MSK Journal Club 05/11/15

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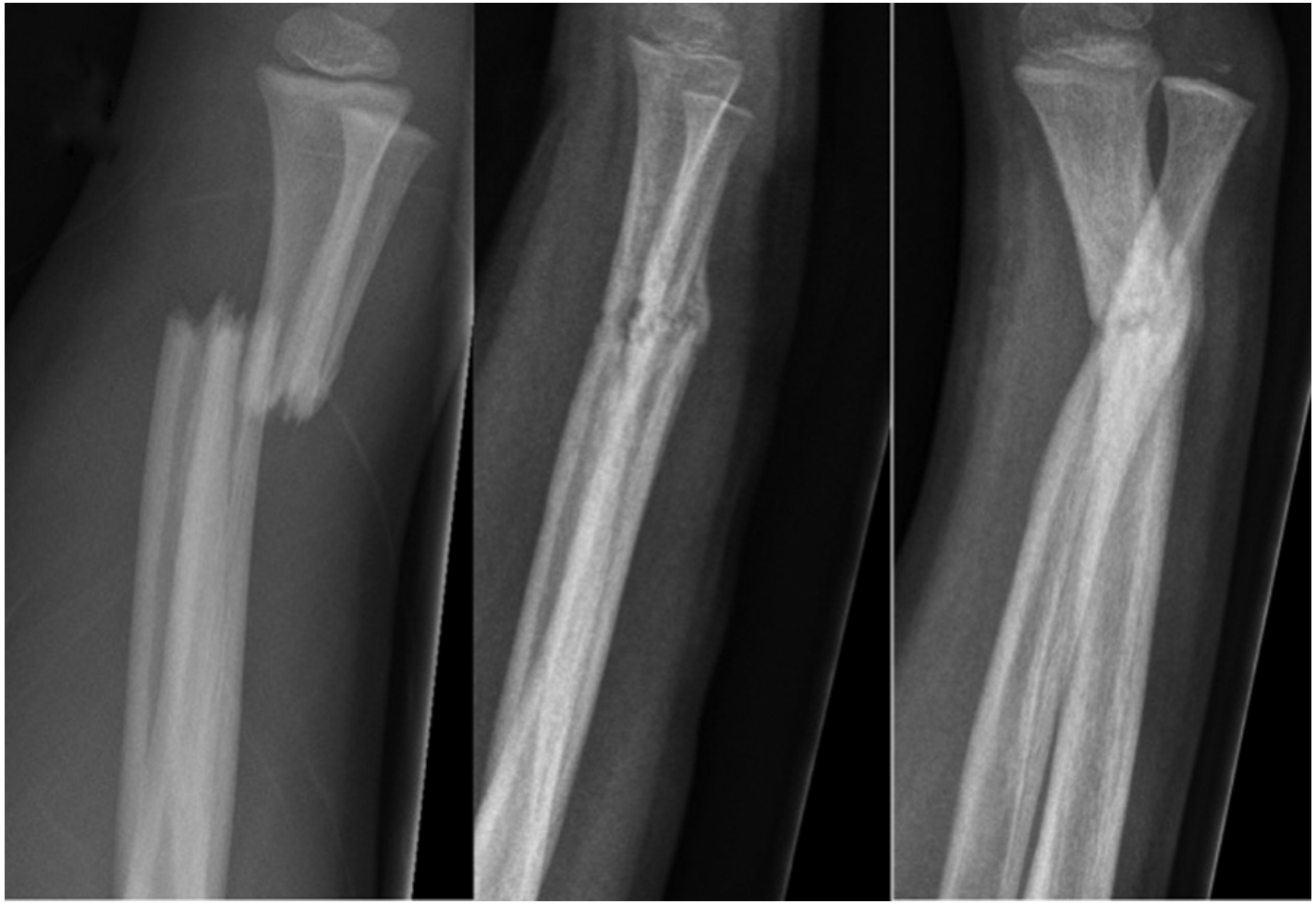
The Paper

