

Spital Thurgau

13. Thurgauer Symposium Innere Medizin

Grundversorgung und Spitalmedizin Unterschiede und Gemeinsamkeiten

Blutdruckeinstellung – wer, wann und wie?



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71-jährige Patientin

- Hospitalisiert wegen Erysipel bei chronisch venöser Insuffizienz
- Bekannte arterielle Hypertonie unter Lisinopril 20mg täglich

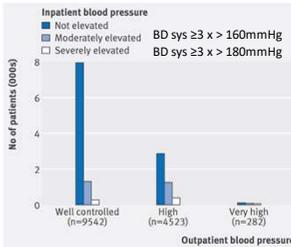
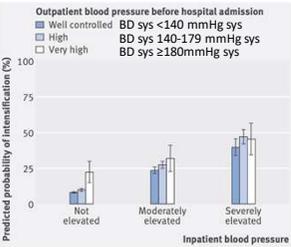
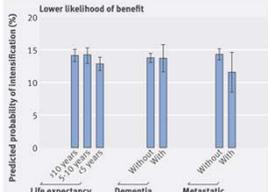
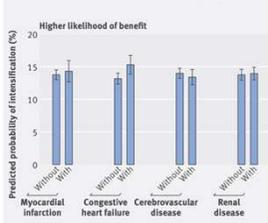
BD	174/76	173/79	185/75	171/77	164/73	X	169/72	184/79			
	150/73		171/77					145/70			
P	74	78	71	X	74	81	74	X	72	72	64
T	37.2		37.4				37.2				36.6

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Steigerung der Antihypertensiva während Hospitalisation

Multizentrische retrospektive Studie, USA
Alter >65
Hospitalisation mit nicht-kardialer Ursache

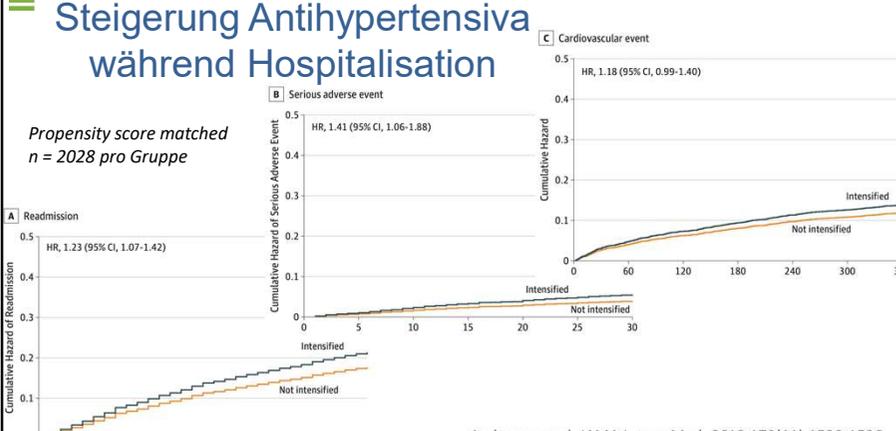
Anderson et al. BMJ 2018;362:k3503

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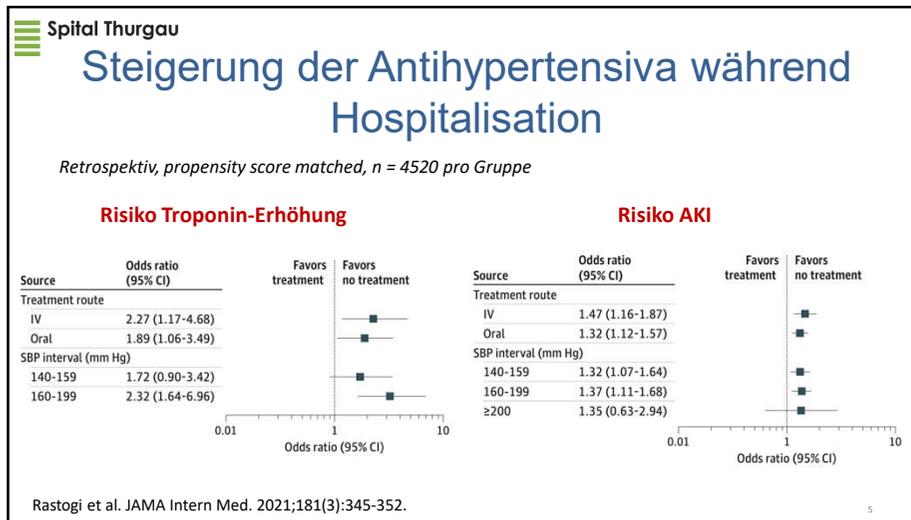
Steigerung Antihypertensiva während Hospitalisation

