	Office	Home	24 h ambulatory	Pharmacy
Screening	+++	+	–	++
Initial diagnosis	+	++	+++	–
Treatment titration	+	++	++	–
Follow-up	++	+++	+	+
Main indication	Screening of untreated individuals. Follow-up of treated patients	Long-term follow-up of treated patients (preferred method)	Initial diagnosis (preferred method)	Screening of untreated individuals. Follow-up of treated patients
Hypertension (mmHg)	≥140/90	≥135/85	≥130/80	≥135/85 (?)

Stergiou et al. Journal of Hypertension 2021

Office blood pressure measurement

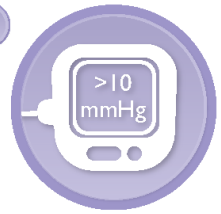
1. 
Measure after 5 min seated comfortably in a quiet environment

2. 
Use a validated device with an appropriate cuff size based on arm circumference

3. 
Place the BP cuff at the level of the heart with the patient's back and arm supported

4. 

Measure BP three times (1–2 min apart) and average the last 2 readings

5. 

Obtain further measurements if the readings differ by >10 mmHg

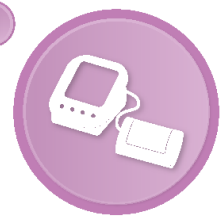
6. 
Measure BP in both arms at the 1st visit to detect between arm differences

7. 
Record heart rate and exclude arrhythmia by pulse palpation

8. 
Assess for orthostatic hypotension at 1st visit and thereafter by symptoms

ESC

Home-based blood pressure measurement

1. 
Use a validated BP device

2. 
Measure BP in a quiet room after 5 min of rest with arm and back supported

Hypertension:
average HBPM
≥135/85 mmHg

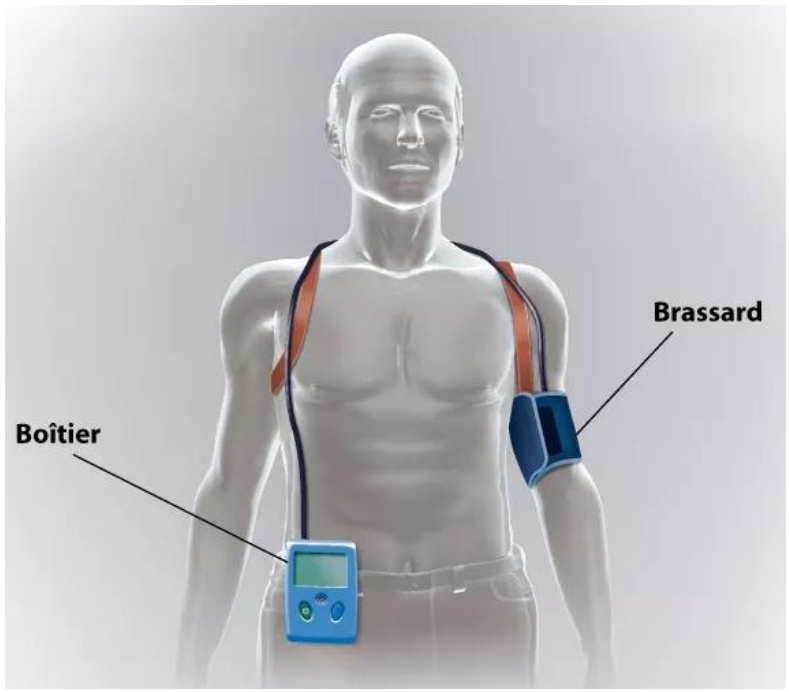
3. 

Obtain two readings on each occasion, 1–2 min apart

4. 
Obtain readings twice a day (morning[a] and evening) for at least 3 and ideally 7 days

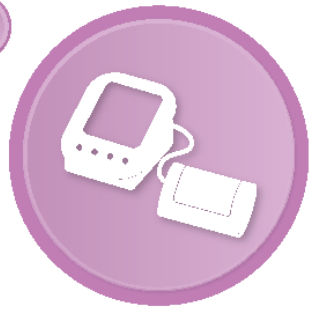
5. 
Record and average all readings and present results to clinician

ESC



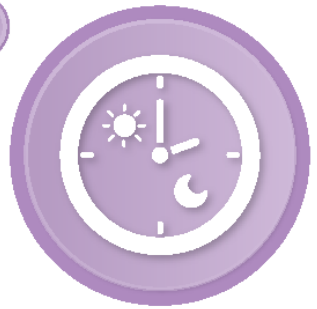
Ambulatory blood pressure measurement

1



Use a validated BP device

2



Device usually records BP at 15–30 min intervals during the day and 30–60 min at night

3

A minimum of 70% usable BP recordings is required

Hypertension:

ABPM ≥130/80 mmHg over 24 h

or

≥135/85 mmHg for the daytime average

or

≥120/70 mmHg for the night-time average

4

A diary of the patient's activities, intake of medications and sleep time should be completed

ESC

Recommended upper arm devices for self-measurement of blood pressure

A&D TM-2430 (Boso TM)

- Method: Osc
- BHS: A/A
- DBL: Yes
- Available in Switzerland: Yes
- Cost: 2'520 CHF

Read more: Zetmed

Arteriomed Tensioday

- Method: Osc
- BHS: A/A
- DBL: Yes
- Available in Switzerland: Yes (available via Germany)
- Cost: 1'750 CHF

Read more: Arteriomed

Diasys Integra II

- Method: Osc & Aus
- BHS: B/B
- DBL: Yes
- Available in Switzerland: Yes
- Cost: 6'450 CHF / 4'925 (Osc only)

Read more: Physicor

IEM Mobil-O-Graph NG (with Pulse Wave Analysis)

- Method: Osc
- BHS: A/A
- DBL: Yes
- Available in Switzerland: Yes
- Cost: 2'700 CHF

Read more: I.E.M. GmbH

Microlife WatchBP O3

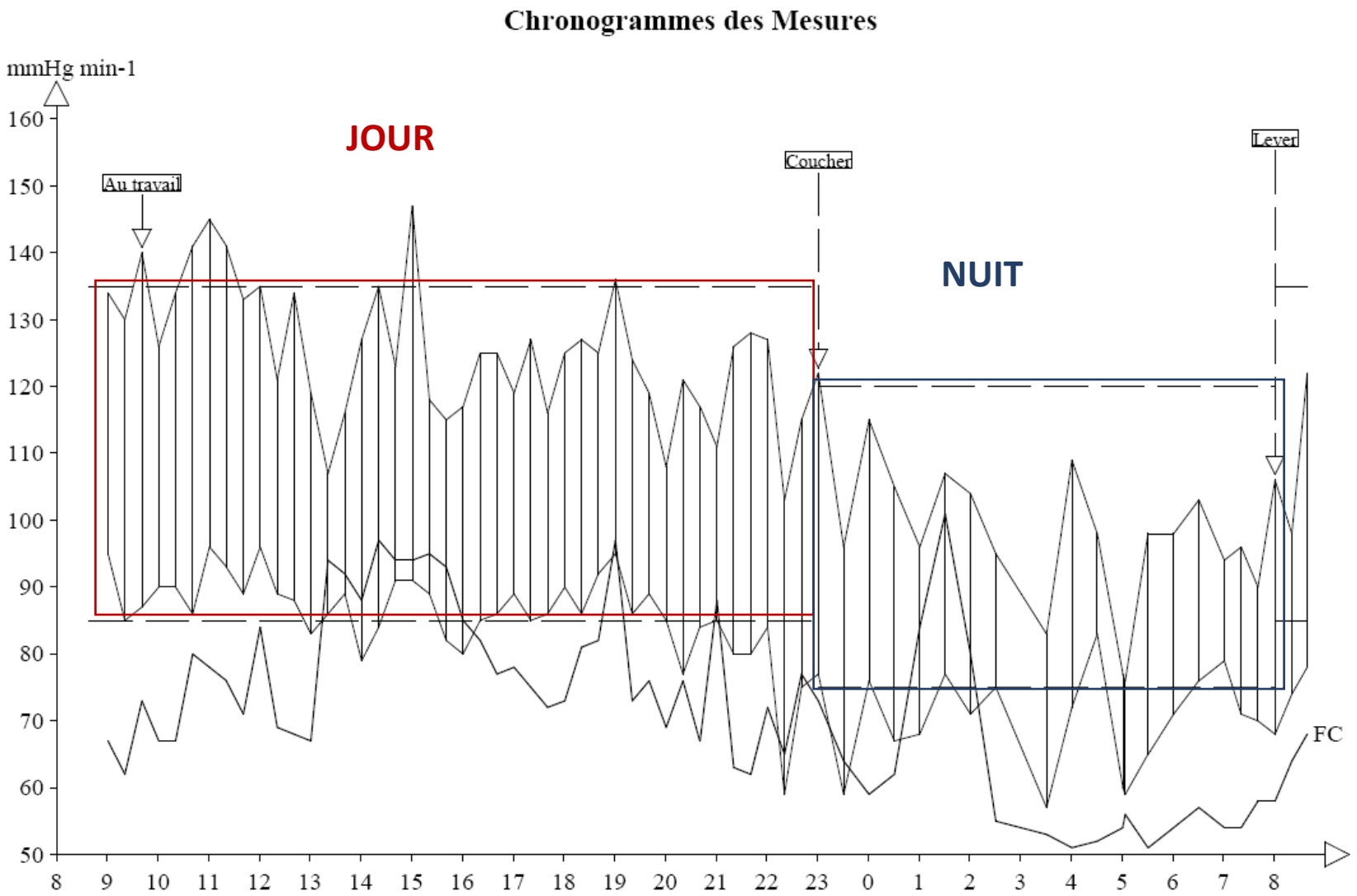
- Method: Osc
- DBL: Yes
- Available in Switzerland: Yes
- Cost: 2'520 CHF