■ CHILDREN'S ORTHOPAEDICS

Risk factors for the displacement of fractures of both bones of the forearm in children

- The Bone and Joint Journal
  - Colaris JW, Allema JH, Reijman M, Biter LU, de Vries MR, van de Ven CP, Bloem RM, Verhaar JA.
  - May 2013; vol 95-B; 689–93

The Problem

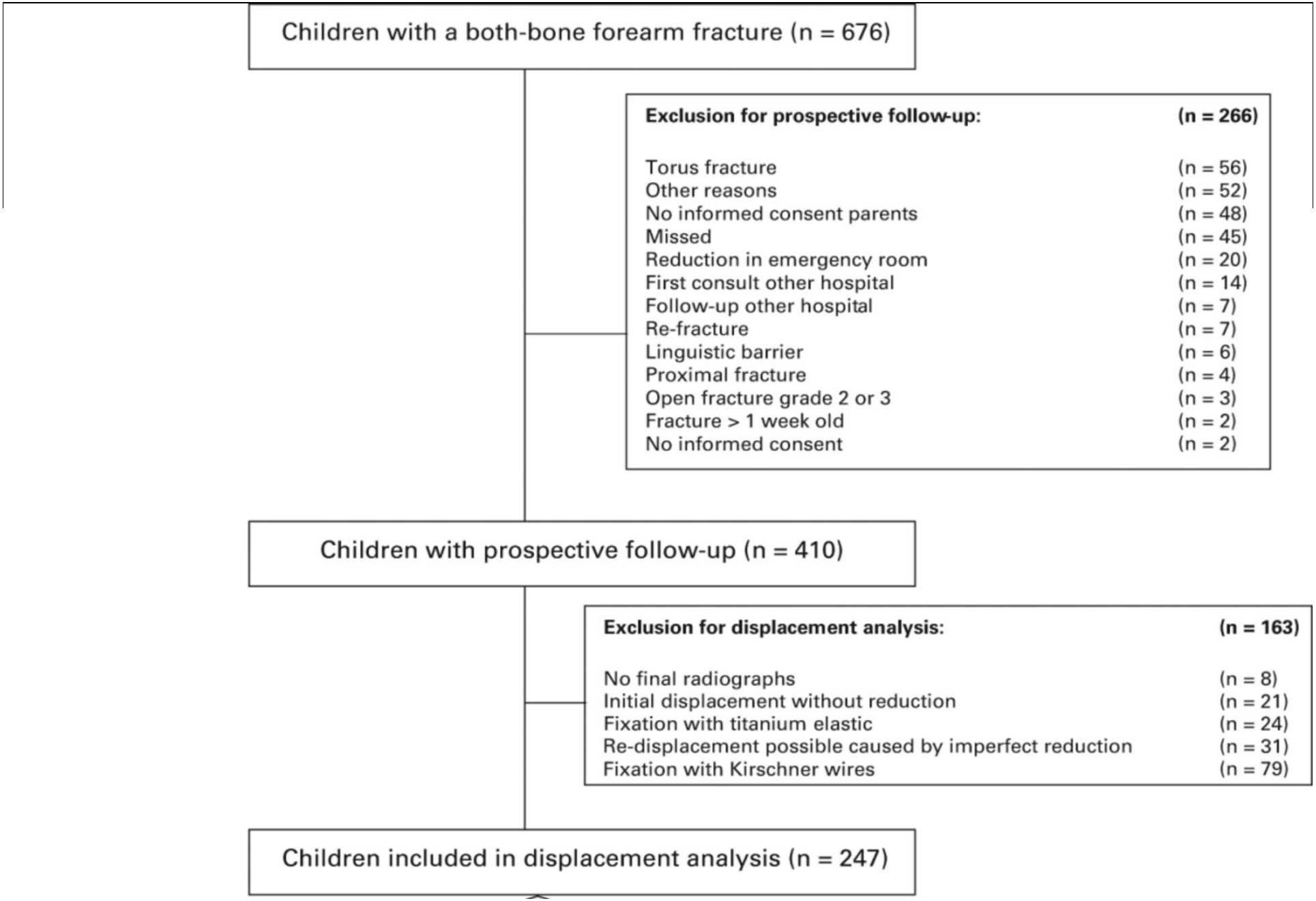


The Problem

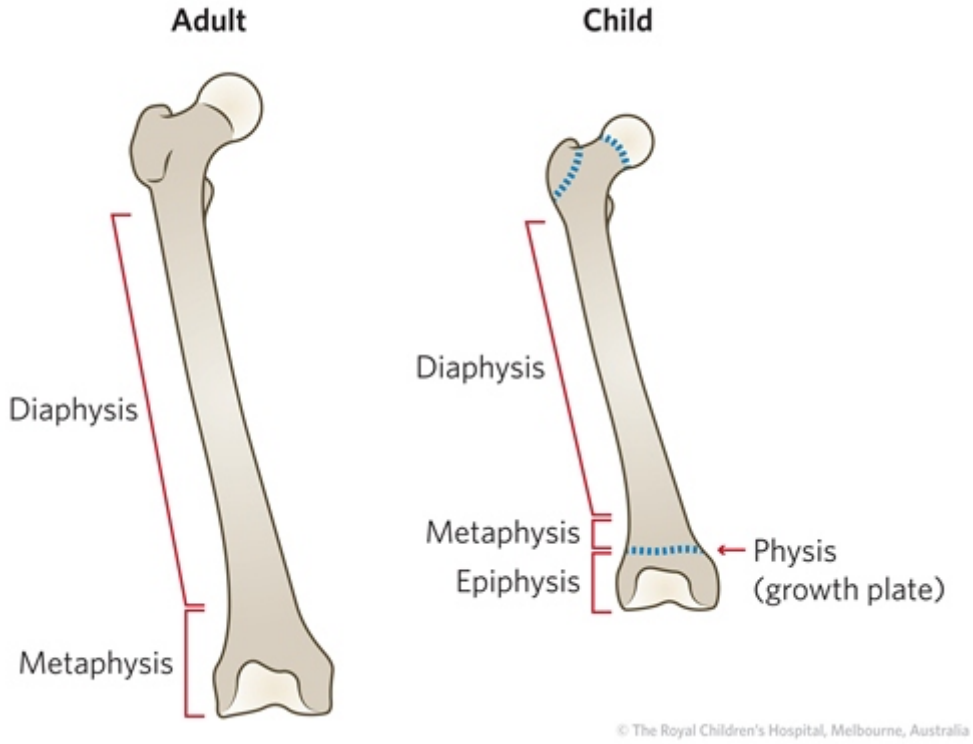
- Are there any risk factors increasing incidence of displacement of fractures to both forearm bones in children?
- Risk Factors analysed:
  - Gender
  - Dominant arm fractured
  - Fracture location
  - Type of fracture
  - Primary displacement
  - Shortening of radius and/or ulna
  - Rotation of radius and/or ulna
  - Reduced fracture
  - Location of reduction
  - Type of cast

The Study

- Children under 16 years, with fractures to both forearm bones.
- Data was collected between Jan 2006 and Aug 2010, as a cohort study, with convenience sampling from 4 hospitals in the Netherlands.