Propensity score matched
n = 2028 pro Gruppe



Anderson et al. JAMA Intern Med. 2019;179(11):1528-1536

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Hypertonie im stationären Spitalsetting

- Kaum wissenschaftlich untersucht; Signifikanz unklar
- Vielfältige Ursachen:
 - Zu Grunde liegende arterielle Hypertonie
 - „reaktiv“: Schmerz, Volumenüberladung, etc.
- In der Regel prognostisch wenig relevant
- Blutdruck wird im Spital eigentlich nie entsprechend den üblichen Qualitätsstandards gemessen

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Take home messages – Teil 1

- **Blutdruckeinstellung gehört ins ambulante Setting**
- **Anpassung Antihypertensiva im Spital nur wenn der Blutdruck teil des Hauptproblems ist oder bei massiv erhöhtem BD**

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62-jähriger Patient, „Checkup“

- BD 153 / 87 mmHg in der Praxis
- Selbstmessungen:

Datum	Uhrzeit	Oberer Wert	Unterer Wert	Puls	Bemerkungen
25.2.	7:40	140	82	70	
	17:50	137	76	68	
26.2.	7:20	136	83	69	
	18:40	135	88	72	
27.2.	7:35	138	83	70	
	18:30	137	84	71	
28.2.	15:50	133	83	73	
1.3.	7:25	137	86	63	
	18:10	140	88	72	
2.3.	8:10	131	84	68	
3.3.	9:20	137	88	63	

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Wie definieren Sie „arterielle Hypertonie“?

- a) BD >140 systolisch u/o >90 mmHg diastolisch
- b) BD >135 systolisch u/o >85 mmHg diastolisch
- c) BD >130 systolisch u/o >80 mmHg diastolisch
- d) BD >130 systolisch u/o >80 mmHg diastolisch *und* Endorganschaden

«es kommt draufan»

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VOL. 71, NO. 19, 2018

CLINICAL PRACTICE GUIDELINE

2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

ESC European Society of Cardiology
European Heart Journal (2018) 39, 3021–3104
doi:10.1093/eurheartj/ehy379

ESC/ESH GUIDELINES

2018 ESC/ESH Guidelines for the management of arterial hypertension

The Task Force for the management of arterial hypertension of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH)

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TABLE 6 Categories of BP in Adults*

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

Table 3 Classification of office blood pressure^a and definitions of hypertension grade^b

Category	Systolic (mmHg)		Diastolic (mmHg)
Optimal	<120	and	<80
Normal	120–129	and/or	80–84
High normal	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	160–179	and/or	100–109
Grade 3 hypertension	≥180	and/or	≥110
Isolated systolic hypertension ^b	≥140	and	<90

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Clinical Practice Guidelines

2020 International Society of Hypertension Global Hypertension Practice Guidelines

Table 1. Classification of Hypertension Based on Office Blood Pressure (BP) Measurement

Category	Systolic (mm Hg)		Diastolic (mm Hg)
Normal BP	<130	and	<85
High-normal BP	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	≥160	and/or	≥100

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Definition der arteriellen Hypertonie

ESC
European Society
of Cardiology

European Heart Journal (2018) 39, 3021–3104
doi:10.1093/eurheartj/ehy339

ESC/ESH GUIDELINES

2018 ESC/ESH Guidelines for the management of arterial hypertension

'hypertension' is defined as the level of BP at which the benefits of treatment (either with lifestyle interventions or drugs) unequivocally outweigh the risks of treatment, as documented by clinical trials.

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Was ist der „Blutdruck“?

Der Blutdruck ist keine konstante Grösse und variiert erheblich

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Was ist der „Blutdruck“?

