Hypertension targets in the elderly

Sarah McCracken
Consultant Geriatrician
North Bristol NHS Trust
September 2016
• NICE (2011)
  • Aim for a target clinic blood pressure below 150/90 mmHg in people aged 80 years and over [new 2011]
  • (<140/80 if diabetic)

• QOF
  • % of patients with hypertension (of any age) whose last recorded BP is < 150/90
  • (and <140/80 if diabetic)
Examples

1. 82 year old woman, no other co-morbidity, globe-trotting, golf-playing
   • Target <150/90

2. 84 year old man, COPD / diabetes / TIA / mild cognitive impairment, mobile short distances with a stick
   • Target < 140/80

3. 89 year old woman, living alone with qds carers, mobile with ZF, recurrent falls, undiagnosed cognitive impairment
   • Target <150/90
BP falls with frailty
Rockwood (2011)
Does high BP harm older people as much as younger people?
High BP is associated with..

- RR 2.0 for cardiac failure
- Hypertension said to account for more than half of CCF in the elderly
  - Strongest contributor to CCF risk in the elderly
High BP is associated with..

- Doubled risk of CKD across all ages
- In most age groups blood pressure control slows rate of renal decline
  - Tight BP control important to prevent progression to ESRF
- As people age, life expectancy falls and contribution of BP to renal outcomes also falls
  - Old people (>85) with established CKD are more likely to die than develop ESRF

O’Hare (2007)
High BP is associated with:

- Doubling of stroke risk for every increase of 20/10 mmHg over 115/75 mmHg
- In young people BP the main risk factor for stroke:
  - Steep slope of stroke risk vs BP
- In older people age is the main risk factor:
  - Slope is less steep
  - Individual risk higher
  - Small increases in BP associated with significant extra risk
  - Most strokes occur in older people with high normal BPs

Lewington 2002
High BP is associated with...

**SBP vs stroke mortality risk relationship**

- No apparent threshold
- Stroke mortality risk doubles for every 20/10 mm Hg increase above 115/75
- 20 mm Hg increase associated with a 10-fold larger annual absolute stroke risk in 80s vs. 50s.

AGS 2016 Symposium

Lewington Lancet 2002
High BP is associated with..

- RR 1.5 for dementia (overall)
- Higher risk for mid-life hypertension
  - Dementia the end result of often decades of damage
- Complicated relationship in elderly
  - Late-life hypertension overall lower risk, but
  - Hypertension associated with stroke, and post-stroke dementia quite common
  - Low BPs also risk cognitive decline in frailty
  - ‘U-shaped curve’

Kennelly, 2009
Brett, 2015
Ogliari, 2015
Summary: is hypertension harmful in the elderly?

- In the elderly high BP is associated with higher risks of
  - Stroke
  - CKD
  - Dementia (probably)
  - CCF (certainly)

- But contribution of BP is lower

- Age itself a stronger risk factor for all but CCF
Evidence base for guidelines
1. HYVET (2008)
1. HYVET (2008)

- **Indapamide ± perindopril**

- 3845 people, average age 84 (73% 80-84 years, 5% 90+)
  - Exclusions: CCF, dementia, creat >150
  - “healthier than gen pop”: lower rate of strokes etc

- Baseline average SBP 173
  - Intervention group average reduction of 15 mm Hg more
    - **mean SBP \approx 140**
1. HYVET (2008)

- Stroke risk 30% lower in treatment group
- MIs 34% lower in treatment group
1. HYVET (2008)

64% reduction in heart failure
1. HYVET (2008)

21% reduction in all cause mortality
1. HYVET (2008)

- Positive outcomes across the board
- But note study population:
  - 3845 people, average age 84 (73% 80-84 years, 5% 90+)
    - Exclusions: CCF, dementia, creat >150
    - “healthier than gen pop”: lower rate of strokes etc
- Baseline average SBP 173
  - Intervention group average reduction of 15 mm Hg more
    - mean SBP ≈ 140
1. HYVET (2008)