Children with a both-bone forearm fracture (n = 676)
Exclusion for prospective follow-up: (n = 266)
Torus fracture (n = 56)
Other reasons (n = 52)
No informed consent parents (n = 48)
Missed (n = 45)
Reduction in emergency room (n = 20)
First consult other hospital (n = 14)
Follow-up other hospital (n = 7)
Re-fracture (n = 7)
Linguistic barrier (n = 6)
Proximal fracture (n = 4)
Open fracture grade 2 or 3 (n = 3)
Fracture > 1 week old (n = 2)
No informed consent (n = 2)
Children with prospective follow-up (n = 410)
Exclusion for displacement analysis: (n = 163)
No final radiographs (n = 8)
Initial displacement without reduction (n = 21)
Fixation with titanium elastic (n = 24)
Re-displacement possible caused by imperfect reduction (n = 31)
Fixation with Kirschner wires (n = 79)
Children included in displacement analysis (n = 247)

Metaphyseal / Diaphyseal fractures



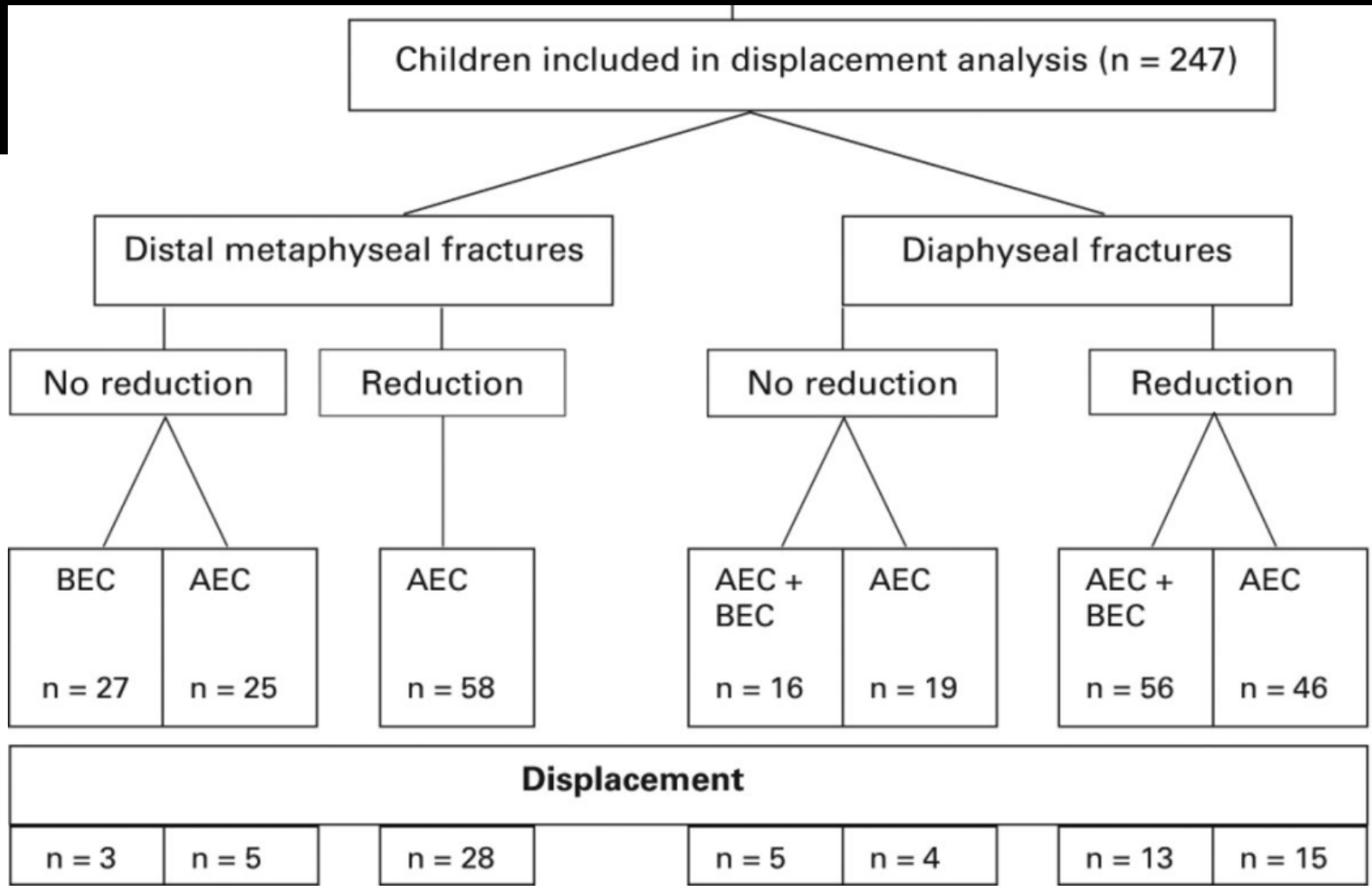
http://www.rch.org.au/uploadedImages/Main/Content/fractureeducation/figure1_bones.jpg?n=3251