Oszillometrisch vs. invasiv gemessener Blutdruck:

SAP difference (IP – OBP)

Mean difference: 10.8
95% limits of agreement: –18.5; 40.1

systolisch

Ribezzo et al. Sci World J. 2014;2014:353628

Der Blutdruck wird fast immer indirekt gemessen -> Messungengenauigkeit

DAP difference (IP – OBP)

Mean difference: –3.6
95% limits of agreement: –15.4; 8.2

diastolisch

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Blutdruckmessung: Technik

TABLE 8 Checklist for Accurate Measurement of BP (S4.1-3,S4.1-4)

Key Steps for Proper BP Measurements	Specific Instructions
Step 1: Properly prepare the patient	<ol style="list-style-type: none"> 1. Have the patient relax, sitting in a chair (feet on floor, back supported) for >5 min. 2. The patient should avoid caffeine, exercise, and smoking for at least 30 min before measurement. 3. Ensure patient has emptied his/her bladder. 4. Neither the patient nor the observer should talk during the rest period or during the measurement. 5. Remove all clothing covering the location of cuff placement. 6. Measurements made while the patient is sitting or lying on an examining table do not fulfill these criteria.
Step 2: Use proper technique for BP measurements	<ol style="list-style-type: none"> 1. Use a BP measurement device that has been validated, and ensure that the device is calibrated periodically.* 2. Support the patient's arm (e.g., resting on a desk). 3. Position the middle of the cuff on the patient's upper arm at the level of the right atrium (the midpoint of the sternum). 4. Use the correct cuff size, such that the bladder encircles 80% of the arm, and note if a larger- or smaller-than-normal cuff size is used (Table 9). 5. Either the stethoscope diaphragm or bell may be used for auscultatory readings (S4.1-5,S4.1-6).
Step 3: Take the proper measurements needed for diagnosis and treatment of elevated BP/hypertension	<ol style="list-style-type: none"> 1. At the first visit, record BP in both arms. Use the arm that gives the higher reading for subsequent readings. 2. Separate repeated measurements by 1-2 min. 3. For auscultatory determinations, use a palpated estimate of radial pulse obliteration pressure to estimate SBP. Inflate the cuff 20-30 mm Hg above this level for an auscultatory determination of the BP level. 4. For auscultatory readings, deflate the cuff pressure 2 mm Hg per second, and listen for Korotkoff sounds.
Step 4: Properly document accurate BP readings	<ol style="list-style-type: none"> 1. Record SBP and DBP. If using the auscultatory technique, record SBP and DBP as onset of the first Korotkoff sound and disappearance of all Korotkoff sounds, respectively, using the nearest even number. 2. Note the time of most recent BP medication taken before measurements.
Step 5: Average the readings	Use an average of ≥ 2 readings obtained on ≥ 2 occasions to estimate the individual's level of BP.
Step 6: Provide BP readings to patient	Provide patients the SBP/DBP readings both verbally and in writing.

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The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Randomized Trial of Intensive versus Standard Blood-Pressure Control

The SPRINT Research Group*

N Engl J Med 2015;373:2103-16.

ABSTRACT

automated office blood pressure measurement
AOBP

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„automated office blood pressure measurement“

Roerecke, JAMA Intern Med, 2019;179(3):351-362

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„automated office blood pressure measurement“

Comparison of BP Measurements	No. of Samples	Mean Difference (95% CI), mm Hg	Conclusion
Main Analyses			
AOBP vs awake ABP measurement	19	-0.3 (-1.1 to 1.7)	AOBP = ABP
AOBP vs research BP measurement	9	7.0 (4.9 to 9.1)	AOBP < research BP
AOBP vs routine office BP measurement	9	14.5 (11.8 to 17.2)	AOBP < routine office BP

Roerecke, JAMA Intern Med, 2019;179(3):351-362

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Routine office vs. AOBP

Measurement	Odds Ratio	P	χ ²
ABPM day SBP	1.34	0.005	8.5
Research SBP	1.31	0.001	11.5
Routine SBP	1.14	0.07	3.5

