

Pitfalls in Basic Assessments



Kathleen Schrank, MD, FACEP, FACP
City of Miami Fire Rescue
University of Miami



Treatment & Transport Decisions Depend on EMS Assessment

& EMS Assessment depends on accurate:

- **History from available sources (patient, others, scene)**
- **Airway and breath sounds**
- **Accurate vital signs**
- **Rest of exam**
- **LOTS of machine stuff (O2 sat, glucose, ETCO2, rhythm, NIBP, 12 leads)**

And then PUTTING IT ALL TOGETHER (critical thinking)

We' ll focus on problems with:

- Pulse
- Blood pressure
- Man vs. machine
- What do the #s mean for THIS patient?



Why might things go wrong?

- **Adverse conditions**
 - Chaos, unsafe scene, moving truck, noise, uncooperative patient, hysterical family
- **Equipment**
- **Basic skills: Taught as EMT, rarely if ever again, usually not controlled**
- **Limited experience with little ones**
- **Shortcuts & endogenous adrenalin**

Pulse check

- **Touch the patient**
 - *It's OK, really it is!*
- **Rate, regularity, shocky?**
- **Also quick check of skin and cap refill**
- **Maybe pulsus alternans, p. paradoxus**
- **Confusion: AFib “pulse varying 130-180”**
 - **Man: Count radial & apical heart rates**
 - **Machine: Count 6 second strip x 10**



Pulse pitfalls

- Not checking it
 - especially with sudden change in patient!
- Occlusion by pushing too hard
- Feeling your own pulse
- Infants – which artery?
- Tachyarrhythmias with radial pulse deficits
- Wrong interpretation (“anxiety reaction”)



Persistent tachycardia



- **S Tach > 120 on 2 readings at least 5 min apart**
- **Patient is NOT simply anxiety reaction, or “hyperventilation syndrome”
(That’s why it’s in Trauma Center Criteria)**
- **Think hidden causes & Dx’s that EMS cannot make in the field**

Man vs Machine: Heart Rate



Do not zap without checking a pulse first!!

AHA statement 2005



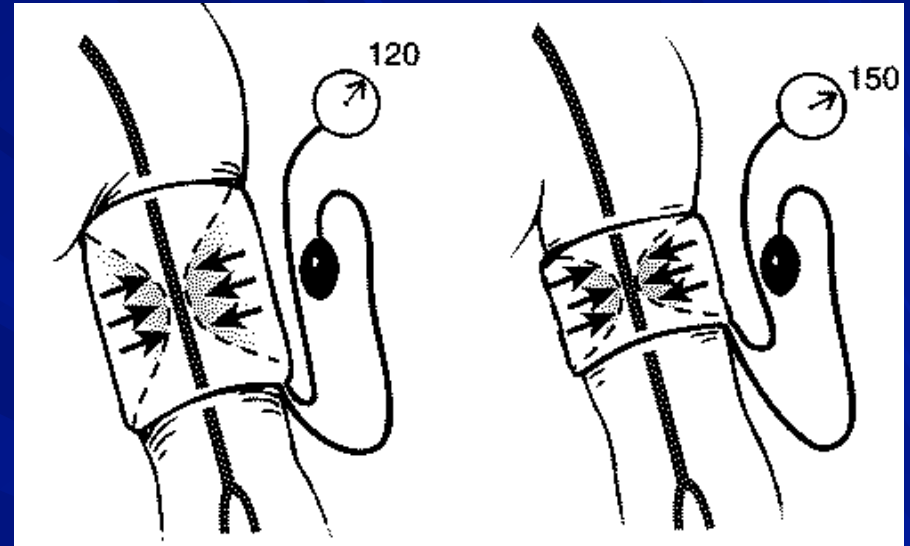
“Blood pressure determination continues to be one of the most important measurements in all of clinical medicine and is still one of the most inaccurately performed.”

