Revision Notes on Cardiovascular Examination:

1. On approaching a child:
   - Around room: Oxygen tank (pulm HT); Saturation monitor
   
   **View from Distance**
   - Nutritional status: ‘I would like to plot his height and weight on a growth chart’
   - Work of breathing: Respiratory rate, recessions
   - Cyanosis
   - Dysmorphism – top 3 syndromes: Down’s, Williams, DiGeorge
     Other possible syndromes related to CVS: Turner’s, Noonan’s

2. Finger:
   - Clubbing
     - Peripheral cyanosis
     - Splinter haemorrhages
     - Capillary refill
   
   Hands: Janeway lesion
   - Osler nodes
   - Tuberous and tendon xanthomas of familial hypercholesterolaemia

   Bony abnormalities: Absent Radii (VACTERYL Syndrome)
   - Absent Thumb (Holt-Oram Syndrome)

   Pulse: Radial and brachial
   - HR (count, rhythm, character) – count over 6 sec X10
   - Blood pressure
   - Radio-radial delay
   - Radio-femoral delay

   Note: if cannot feel pulses – say ‘**pulses are difficult to feel**’

3. Face:
   - Eyes: Sclera – Jaundice (Congestive cardiac failure → Hepatic congestion)
     - Conjunctive – Pallor (Anaemia)
   
   Face: Mitral flush / malar flush
   - Polycythaemia (Cyanotic heart disease → Increased haematocrit)

   Tongue: Central cyanosis (Right to left shunt/ Inadequate oxygenation in lungs)
   - Lips/oral mucosa: Pallor
   - Teeth: Dental Caries
   - Palate: High arch palate (Marfan’s)
     - Conjunctival injection and gum hypertrophy = chronic cyanosis

4. Neck:
   - JVP: Only in older children: Right heart failure, fluid overload)
   - Suprasternal notch: thrill in aortic stenosis
5. Praecordium

**Inspection:**

1. **Scars:** Back scars
   - Front scars
     - See notes in blue for more information on scars
2. **Visible pulsations (hyperdynamic apex beat)**
3. **Chest wall deformity**
   - Anterior bulge chest (cardiomegaly)
   - Harrison sulcus (Increased pulmonary blood flow / asthma)
   - Asymmetry
4. **Respiratory rate**

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**Right thoracotomy scar**

A. **Cardiac causes**
   1. BT shunt
   2. PA banding

B. **Noncardiac causes**
   1. Thoracotomy
   2. Lobectomy
   3. Oesophageal surgery (tracheoesophageal fistula repair)
   4. Congenital diaphragmatic hernia repair (scar may migrate up)

**Left thoracotomy scar**

A. **Cardiac**
   1. BT shunt (old fashioned - no pulse on ipsilateral side; new fashioned: pulse present)
   2. PA banding
   3. PDA ligation
   4. Coarctation of aorta repair

B. **Non cardiac**
   1. Thoracotomy
   2. Lobectomy

**Midline sternotomy scar**

- Complex cardiac surgery
- Any bypass surgery
- PA banding

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**Chest drain scars**

**Mediastinal drains**

**Chest wall pacemaker**

**Messy median sternotomy scars**
If no murmurs: differential includes hypoplastic left heart syndrome due to Norwood 1, 2, 3.

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**Scars for Tetralogy of Fallot**

Left or right thoracotomy scars in association with pulse on corresponding side

If bilateral thoracotomy scars -- failure of one shunt and the need for second shunt procedure

Central sternotomy scar indicates definitive repair carried out - Child may not be cyanosed, but may still have right ventricular outflow stenosis

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**Notes on Cardiac Procedures**

1. **Repair:** VSD, ASD, Tetralogy of Fallot repair
2. **Palliative:**
   A. Temporary:
   - BT shunt (to allow for pulmonary blood flow, encourage deviation of pulmonary tree)
   - PA banding (prevent overloading of the pulmonary circulation pending repair of large VSD)