Agarwal, J Am Heart Assoc 2017;6(2):e004536

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Heim-Blutdruckmessung

Heim-Blutdruckwerte (Selbstmessung / 24h-BD) korrelieren besser mit Endorganschaden als Praxiswerte

		Not receiving antihypertensive medication		Receiving antihypertensive medication	
Hypertension based on standardized office BP	Yes	White coat hypertension	Sustained hypertension	White coat effect	Sustained uncontrolled hypertension
	No	Normotension	Masked hypertension	Sustained controlled hypertension	Masked uncontrolled hypertension
		No	Yes	No	Yes
		Hypertension based on out-of-office BP		Hypertension based on out-of-office BP	

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BD-Selbstmessung: Technik

- Oberarm-Gerät, kalibriert
- 5 min Sitzen, mit Rückenlehne, Arm aufgestützt, 30 min kein Kaffee / Nikotin
- Während 5-7 Tagen vor Konsultation 2 Messungen (Abstand 1-2 Minuten) morgens und 2 Messungen abends
→ Durchschnitt aller Messungen ausser Tag 1
- Ev. zusätzlich 2 Messungen / Woche zwischen Konsultationen

ESH-Guidelines HBP measurement (Parati, J Hypertens 2008,26:1505)

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Indikationen 24h-Blutdruckmessung

- Diagnose einer arteriellen Hypertonie in „Grenzfällen“
- Starke Divergenz zwischen Praxis- und Selbstmessungen
- Unfähigkeit für zuverlässige Selbstmessung (kognitiv, motorisch...)
- Starke BD-Variabilität
- Evaluation von nächtlichem Dipping

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Grenzwerte je nach Messmethode

Table 9 Definitions of hypertension according to office, ambulatory, and home blood pressure levels

Category	SBP (mmHg)		DBP (mmHg)
Office BP ^a	≥140	and/or	≥90
Ambulatory BP			
Daytime (or awake) mean	≥135	and/or	≥85
Night-time (or asleep) mean	≥120	and/or	≥70
24 h mean	≥130	and/or	≥80
Home BP mean	≥135	and/or	≥85

©ESC/ESH 2018

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Take home messages – Teil 2

- Bitte kein Blindflug! Messen Sie den Blutdruck korrekt – Sie basieren darauf wichtige Therapieentscheide!
 - Standardisiert in der Praxis
 - Ergänzt durch (gut instruierte) Heimmessungen +/- 24h-BD

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Therapie der arteriellen Hypertonie

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BD-Zielwerte

Table 23 Office blood pressure treatment target range

Age group	Office SBP treatment target ranges (mmHg)					Office DBP treatment target range (mmHg)
	Hypertension	+ Diabetes	+ CKD	+ CAD	+ Stroke/TIA	
18-65 years	Target to 130 or lower if tolerated. Not <120	Target to 130 or lower if tolerated. Not <120	Target to <140 to 130 if tolerated	Target to 130 or lower if tolerated. Not <120	Target to 130 or lower if tolerated. Not <120	70-79
65-79 years ^a	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	70-79
≥80 years ^b	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	Target to 130-139 if tolerated	70-79
Office DBP treatment target range (mmHg)	70-79	70-79	70-79	70-79	70-79	

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BD-Zielwerte

KDIGO 2021 Clinical Practice Guideline for the Management of Blood Pressure in Chronic Kidney Disease



VOLUME 99 | ISSUE 3S | MARCH 2021
www.kidney-international.org

3.1. Blood pressure targets

Recommendation 3.1.1: We suggest that adults with high BP and CKD be treated with a target systolic blood pressure (SBP) of <120 mm Hg, when tolerated, using standardized office BP measurement (2B).