- Positive outcomes across the board
- But note study population: **Fit, young elderly**
- 3845 people, average age 84 (73% 80-84 years, 5% 90+)
  - Exclusions: CCF, dementia, creat >150
  - “healthier than gen pop”: lower rate of strokes etc
- Baseline average SBP 173
  - Intervention group average reduction of 15 mm Hg more
    - mean SBP ≈140
    - High starting BP, modest reduction
2. INVEST subgroup (2010)
2. INVEST subgroup (2010): Death/MI/CVA vs BP in people with coronary artery disease

Denardo (2010)
3. ACCORD (2010)

- Intensive BP control in type 2 diabetes (SBP <120) vs standard therapy (<140)

- Reduction in stroke - RR 0.6 - but event rate low: need to treat 89 people for 5 years to reduce 1 stroke

- No effect on mortality

- Serious adverse side effects of treatment in 3.3% intensive vs 1.3% standard treatment

- Under 80s only
Summary: evidence for current guidelines

- All studies are of fit, young elderly. In these:

- High BP associated with higher stroke / CKD / dementia / CCF risk in elderly

- HYVET trial suggests lowering SBP to target 140 is safe and effective in a fit, younger subset of elderly
  - INVEST subgroup suggests optimal SBP in >80s with coronary artery disease is 140 too

- Evidence for aggressive targets in diabetics (ACCORD trial) to reduce stroke risk did not include > 80s
How low should we go?
Stroke risk vs BP

SBP vs stroke mortality risk relationship

- No apparent threshold
- Stroke mortality risk doubles for every 20/10 mm Hg increase above 115/75
- 20 mm Hg increase associated with a 10-fold larger annual absolute stroke risk in 80s vs. 50s.

AGS 2016 Symposium
Lewington Lancet 2002
SPRINT senior (2016)
SPRINT senior (2016)

- 2636 patients > 75 years, average 79 years
- Target SBP <120; **achieved 123mmHg**
  - but different method so clinic BPs likely higher than this
- Excluded:
  - DM/stroke/eGFR<20/dementia/CCF/standing SBP<110
  - Non-ambulatory or living in care home
- Attempt made to address frailty issue:
  - calculated frailty index, gait speed, collected falls data
3. SPRINT senior (2016)

Conclusions

- The SPRINT-Senior cohort is representative of community dwelling older adults
- Rates of hypotension, syncope, electrolyte abnormalities, kidney injury were higher in the intensive arm, but not rates of injurious falls or orthostatic hypotension
- Overall, benefits of more intensive BP lowering – 33% reduction in primary CV outcome and 32% reduction in total mortality – exceeded the potential for harm, even among the most frail older patients
SPRINT senior (2016)

- 27 treated for 3.14 years to prevent composite end point (vascular event / decompensated CCF / death)
- 41 treated for 3.14 years to prevent a death (RR 0.66)
- No increase in orthostatic hypotension (20%) / syncope / falls
- Small increase in electrolyte abnormalities, AKI
3. SPRINT senior (2016)

Conditions of Interest for Participants > 75 Years

- Hypotension
- Sycopa
- Bradycardia
- Electrolyte Abnormality
- Injurious Fall
- AKI/ARF

% of Participants Experiencing at Least One Condition of Interest
SPRINT senior (2016)

- Reductions in stroke risk and mortality in >75s
- But:
  - Relatively small numbers with overlap in outcomes
  - Despite claims, not very frail (average FI 0.18; frail if > 0.21)
  - Starting SBP low (143)
    - Unlikely to be able to treat to target 120 from eg. 170 without adverse effects
  - BP measurements were different to real life
  - Postural BP measurements different to real life
  - Mostly under 80s, with major exclusions
In the fittest (young) elderly without coronary artery disease, lowering SBP slowly to < 120 is likely to lower stroke risk and possibly mortality.