Read more: WatchBP

Schiller BR-102 plus

- Method: Osc & Aus
- DBL: Yes
- Available in Switzerland: Yes
- Cost: 3'450 CHF

Read more: Schiller



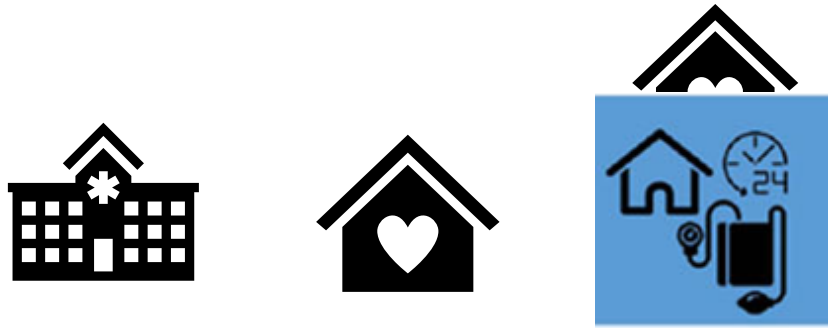
Blood pressure classification

Non-elevated blood pressure	Elevated blood pressure	Hypertension
Office BP	**Office BP**	**Office BP**
SBP <120 mmHg and DBP <70 mmHg	SBP 120–139 mmHg or DBP 70–89 mmHg	SBP ≥140 mmHg or DBP ≥90 mmHg
HBPM	**HBPM**	**HBPM**
SBP <120 mmHg and DBP <70 mmHg	SBP 120–134 mmHg or DBP 70–84 mmHg	SBP ≥135 mmHg or DBP ≥85 mmHg
ABPM	**ABPM**	**ABPM**
Daytime SBP <120 mmHg and Daytime DBP <70 mmHg	Daytime SBP 120–134 mmHg or Daytime DBP 70–84 mmHg	Daytime SBP ≥135 mmHg or Daytime DBP ≥85 mmHg
Insufficient evidence confirming the efficacy and safety of BP pharmacological treatment	Risk stratify to identify individuals with high cardiovascular risk for BP pharmacological treatment	Cardiovascular risk is sufficiently high to merit BP pharmacological treatment initiation

The diagnosis of hypertension and elevated BP requires confirmation using out-of-office measurements (HBPM or ABPM) or at least one additional subsequent office measurement

ESC

Seuils de pressions artérielles différentes selon l'endroit de la mesure pour définir une hypertension



Office Home 24h-ABPM

SITUATIONS DANS LESQUELLES LA PA EST MESURÉE

Attended

Unattended

Home

Adapted from Paul Muntner et al. Journal of the American College of Cardiology, Volume 73, Issue 3, 2019,Pages 317-335.

MÉTHODES DE MESURES DIFFÉRENTES – ASSISTANCE APP: COMPARAISONS

Methods

- **113** patients with hypertension
- Multi-center: **3** hypertension clinics 2020-2022
- Randomized **cross-over** design
- **5** different BP measurement methods

Results

Mean 24-hour ambulatory BP: 126/73 mm Hg
(Reference standard)

	App-assisted home BP	30-min BP	Attended office BP	Unattended office BP
Mean BP (mm Hg)	**141/82**	**134/80**	**137/81**	**135/81**
Agreement hypertension* (κ-statistic (95% CI))	**0.33** (0.18 - 0.47)	**0.30** (0.13 - 0.47)	**0.48** (0.31 - 0.65)	**0.41** (0.22 - 0.59)

**Home BP monitoring (HBPM): ≥135/85 mm Hg, 30-min BP: ≥135/85 mm Hg, attended OBP: ≥140/90 mm Hg, unattended OBP: ≥140/90 mm Hg.*

E. H. Groenland, et al. Smart-phone assisted home blood pressure monitoring compared with office and ambulatory blood pressure monitoring in patients with hypertension: the AMUSE-BP study. Hypertension 2022 Vol. 79 Issue 10 Pages 2373-2382

PERFORMANCES OF APP-ASSISTED HBPM

Table 3. Diagnostic Performance of App-Assisted HBPM and Automated OBP Monitoring in Detecting Hypertension Diagnosed by 24-Hour Ambulatory Blood Pressure Monitoring (Reference)

	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	κ coefficient
HBPM	92 (78–98)	46 (33–59)	51 (38–63)	90 (74–98)	0.33 (0.18–0.47)
Unattended 30-min BP	77 (61–89)	56 (42–68)	53 (39–66)	79 (64–90)	0.30 (0.13–0.47)
Attended OBP	77 (61–89)	73 (60–83)	64 (49–77)	83 (71–92)	0.48 (0.31–0.65)
Unattended OBP	62 (45–77)	79 (66–88)	65 (47–80)	76 (64–86)	0.41 (0.22–0.59)

Table 4. Diagnostic Performance of App-Assisted Home Against 24-Hour Ambulatory BP Monitoring (Reference) in Detecting Different Hypertension Phenotypes

	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	κ coefficient
Sustained hypertension	92 (78–98)	46 (33–59)	51 (38–63)	90 (74–98)	0.33 (0.18–0.47)
White-coat hypertension	32 (16–52)	99 (92–100)	90 (55–100)	81 (68–86)	0.38 (0.18–0.58)
Masked hypertension	80 (44–97)	84 (75–91)	36 (17–59)	97 (91–100)	0.42 (0.20–0.64)