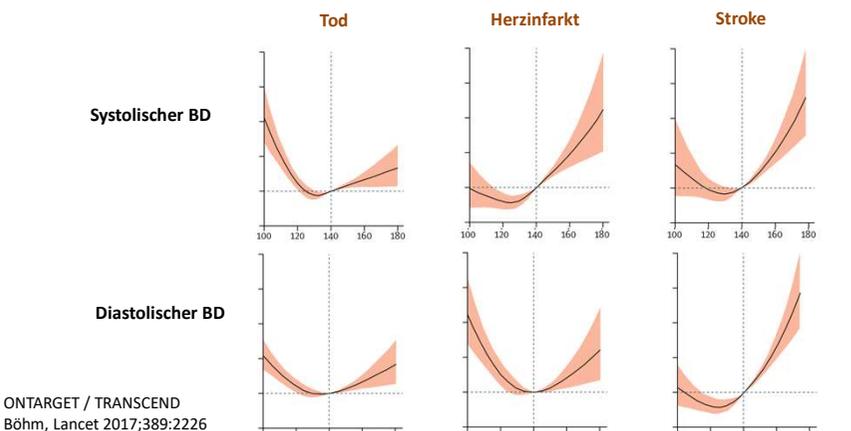
Practice Point 3.1.1: It is potentially hazardous to apply the recommended SBP target of <120 mm Hg to BP measurements obtained in a non-standardized manner.

Practice Point 3.1.2: Clinicians can reasonably offer less intensive BP-lowering therapy in patients with very limited life expectancy or symptomatic postural hypotension.

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Zu tiefer Blutdruck



Systolischer BD

Diastolischer BD

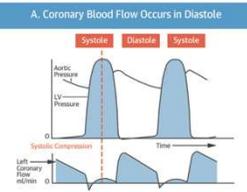
ONTARGET / TRANSCEND
Böhm, Lancet 2017;389:2226

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Zu tiefer diastolischer Blutdruck

A. Coronary Blood Flow Occurs in Diastole



B. Diastolic BP Drives Coronary Perfusion Gradient

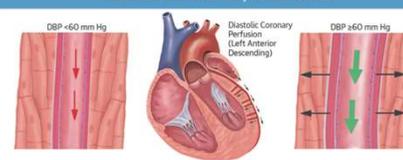
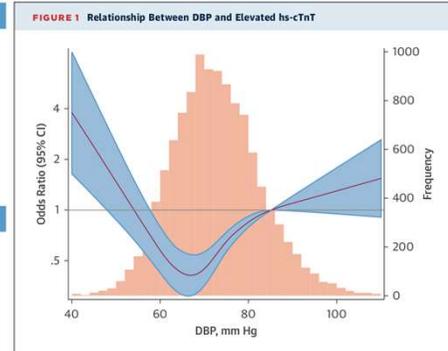


FIGURE 1 Relationship Between DBP and Elevated hs-cTnT



McEvoy, J Am Coll Cardiol 2016;68:1713-22

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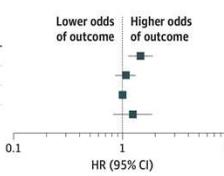
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Tiefer DBP in SPRINT und ACCORD-BP

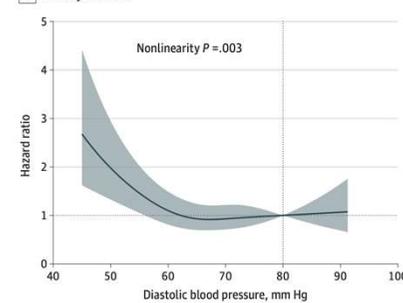
A Primary outcome

Mean DBP, mm Hg *	HR (95% CI)
<60	1.46 (1.13-1.90)
60 to <70	1.07 (0.86-1.32)
70 to <80	1 [Reference]
≥80	1.24 (0.82-1.86)

* unter Therapie



A Primary outcome



Nonlinearity P = .003

Liu et al. JAMA Network Open. 2021;4(2):e2037554

*In der Subgruppe der Patient*innen mit baseline DBP <60mmHg zeigte die intensive BD-Kontrolle (BD sys <120mmHg) einen nicht-signifikanten Trend zu erhöhtem Risiko für kardiovaskuläre und Gesamt mortalität*

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Take home messages – Teil 3

- Auch für die BD-Zielwerte ist eine verlässliche Messung essenziell!
- Pflicht: Praxiswert <140/90 mmHg bei allen!
- Kür: tiefere Zielwerte, wenn korrekte Messung sichergestellt und toleriert und DBP nicht zu tief

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Hypertonie-Behandlung bei tiefem CV-Risiko

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Hypertonie-Behandlung bei tiefem CV-Risiko