0% had adverse effects of treatment, however.
What do you think the targets should be?
Examples

1. 82 year old woman, no other co-morbidity, globe-trotting, golf-playing
   • Target <150/90

2. 84 year old man, COPD / diabetes / TIA / mild cognitive impairment, mobile short distances with a stick
   • Target < 140/80

3. 89 year old woman, living alone with qds carers, mobile with ZF, recurrent falls, undiagnosed cognitive impairment
   • Target <150/90
Examples

1. 82 year old woman, no other co-morbidity, globe-trotting, golf-playing
   • Target <150/90

2. 84 year old man, COPD / diabetes / TIA / mild cognitive impairment, mobile short distances with a stick
   • Target < 140/80

3. 89 year old woman, living alone with qds carers, mobile with ZF, recurrent falls, undiagnosed cognitive impairment
   • Target <150/90
Is there evidence in less selected elderly people?
BP and mortality

- In > 80s, SBP > 139 and DBP > 89 associated with lower 5 year mortality
- In > 80s, no relationship between mortality and uncontrolled hypertension

Oates 2007
Postural hypotension predicts death in ambulatory older men

- Postural hypotension predicts increased risk of death (RR 1.64) during 4 year follow up in older men
  - Despite adjusting for BMI, smoking, activity, medications etc
- Increased drop associated with increased risk

Masaki, 1998
Diastolic hypotension predicts death in over 85s

- 835 people followed for 5-7 years
  - DBP < 65mmHg 88% died
  - DBP > 100mmHg 59% died

Boshuizen, 1998
INVEST subgroup: Death/MI/CVA vs BP in people with coronary artery disease

Denardo (2010)
BP, mortality and gait speed

- 2340 people >65 years, followed 6 years
- In fast walkers
  - higher SBP = more likely to die (RR 1.35)
- In slower walkers
  - no relationship BP and mortality
- In those who couldn’t walk 6m
  - elevated SBP > 140 associated with lower risk of death (RR 0.38)

Odden, 2012
J shaped curve BP and stroke

- Stroke risk increased in orthostatic hypotension
  - RR 2.0

  Eigenbrodt, 2000

- In untreated hypertensives, linear association increasing BP and stroke risk

- In treated hypertensives, J shaped relationship
  - Low BPs also associated with stroke

  Voko, 1999
Hypotension and cognitive decline

- Hypotension and postural hypotension associated with dementia and risk of developing dementia
  - Kennelly, 2009
  - Brett, 2015
  - Ogliari, 2015

- Small white matter lesions associated with low systolic and diastolic BPs

- In those with treated hypertension, risk of dementia decreases with increasing BP
  - I.e. over-treated hypertension associated with dementia

Ruitenberg 2001
Diastolic BP and stroke

- For those with ADL limitation
  - high DBP protective against stroke
    - RR 0.65 for DBP 66-80
    - RR 0.49 for DBP > 80

- For those with ADL limitation
  - lowest mortality with DBP 66-80 (RR 0.72)

Peralta 2014
Anecdotally

- Complications of anti-hypertensives prevalent in hospital, where elderly patients more likely to be hypo than hypertensive
  - Falls, fractures
    - Low BP or postural hypotension
  - AKI
    - Often precipitated by sepsis / bleeding
      - Sepsis and bleeding seem to be poorly tolerated in frail elderly on anti-hypertensives
  - Electrolyte disturbance
In less selected elderly populations, hypotension and especially over-treated hypertension are associated with poor outcomes:

- Dementia
- Stroke
- Mortality in those dependent for ADLs / unable to walk 6m

Gait speed helps to decide on aggressiveness of BP treatment
- Aggressive treatment beneficial in fast elderly walkers
Examples

1. 82 year old woman, no other co-morbidity, globe-trotting, golf-playing
   • Target?

2. 84 year old man, COPD / diabetes / TIA / mild cognitive impairment, mobile short distances with a stick
   • Target?

3. 89 year old woman, living alone with qds carers, mobile with ZF, recurrent falls, undiagnosed cognitive impairment
   • Target?
Bottom line

- Over 80s too heterogeneous for blanket BP recommendations
  - Large BP trials favour the fit and relatively young

- In fittest, NICE targets may not be aggressive enough
  - Though development of postural hypotension with aggressive treatment likely to be harmful
  - Gait speed helps to identify fittest

- In frailest, hypotension likely to be more harmful than hypertension
  - And beware the underlying (falling) BP trajectory