CONCLUSIONS ETUDE

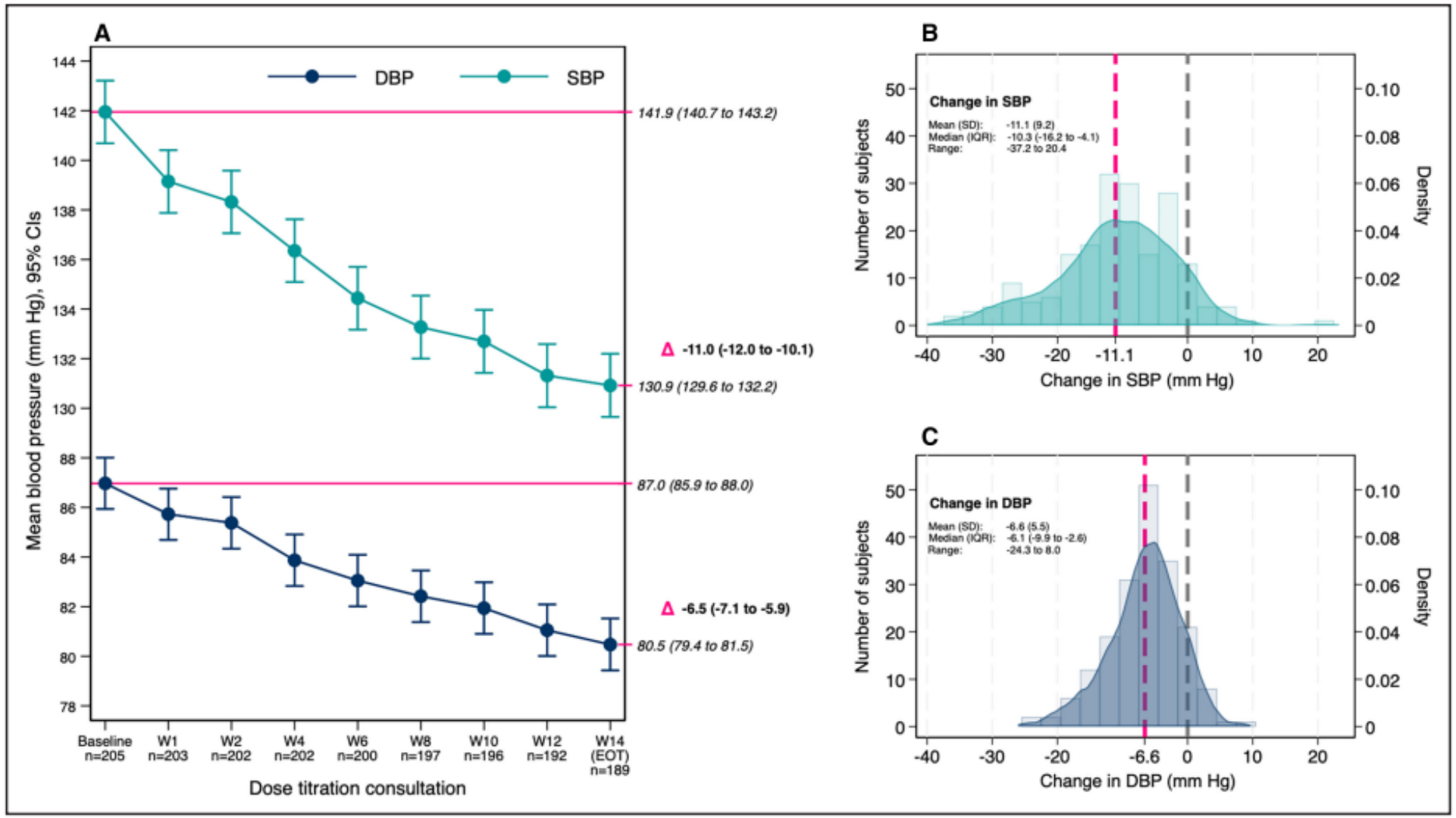
This study showed a **considerable (diagnostic) disagreement between app-assisted HBPM and ABPM**.

App-assisted HBPM had **high sensitivity in the diagnosis of sustained and masked hypertension** and may therefore be used as **complementary tool, but not a replacement of, ABPM**

OPEN-LABEL, REMOTE, DOSE TITRATION TRIAL USING DAILY HOME SELF-MONITORING OF BP, DRUG DOSE, AND SIDE EFFECTS WITH LINKED SMARTPHONE APP AND TELEMONITORING IN ADULTS WITH UNCONTROLLED HT

Outcome I:
mean SBP change from baseline to end of treatment.
N= 205

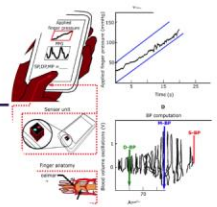
Results:
mean BP reduction of 11 (95% CI, 10–12)/7 (95% CI, 6–7) mmHg,



DJ Collier et al. J AM Heart Ass 2024.
Personalized Antihypertensive Treatment Optimization With Smartphone-Enabled Remote Precision Dosing of Amlodipine During the COVID-19 Pandemic

WHAT IS NEXT?