Retrospektiv
Propensity score matched
BD 140-159/90-99 mmHg (ESC Grad 1)

Low risk = Ausschluss von:

- CVD
- LVH
- VHFli
- DM
- CKD
- pos FA

No. at risk	19143	10731	3717	218
Not treated	19143	10695	3788	206
Treated				

No. at risk	19143	10057	3581	262
Not treated	19143	10448	3621	190
Treated				

No. at risk	19143	10598	3629	201
Not treated	19143	10590	3726	196
Treated				

No. at risk	19143	10692	3655	199
Not treated	19143	10601	3723	202
Treated				

Sheppard, JAMA Intern Med 2018;178(12):1626-1634

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Hypertonie-Behandlung bei tiefem CV-Risiko

No. at risk	19143	10697	3592	207
Not treated	19143	10594	3697	199
Treated				

No. at risk	19143	10548	3564	219
Not treated	19143	10436	3605	198
Treated				

Sheppard, JAMA Intern Med 2018;178(12):1626-1634

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Hypertension disease staging	Other risk factors, HMOD, or disease	BP (mmHg) grading			
		High normal SBP 130-139 DBP 85-89	Grade 1 SBP 140-159 DBP 90-99	Grade 2 SBP 160-179 DBP 100-109	Grade 3 SBP \geq 180 or DBP \geq 110
Stage 1 (uncomplicated)	No other risk factors	Low risk	Low risk	Moderate risk	High risk
	1 or 2 risk factors	Low risk	Moderate risk	Moderate to high risk	High risk
	\geq 3 risk factors	Low to Moderate risk	Moderate to high risk	High Risk	High risk
Stage 2 (asymptomatic disease)	HMOD, CKD grade 3, or diabetes mellitus without organ damage	Moderate to high risk	High risk	High risk	High to very high risk
Stage 3 (established disease)	Established CVD, CKD grade \geq 4, or diabetes mellitus with organ damage	Very high risk	Very high risk	Very high risk	Very high risk

©ESC/EISH 2018

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Take home messages – Teil 4

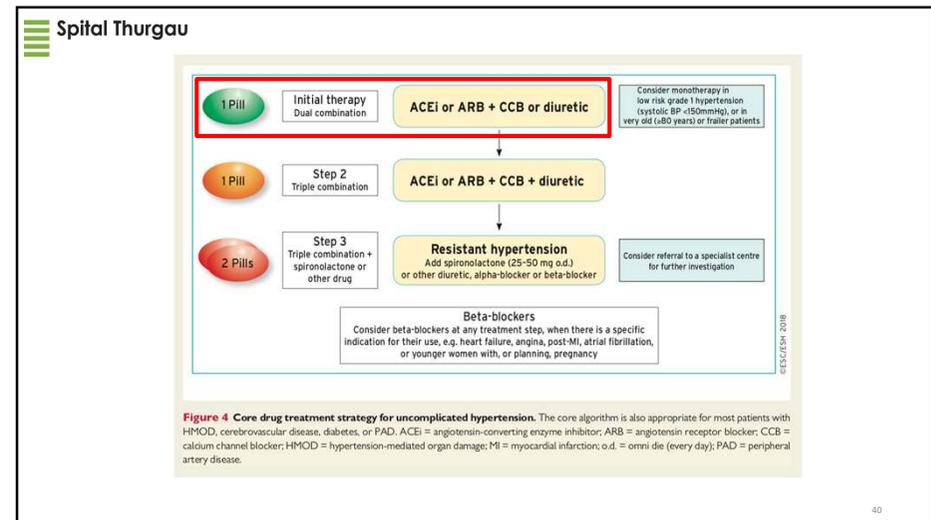
- Behandeln Sie nicht einfach den Blutdruck, sondern das kardiovaskuläre Gesamt-Risikoprofil (und noch besser natürlich den Patienten / die Patientin...)