The Method

- X-ray : Initial, after reduction, during follow up.
- Independently reviewed by an orthopaedic surgeon not involved in the primary treatment.
- Qualified as 'displaced' if further reduction was needed (following primary reduction criteria)

Table II. Criteria for reduction of the fracture of radius and/or ulna based on anteroposterior and/or lateral radiographs

Type of deformity	Age (yrs)	Deformity
Angulation	< 10	> 15°
	10 to 16	> 10°
Translation	< 16	> half of bone diameter
Rotation	< 16	> 0


Children included in displacement analysis (n = 247)
Distal metaphyseal fractures
Diaphyseal fractures
No reduction
Reduction
No reduction
Reduction
BEC
n = 27
AEC
n = 25
AEC
n = 58
AEC + BEC
n = 16
AEC
n = 19
AEC + BEC
n = 56
AEC
n = 46
Displacement
n = 3
n = 5
n = 28
n = 5
n = 4
n = 13
n = 15

The Results

- 73 displaced(29.6%),
- Statistically relevant risk factors identified by the study:
  - Fracture of the non-dominant arm(p = 0.024)
  - A complete fracture (p = 0.040)
  - A fracture with translation of the ulna on lateral radiographs (p = 0.014)
  - Shortening of the fracture (p = 0.019)

Potential Issues

- When do they displace?
- Cast type, and quality?
- Different fixation methods?
- Radiography - when were they followed up? How long was follow up?
- Imperfect reduction?

The Outcome

- Overall, the issues with patient follow up/cast application and type/poor recruitment make this paper less than convincing.
- Important topic, but poor study – the methodology needs vast improvement.
- Can we change anything?
  - Radiograph all children with risk factors?
  - Avoid cosmetic/functional problems.

[redacted]

Characteristic	
Children (n)	247
Mean age (yrs) (SD; range)	7.3 (3.2; 0.9 to 14.9)
Male (n, %)	147 (*59.5*)
Fracture on dominant arm (n, %)	98 (*39.7*)
Right arm fractured	96 (*38.9*)
Location (n, %)	
Diaphysis	137 (*55.5*)
Metaphysis	110 (*44.5*)
Type of fracture (n, %)	
Both greenstick	111 (*44.9*)
Both complete	64 (*25.9*)
Greenstick (ulna) + complete (radius)	34 (*13.8*)
Complete (ulna) + greenstick (radius)	17 (*6.9*)
Torus (ulna) + greenstick (radius)	12 (*4.9*)
Greenstick (ulna) + torus (radius)	4 (*1.6*)
Torus (ulna) + complete (radius)	4 (*1.6*)
Complete (ulna) + torus (radius)	1 (*0.4*)

References

- All tables/figures: Risk factors for the displacement of fractures of both bones of the forearm in children; ***Bone Joint J* 2013;95-B:689–93**
- **http://www.unige.ch/ses/sococ/cl//spss/cmd/regression.methods.html**
- http://www.statsdirect.com/help/default.htm#basics/p_values.htm

Any questions?

https://www.ivyexec.com/executive-insights/wp-content/uploads/2014/08/interview_question-750x422.jpg