Cuff-less or Cuff-free



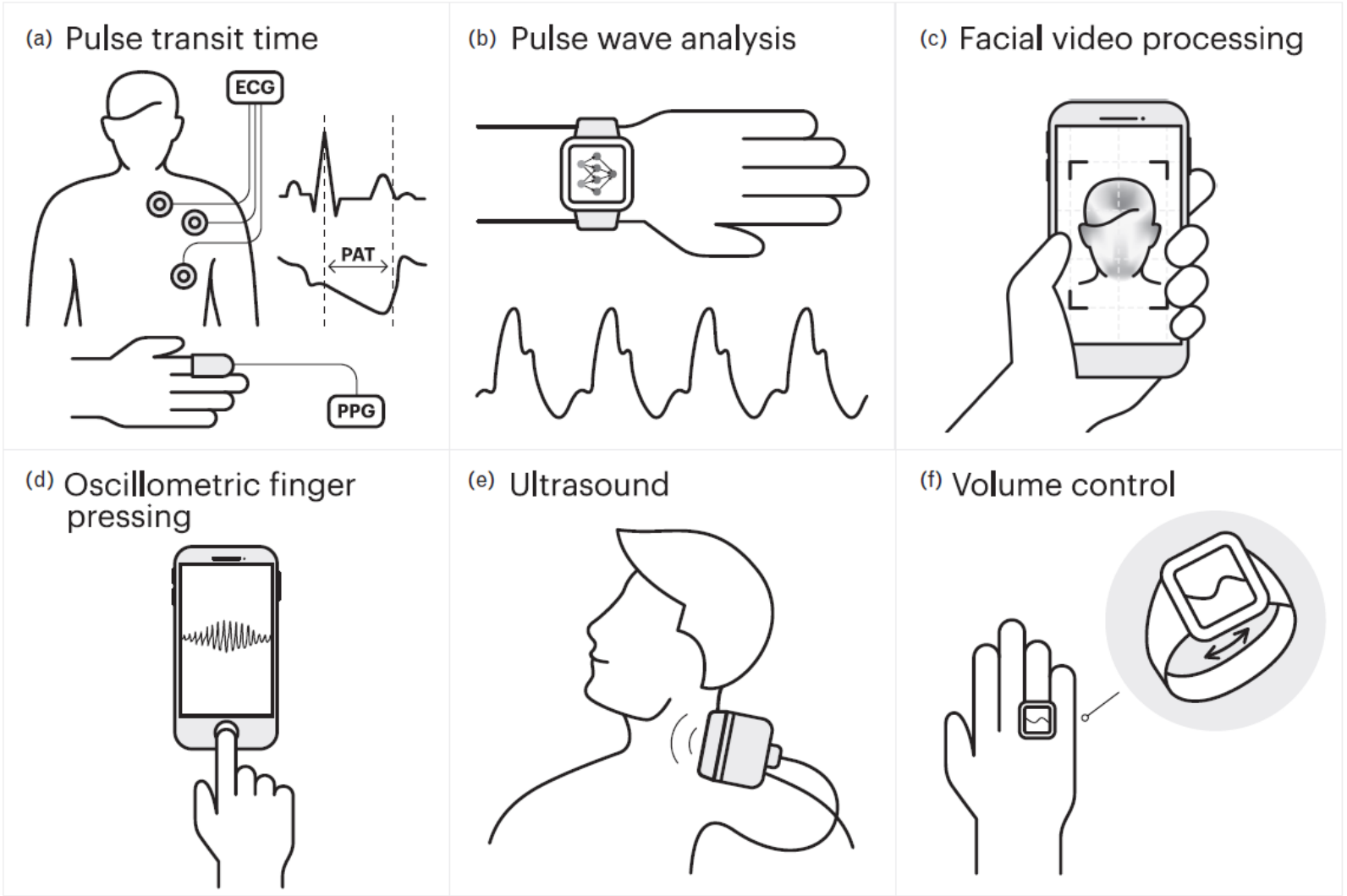
Finger oscillommetry

Body sensors

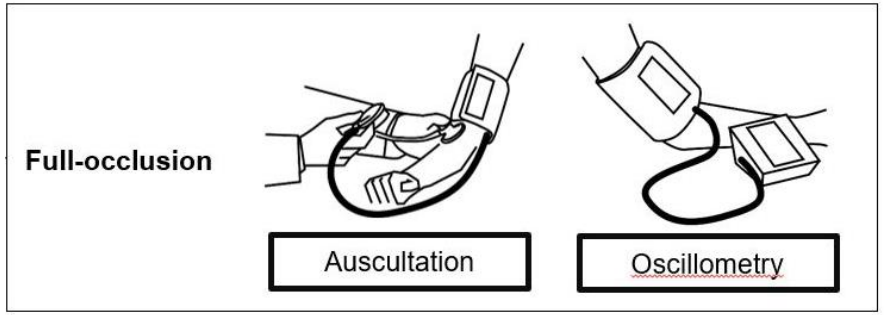
Reflectance Pulse oximetry

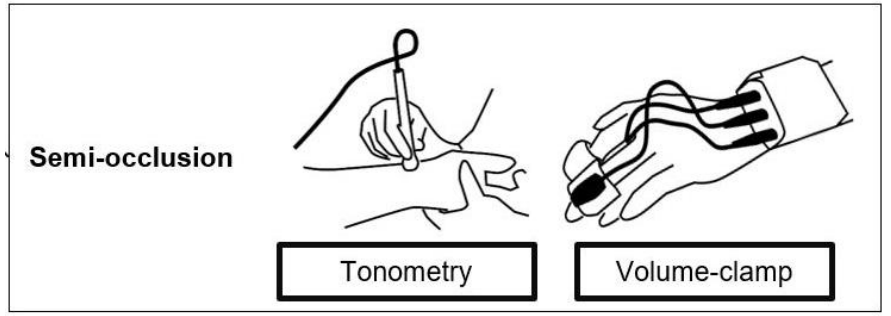
Optical sensors

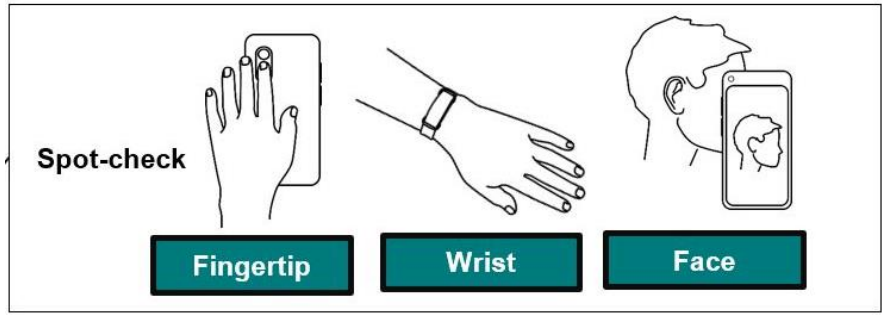
Cuffless blood pressure measuring devices: review and statement by the European Society of Hypertension Working Group on Blood Pressure Monitoring and Cardiovascular Variability