   Atrial septostomy (transposition of great arteries)
Palpation

1. Apex Beat (Use both hands to feel both sides)
   a) Site
      Displaced to left: Cardiomegaly, pectus excavatum, scoliosis
      Displaced to right: Congenital dextrocardia (feel for liver- Kartagener syndrome),
      Left diaphragmatic hernia,
      Collapsed lung on right,
      Left pleural effusion,
      Left pneumothorax

   b) Character: Sustained
      Forceful (LVH)
      Thrusting : Volume overload (Large stroke volume ventricle in mitral/aortic
      incompetence, or left to right shunt)

2. Left parasternal heave → Right IVH / RV outflow tract obstruction

3. Thrills:

   Thumb palpate at suprasternal notch for thrills at the same time

   Lower left sternal edge: VSD

   Upper left sternal edge: Pulmonary stenosis

Image source: [http://www.childrenshospital.org/health-topics/procedures/heart-transplant](http://www.childrenshospital.org/health-topics/procedures/heart-transplant)
**Auscultation:**

Auscultate areas:

1. **Mitral area (Apex area) → Tricuspid area (LLSE) → Pulmonary area (LUSE) → Aortic area (RUSE)**
2. Also auscultate - Axillary area (if there is murmur at Apex or LUSE)
   - Back (If there is murmur at LUSE)
   - Neck (If there is murmur at RUSE)
3. Base of lungs for inspiratory crepitation in cardiac failure

**RUSE:**
- Ejection systolic: Aortic stenosis
- Continuous: Rt BT shunt
- Venous hum

**ULSE:**
- Ejection systolic: Pulmonary stenosis
- ASD
- Innocent murmur

**Apex:**
- Pansystolic: Mitral regurgitation
- VSD
- Late systolic: Mitral Valve Prolapse
- Ejection Systolic: Aortic stenosis
- Mid-diastolic: Mitral stenosis

**Back:**
- Systolic: coarctation (between scapulae), peripheral pulmonary stenosis
- Continuous: PDA

**LLSE:**
- Pansystolic: Tricuspid regurgitation
- VSD
- Diastolic: Tricuspid stenosis
- Aortic regurgitation
- Still’s murmur
5 types of normal murmur:
1. Still's murmur (LLSE)
2. Pulmonary flow murmur
3. Venous hum
4. Supraclavicular/ carotid bruit
5. Neonatal physiological peripheral artery stenosis murmur

Innocent murmur do not radiate
Pulmonary stenosis murmur radiate to the back and axilla
Mitr al regurgitation radiates to left axilla

To differentiate aortic stenosis from pulmonary stenosis:
Murmurs louds in expiration → Left heart disease → Aortic stenosis
Murmurs loudest in inspiration → Right heart disease → Pulmonary stenosis

Anything else?
I would like to complete my cardiovascular examination by:
1. Feeling for hepatomegaly
2. Feeling for femoral pulses and looking for scars on inguinal area for cardiac catheterisation/ arterial lines
3. Measure blood pressure and oxygen saturation (if not mentioned earlier)
4. Measure height and weight and plot on growth chart appropriate for age and size
5. Feeling for peripheral and sacral oedema
6. Auscultate lung bases (if not done earlier)

Conclusions:
Don't panic. Speak sense
When you present: Rather than describing your entire examination in detail, please present the salient points:

1. Cyanosis/Pink
2. Stable/not in respiratory distress
3. Clubbing
4. Scars
5. Heart sounds I + II + murmur (grade)

Example of presentation:
I examined Peter, a 7-year-old boy who looks well-grown for his age and I would like to plot his height and weight on a growth chart.
He is pink and not in respiratory distress. There are no dysmorphic features or finger clubbing. There are no scars on his chest. There is a palpable thrill at his suprasternal notch. He has a grade 3/6 ejection systolic murmur at right upper sternal edge radiating to carotid area.
He has left ventricular outflow obstruction such as aortic stenosis.