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Pharmakotherapie der arteriellen Hypertonie

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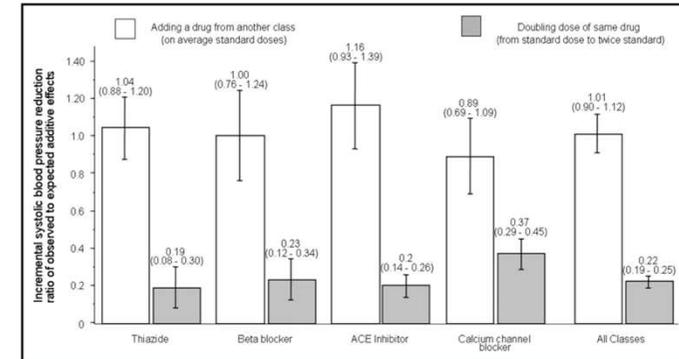
Beginn mit Kombinationspräparat

- BD-Kontrolle mit einem Präparat selten zu erreichen
- Kombination zweier Präparate in tiefer Dosis oft potenter als ein hochdosiertes Präparat, somit weniger Nebenwirkungen
- Nebenwirkungen heben sich teils gegenseitig auf (z.B. Hypo-/Hyperkaliämie)
- Einfachere Umsetzung
- Kombi in 1 Tbl: Adherence

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Beginn mit Kombinationspräparat



Wald, Am J Med 2009;122:290-300

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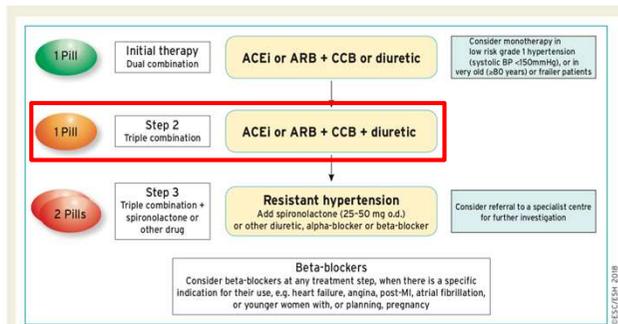


Figure 4 Core drug treatment strategy for uncomplicated hypertension. The core algorithm is also appropriate for most patients with HMOD, cerebrovascular disease, diabetes, or PAD. ACEi = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; CCB = calcium channel blocker; HMOD = hypertension-mediated organ damage; MI = myocardial infarction; o.d. = omni die (every day); PAD = peripheral artery disease.

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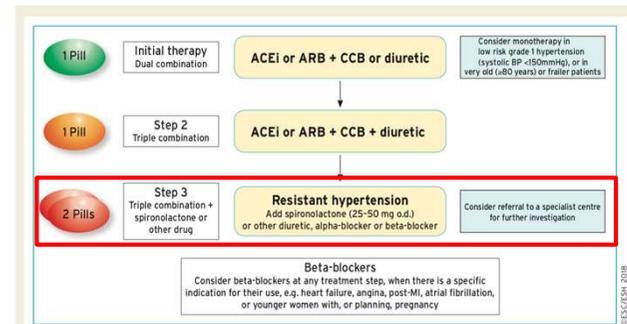
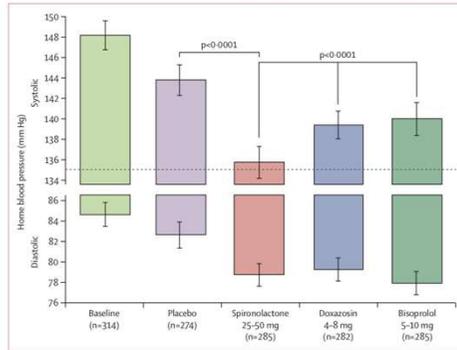


Figure 4 Core drug treatment strategy for uncomplicated hypertension. The core algorithm is also appropriate for most patients with HMOD, cerebrovascular disease, diabetes, or PAD. ACEi = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; CCB = calcium channel blocker; HMOD = hypertension-mediated organ damage; MI = myocardial infarction; o.d. = omni die (every day); PAD = peripheral artery disease.

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Therapieresistente Hypertonie



PATHWAY-2: Williams et al. Lancet 2015;386:2059

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Take home messages – Teil 5

- **Mit Kombinationstherapie starten:**
 - ACEI / ARB + CCB / Thiazid
- **Keep it simple! So wenige Tabletten wie möglich**
 - Kombinationspräparate!

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