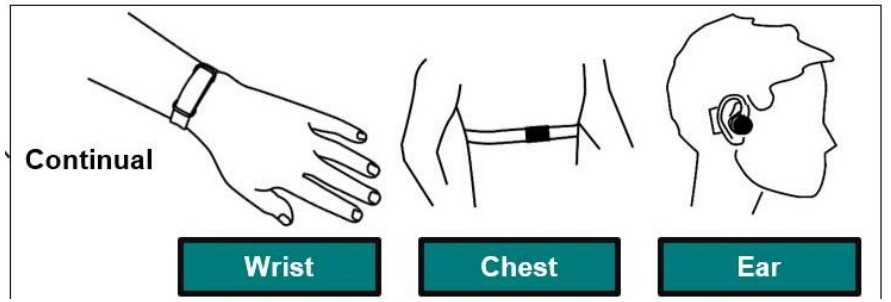


Stergiou G. Journal of Hypertension 2022 (40) p1449-1460



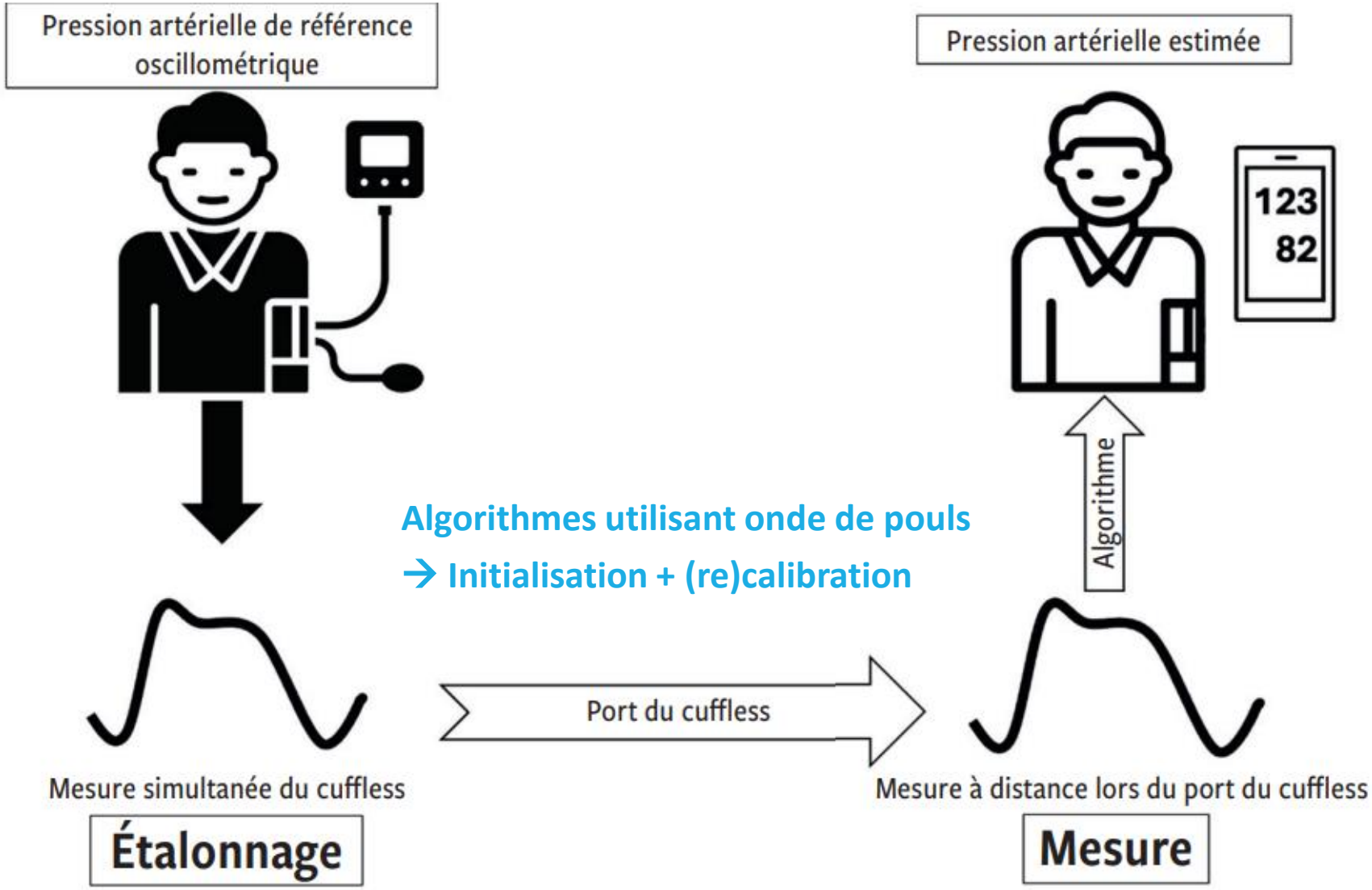






Sola j. Front Med Tech 2022 (4). Guidance for interpretation

CONCEPT GENERAL DES CUFFLESS



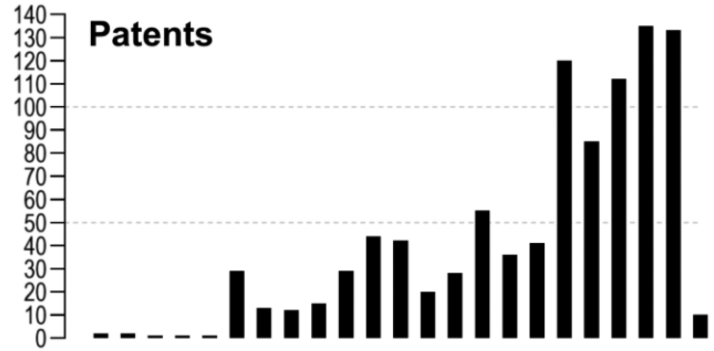
B Thompson et al. Rev Med Suisse sept 2025

MAIN FEATURES OF STANDARDS SPECIFICALLY DEVELOPED FOR THE VALIDATION OF CUFFLESS BLOOD PRESSURE MEASURING DEVICES

	Institute of Electrical and Electronic Engineers **IEEE** **1708-2014 & 1708a-2019**	International Organization for Standardization **ISO 81060-3** **(*Under development*)**
Intended use	Cuffless wearable BP devices	Cuffless continuous BP devices
Number of subjects	≥85	30-120 depending on intraclass correlation for each BP parameter
Reference method	Manual auscultatory	Intra-arterial
Validation phases		
A. Test immediately post calibration	Yes	Yes
B. Test after BP change	Specific requirements for BP change	Specific requirements for BP change
C. Test before re- calibration	Yes	Yes
Procedure for inducing BP changes	Not specified	Not specified (subjects may already be hemodynamically unstable)
BP measurement sequence	Simultaneous or sequential	Simultaneous
Pass requirements (mean error limit)	≤6 mmHg (for BP changes ≤7 mmHg)	≤6 mmHg (SD ≤10 mmHg)

Stergiou G. Journal of Hypertension 2022 (40) p1449-1460

PRINCIPAUX DISPOSITIFS CUFFLESS DISPONIBLES EN SUISSE (RMS2025)



*__510(k) Clearance__: la FDA reconnaît que le dispositif est **substantiellement équivalent** à un autre déjà sur le marché.
CE: conformité européenne; FDA: Food and Drug Administration; PA: pression artérielle; PPG: photopléthysmographie.

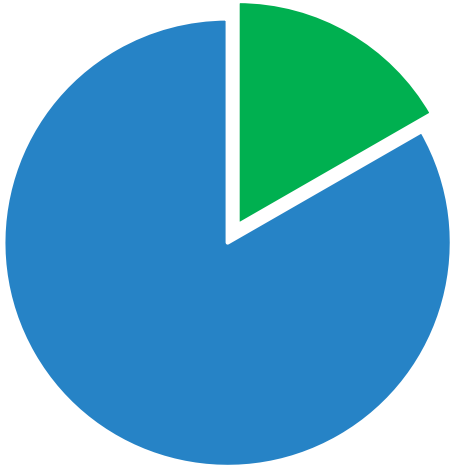
Marque	Dispositif	Type de capteur	Marquage CE	Reconnaissance FDA (510k)*	Validé par les sociétés savantes	Usage prévu
Biobeat Technologies	Patch pectoral	PPG	☑	☑	☒	Mesure ponctuelle non invasive de la PA et d'autres signes vitaux
Biospectal optiBP	Smartphone	PPG	☑	☒	☒	Application médicale mobile destinée à être utilisée sur une plateforme informatique mobile compatible pour afficher la PA sur la base d'un signal de PPG
Corsano Health CardioWatch 287-2	Bracelet	PPG	☑	☑	☒	Mesure non invasive intermittente ou à la demande de la PA et d'autres signes vitaux
(Hilo) par Aktiia	Bracelet	PPG	☑	☑	☒	Surveillance continue de la PA
Samsung Galaxy Watch	Montre	PPG	☑	☒	☒	Surveillance de santé destinée au grand public

B Thompson et al. Rev Med Suisse sept 2025

AVANTAGES CUFFLESS DEVICES?

FACILITATE REGULAR MEASUREMENT OF BP

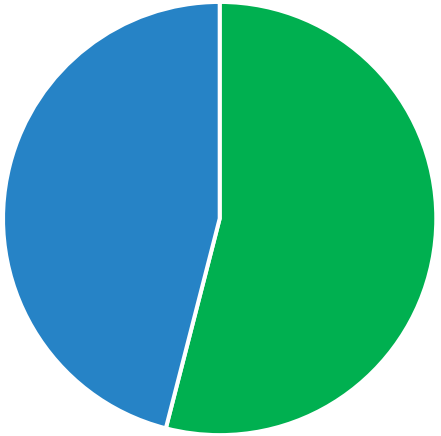
Adherence to HBPM monitoring



- Uses HBPM monthly or weekly
- Never uses HBPM or uses HBPM less than once a month

N = 10’958 US citizens from the NHANES survey between 2011 and 2014.
Data from Am J Hypertens. 2017 Nov 1; 30(11): 1126–1132.

Adherence to cuffless monitoring



- Engages with BP data monthly or weekly
- Stops engaging with wearable or engages less than once a month

N = 8’471 EU citizens that started using a wearable device between January and July 2022.
Internal Aktiia data.

CHALLENGES POUR LA VALIDATION DES « CUFFLESS »

- Le but de l'utilisation doit être clair
  - screening? diagnostic? follow-up?
- Obtenir un standard reconnu et accepté pour la validation
- Doit inclure suffisammnet de variation de PA intra- and inter-patient
- L'impacte du modèle mathématique doit être transparent
  - age, gender, ...