Pickering, et al, Hypertension 2005

AHA BP Measurement Technique

1. Patient calm, seated in chair, legs uncrossed, feet on floor, not talking
2. Arm exposed, supported, middle of cuff at level of RA (mid-sternum)
3. If supine, then arm on a pillow (& nl SBP is 8 mmHg higher)
4. Correct size cuff
5. Palpate brachial artery
6. Center of bladder over BA
7. Palpate RA or BA, and inflate until pulse gone
8. Deflate for 15-30 sec
9. Inflate to 30 above prior palpated reading
10. Place stethoscope (bell preferred) over BA
11. Deflate at 2-3 mmHg/sec
12. Listen for 1st sound
13. Listen for last sound
14. Wait 1 min before repeat

BP Cuff size



- Bladder length 80% of arm circumference
- Bladder width at least 40% of arm circ.
- Too small = falsely high BP reading
- Too large = falsely low

EMS & BP – Miami study

- RAs trained in correct AHA technique
 - phase 1 met EMS in ED, rechecked BP
 - phase 2 rode with EMS
- EMS: 69% of SBPs, 57% of DBPs end in 0
- EMS vs trained RA, agreement in field:

	≤ 5 mmHg	≤ 10	≤ 15
SBP	59%	86%	100%
DBP	64%	86%	92%

Adherence to BP technique

<u>Technique</u>	<u>Self-reported</u>	<u>RA-witnessed</u>
Palpated BA first	68%	6%
Centered cuff on BA	99%	6%
Scope placed over BA	99%	40%
Rapidly inflate to 200	96%	24%
Deflate at 2-3 mmHg/sec	100%	10%

Cienki J, DeLuca L JEM 2012

Other studies...

- **Doctors and nurses often noncompliant**
- **Interobserver reliability poor in ED**
- **Devices:**
 - **21% of mercury type had technical problems**
 - **50% of aneroid type off by ≥ 10 mmHg**
 - **inaccuracies in aneroid devices 1-44%**
- **Devices should be checked, calibrated periodically but rarely are**

So what?



Here's the What



- **Major treatment & transport determinants**
 - **Trauma Center transport SBP <90**
 - **IV fluid therapy, shock, sepsis protocols**
 - **Induced hypothermia post ROSC**
 - **Drug indication/contraindication**
 - **Cardioversion**
 - **CPAP safety**

Machine BPs?

- NIBP devices for SBP, DBP, MAP, HR
- Oscillometric method, not Korotkoff sounds
- Changes in pressure pulses from flow of blood thru the artery
 - Point of max oscillation = MAP
 - Proprietary algorithm for indirect SBP & DBP
 - Position of cuff over BA not critical
 - Less susceptible to external noise

NIBP Pitfalls

- Still need correct cuff size
- Low frequency sounds/vibrations/motion
- Stiff arteries (falsely low MAP)
- Not validated in abnormal ranges. Often higher than manual BP, esp in shock trauma (Davis et al J Trauma 2003)
- Prolonged inflation, recycles too fast if no reading
- Less reliable with arrhythmia esp Afib
- *Correlate with manual BP !!*

Some Patients Don't Cooperate

- **Auscultatory gap (may miss true SBP)**
- **Sounds heard down to 0 (record muffling point)**
 - **Pregnant women**
 - **Aortic insufficiency**
 - **A-V fistula (e.g., dialysis access)**
 - **Many young children**
- **White coat HTN = Red lights & sirens HTN**
- **Pseudohypertension (lead pipe arteries)**

BP $\neq$ Perfusion

- Skin pale, cool, clammy?
- Capillary refill?
- Anxious, restless, altered mental status?
- Persistent tachycardia?
- Think in terms of MAP, too
- Lactic acid, ETCO₂, base deficit?



Putting it all together:

50 yr old woman called 911 for bleeding:

- Had facial plastic surgery 1 wk earlier
- ~ 750 ml of blood pooled on floor
- Brisk bleeding from surgical scar behind ear
- Initial BP 140/90, pulse 110, patient lying on floor, skin cool and wet, VERY anxious
- Bleeding control???
- Mental status ↓↓ and BP 100/70 despite 2 L IVF
- Best transport destination???

More to work on...

- Snoring ≠ good airway “just drunk”
- Rales ≠ cardiac pulmonary edema
- Afebrile ≠ not pneumonia, sepsis
- “But the monitor said...”



SO....

- *Nothing is ever simple!*
- Use good technique
- Measure twice, THINK twice
- Know your machines
 - Artifact, troubleshooting, batteries
 - Device vs device interference
 - Maintenance & calibration
- Serial vital signs are a MUST
- Consider whole picture



**Thanks,
and be careful out there**



