

## Spirometry and hypertension; should blood pressure be measured prior to testing? Paul Cullinan

The issue of whether spirometry poses a risk to people with hypertension is an evidence-free zone; indeed it's difficult to see how any meaningful 'evidence' could ever be gathered. Moreover, I have failed to discover where the concerns originated. However, there are some 'knowns':

1. It's not clear what effect forced spirometry has on either intra-cranial pressure or intra-cranial arterial pressure. Perhaps counter-intuitively, a forced Valsalva manoeuvre (similar to that which occurs during spirometry) appears to *decrease* both intra-cranial and mean arterial pressures (Matta B. J Neurosurgical Anesthesiology. 1994;6:280-283) probably due to complex and reflex autoregulation.
2. There appear to be no reports of spirometry-associated strokes.
3. Much the same can be said for intra-abdominal pressures – and (the absence of) adverse effects of abdominal aortic aneurysms
4. Formal and expert guidelines:
  - i. *either* make no mention of hypertension being a contraindication; this is the case for the 'major' spirometry guidelines produced by bodies such as the European Respiratory Society, the American Thoracic Society and NICE. The American College of Occupational and Environmental Medicine describe no contraindications (relating to blood pressure or otherwise) in their 2011 Guidance Statement on Spirometry in the Occupational Health Setting ([https://www.acoem.org/uploadedFiles/Public\\_Affairs/Policies\\_And\\_Position\\_Statements/ACOEM%20Spirometry%20Statement.pdf](https://www.acoem.org/uploadedFiles/Public_Affairs/Policies_And_Position_Statements/ACOEM%20Spirometry%20Statement.pdf)).
  - ii. *or* they list it as a potential, *relative* contraindication, qualified by phrases such as 'uncontrolled' or 'severe' hypertension. For example, Canadian guidance (Canadian Resp J 2013;20;13-22) suggests that blood pressure above 200/120 is a relative contraindication. When conducting workplace surveys, NIOSH in the US use a systolic (or diastolic) blood pressure >180 (>100) as a contraindication. I have never seen a justification for these figures and would be surprised if they had any basis in evidence.
5. Similarly (but conversely) I'm not aware of any guidelines on the management of hypertension that advise against manoeuvres that may increase intra-cranial vascular pressure; this seems to be true even for severe hypertension (eg Crit Care. 2003; 7(5): 374–384)
6. The ARTP leaves the question open but does not mandate the measurement of blood pressure prior to spirometry; they may currently be updating their guidance. Note that in most hospital services, blood pressure is *not* routinely measured prior to spirometry.
7. Brendan Cooper's article in Thorax (2011) states: "Where suspicion of severe hypertension is high, blood pressure should be measured prior to testing. More evidence is needed to support these recommendations".

Thus:

- A. Routine measurement of blood pressure before spirometry seems neither to be routinely recommended nor, in hospitals, widely practised.
- B. Any risks of spirometry in people with hypertension must be very small and may even be imaginary; if indeed there is a risk then presumably it is higher when the blood pressure is higher.
- C. There are no data that relate risk to blood pressure. Any programme that includes the routine measurement of blood pressure before spirometry immediately faces the (unanswerable) question of 'at what level is the risk too high'.
- D. Three possible approaches, of equal acceptability, occur to me:
  - i. Spirometry is performed without any consideration of the subject's blood pressure
  - ii. Spirometry is performed only after measurement of each subject's blood pressure; and only if the blood pressure is below an arbitrarily set level – with values along the lines of those in 2.ii above
  - iii. Spirometry is preceded by a question along the lines of 'since your last test have you been told by a doctor that you have high blood pressure that can't be controlled'; and is omitted in those who answer 'Yes', without measuring the blood pressure (see C above).