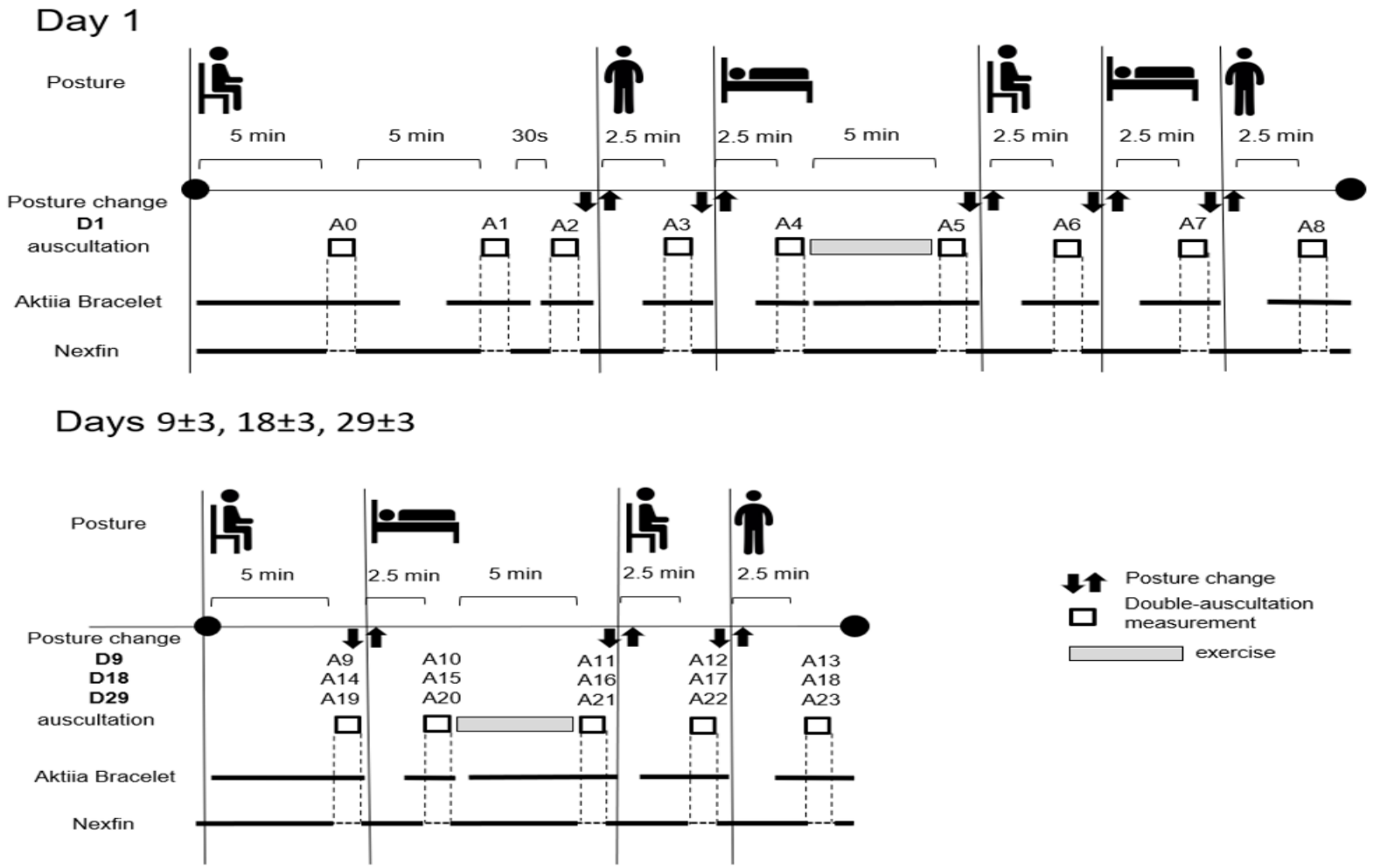
Exemple: Hilo

- Signaux optiques photo-plethysmographiques, analyse du changement de diamètre artériel, à chaque battement cardiaque
- Calcule de la TAS et TAD via des algorithmes qui utilisent l'analyse de l'onde de pouls.
- Calibration de l'appareil 1x/mois
- Fiable pour la mesure de la TA en position assise
- Non validé encore pour les mesures nocturnes

Design of the validation protocol (CE)

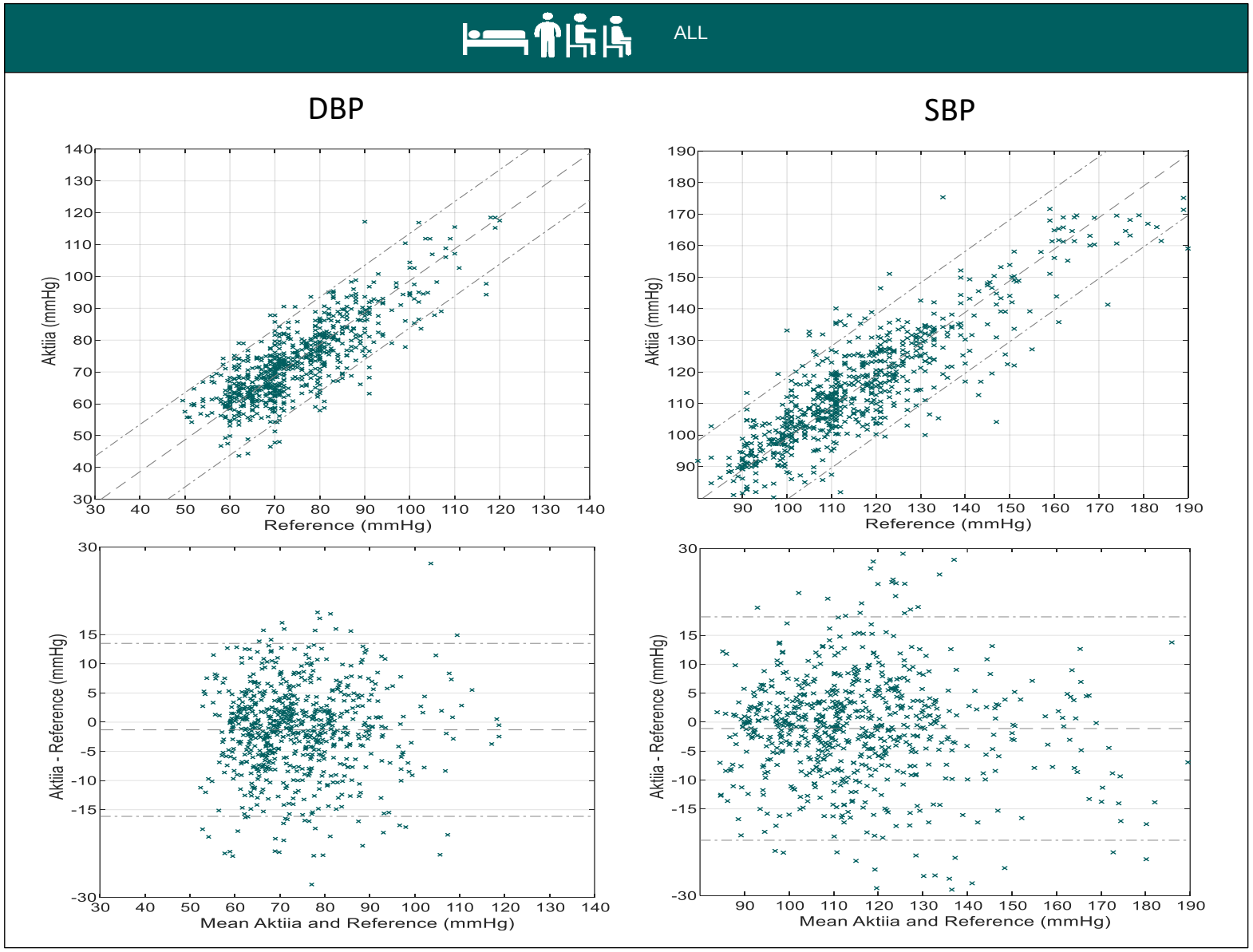
Day 1
- Immediate post qualibration accuracy
- Tracking of BP changes with position

Day 9 to 29
- Stability of accuracy with time



Sola J et al. Sci Rep. 2021 Oct 19;11(1):20644

PERFORMANCE DANS DIFFÉRENTES POSITIONS



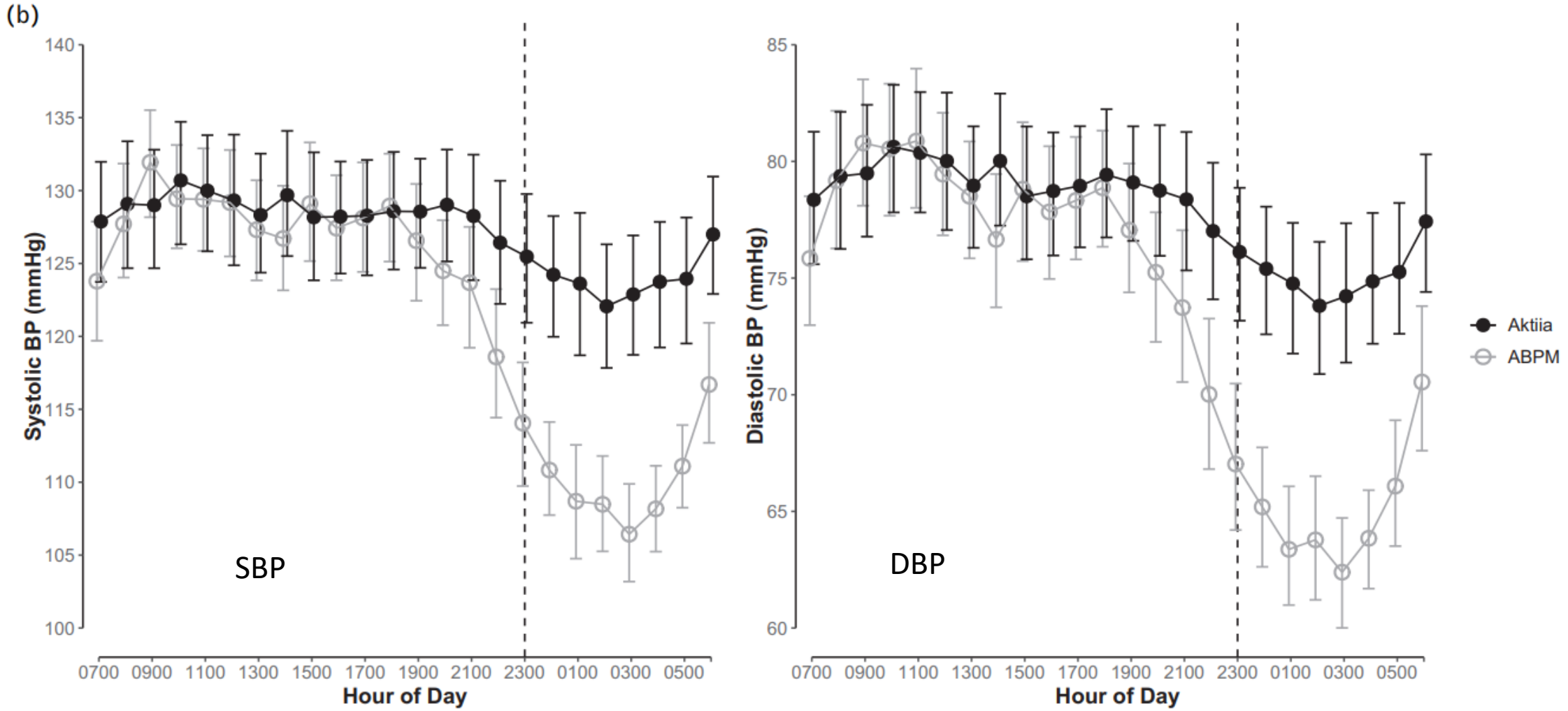
Sola J et al. Sci Rep. 2021 Oct 19;11(1):20644

PERFORMANCE DANS DIFFÉRENTES POSITIONS

Mean ± Std (mmHg)	All positions	Lying	Sitting - wrist at heart level	Sitting - wrist at lap level	Standing
Systolic blood pressure	-1.11 ± 9.85	-2.44 ± 10.15	0.46 ± 7.75	-3.02 ± 6.10	-0.62 ± 12.51
Diastolic blood pressure	-1.32 ± 7.56	-1.93± 7.65	0.39 ± 6.86	-4.22 ± 6.56	-4.85 ± 9.11

Mean and SD of the differences between reference and the Aktiia

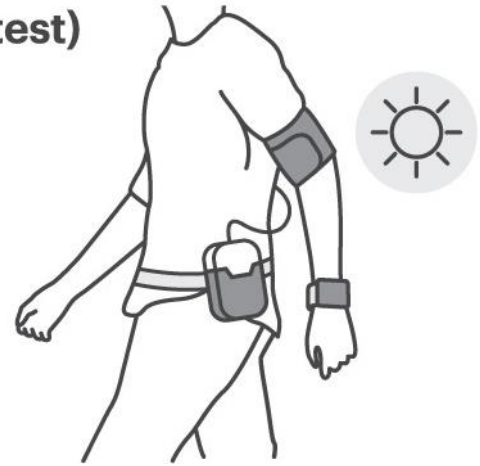
24H BP TRACKING:
ABPM VS COMMERCIALLY AVAILABLE CUFFLESS DEVICE



I. Tan et al. J Hypertens 2023

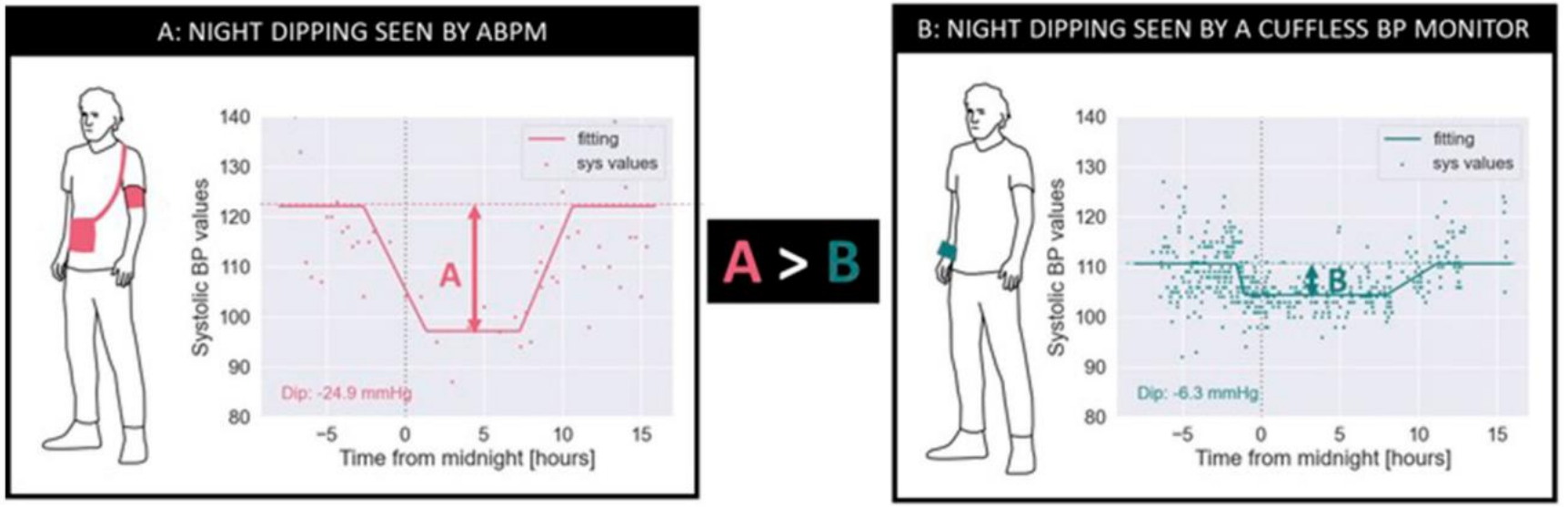
AWAKE / ASLEEP TEST

4. Awake/asleep test (primary test)

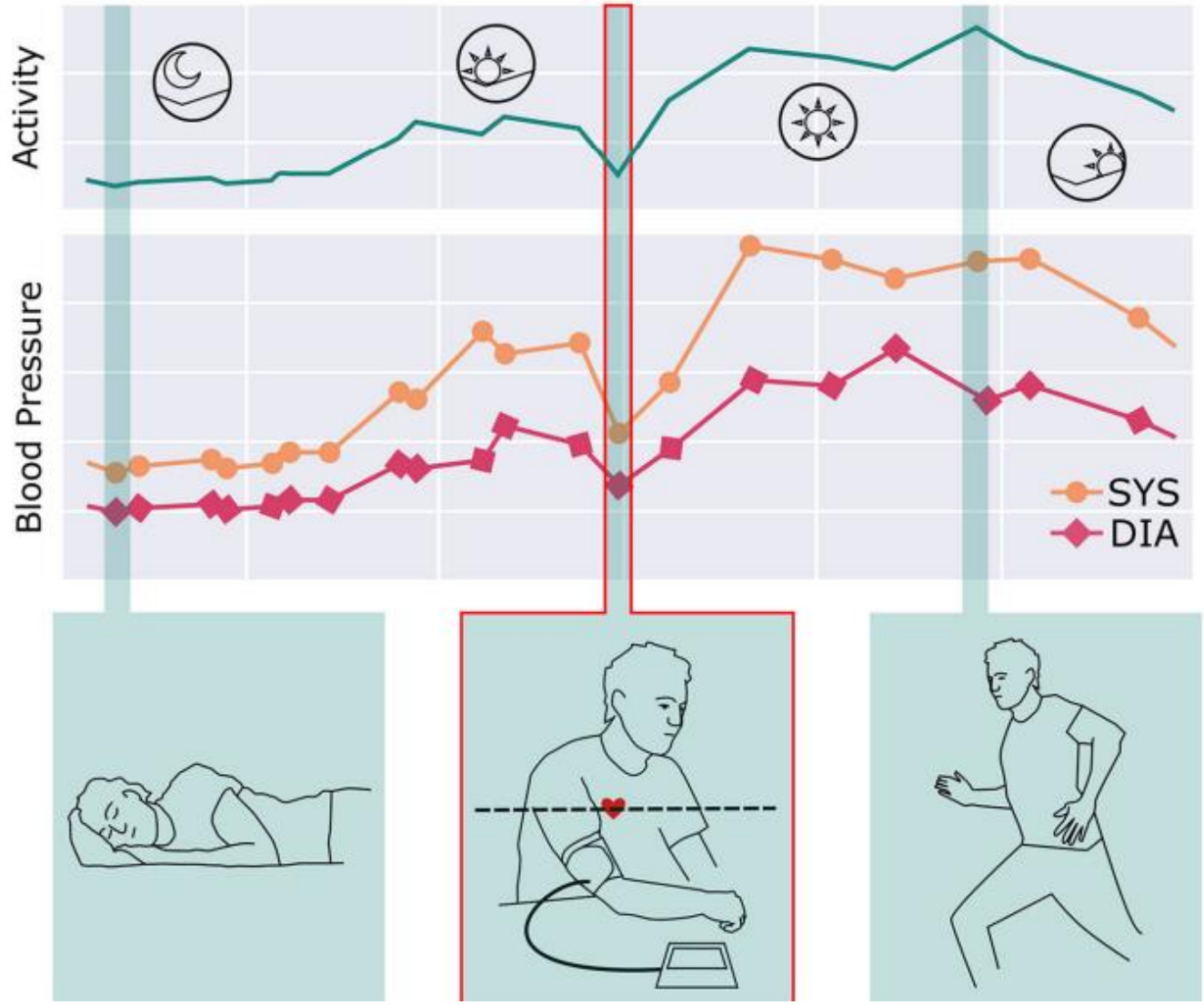


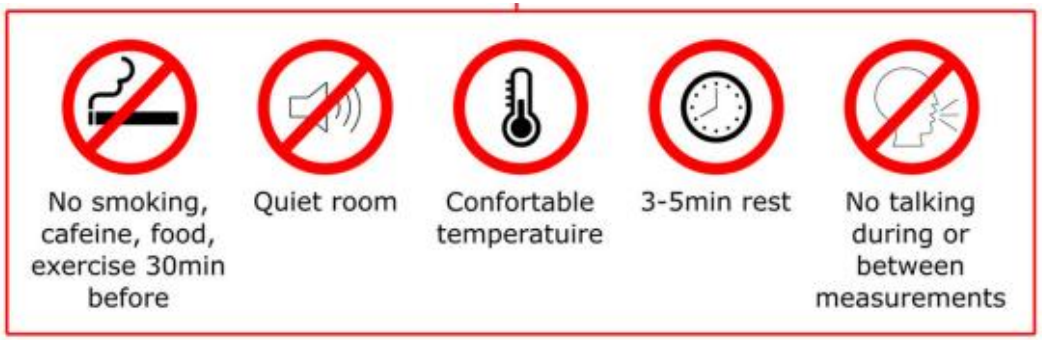
24-hour cuffless BP monitoring and upper-arm cuff oscillometric ambulatory monitoring to compare the awake/asleep BP change measured by the two devices

≥35 Error in awake/asleep BP change ≤5±8 (mean±SD) mmHg



RÉALITÉ DE LA PRESSION ARTÉRIELLE: VARIATIONS CONTINUES





Aspect unique pour validation clinique des cuffless

Ability to track BP changes

Impact of different device positions relative to the heart

Stability of cuff calibration accuracy over time

Impact of body movement and physical activity

EVIDENCES PAR RAPPORTS AUX DIFFÉRENTES MESURE DE PA

	Diagnosis	TOD	Prognosis	Target BP
oBP	√	√	√	√
Unattended OB	√	√	√	√
Home BP	√	√	√	?
ABPM	√	√	√	?
Cuffless	?	?	?	?

EN CONCLUSIONS…

- PA est très variable
- Moyens de mesures «traditionnelles» ne tiennent pas forcément compte de toutes ces variations
- App-connectées à domicile peuvent aider mais ne remplacent pas l'ABPM 24h
- Conditions de mesure PA avec les cuffless vs méthode traditionnelle: pas du tout les mêmes
- Rôle complémentaire et non compétitif dans l'évaluation de l'hypertension
- Information obtenue peut être similaire mais aussi différente: apporte ainsi d'avantage d'information sur le profil tensionnel et le comportement du patient
- Remboursement ? Appareils standards par remboursés par assurance de base…

20ème Journée Romande d'Hypertension

Jeudi, 30 octobre 2025
à partir de **12h30**

CHUV
Hôpital des enfants

Auditoire ROUX – a confirmer

Rue du Bugnon 50
1011 Lausanne

Une formation de la SHG SSI SSH
www.swisshypertension.ch

Une formation de la
Hypertension Research Foundation

THEMATIQUE: Les oubliés de l'hypertension

Organisation: Prof Grégoire Wuerzner (CHUV), Prof Georg Ehret (HUG), Prof Belén Ponte (HUG)

12h30-13h30 Apéritif de bienvenue

13h30-13h40 Introduction Prof G. Wuerzner

Partie 1: Chair Prof Georg Ehret

13h40-14h10 Conférence – «Utilisation intelligente des diurétiques en hypertension»
Prof Théodora Angoulvant, CHRU de Tours

14h10-14h20 Cas pratique
(le cas qui a changé ma pratique)
Prof Bernard Waeber, UNIL

14h20-14h50 Conférence – «Prise en charge de l'hypertension chez un patient d'origine africaine»
Prof Faiçal Jarraya, Université de Sfax

14h50-15h00 Cas clinique
(le cas qui a changé ma pratique)
Prof Antoinette Pechère, UNIGE

15h00-15h20 Quizz interactif sur la mesure ambulatoire de la pression artérielle
Intervenants multiples

15h20-15h50 Pause

Formation continue essentielle. 3,5 crédits SSN, 3,5 crédits SSC

Partie 2: Chair Prof Belen Ponte

15h50-16h10 Défis cliniques en ville:
- Dr Bullani, EHC, Morges
- Dre Zizimopoulou, cabinet médical, Genève

16h10-16h40 Les artères, l'organe oublié de l'hypertension artérielle
Prof Lucia Mazzolai, CHUV

16h40-16h50 Cas pratique
(le cas qui a changé ma pratique)
Prof Michel Burnier, UNIL

16h50-17h20 Les nouvelles 2025 en HTA
Prof Belén Ponte, Prof Georg Ehret, Prof Grégoire Wuerzner

17h20-17h30 Synthèse de la journée

17h30 Clôture

INSCRIPTION SUR PLACE / EN LIGNE

Merci d'envoyer votre inscription par e-mail: neh.secretariat@chuv.ch

Prénom:

Nom:

Adresse e-mail:

sur place ☐ en ligne ☐

Office BP (mmHg)	24-h BP (mmHg)	Home BP (mmHg)	2023 ESH guideline	2024 ESC guideline
Systolic				
<120	<115	<120	Optimal	Non-elevated
120–129	115–129	120–134	Normal	Elevated
130–139			High-normal	
140–159	≥130	≥135	Hypertension grade 1	Hypertension
160–179			Hypertension grade 2	
≥180			Hypertension grade 3	
+				
Diastolic				
<70	<65	<70	Optimal	Non-elevated
70–79	65–79	70–84	Normal	Elevated
80–84			High-normal	
85–89			Hypertension grade 1	
90–99	≥80	≥85	Hypertension grade 2	Hypertension
100–109			Hypertension grade 3	
≥110				
+				