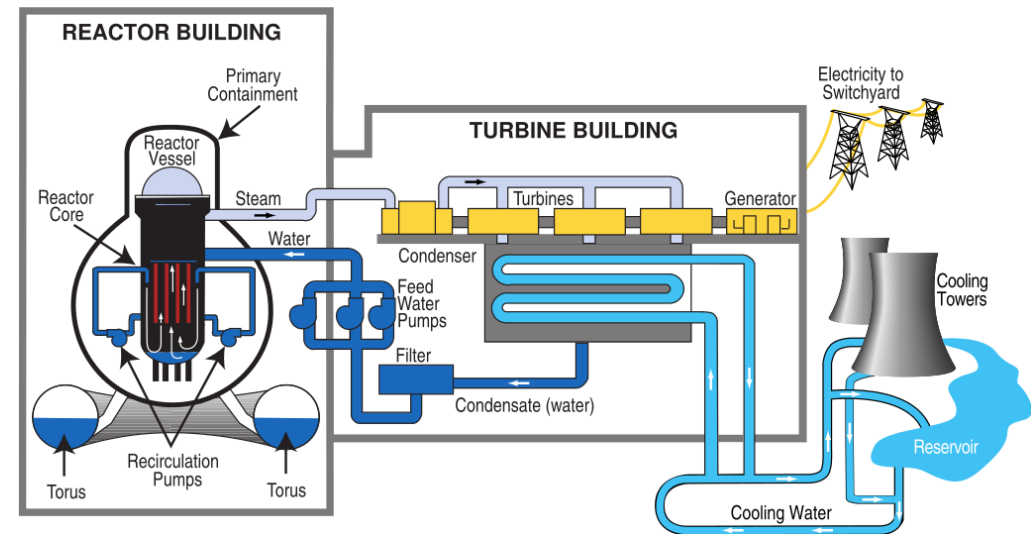




The complexity of modern life

MK

What is the most complex thing?



Imagine this scenario:

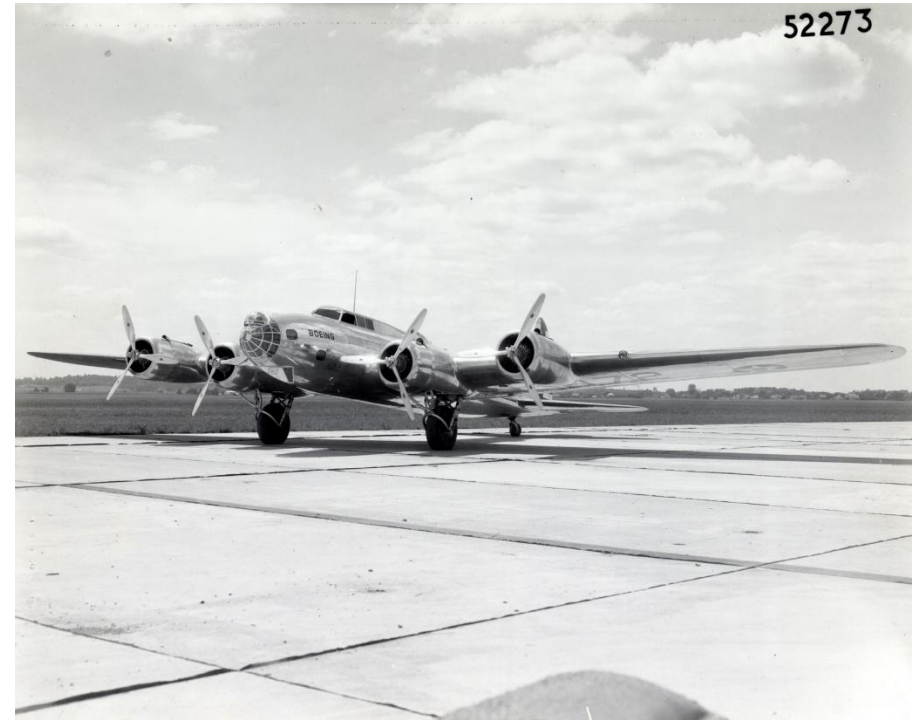
- ▶ The date is October 30, 1935
- ▶ You are a part of US Army Air Corps committee
- ▶ Your job is to select next generation long-range bomber
- ▶ On top of the competition:
 - ▶ Boeing Model 299



Property of Museum of History & Industry, Seattle

Little bits about the airplane

- ▶ It can carry five times as many bombs as requested by Airforce
- ▶ It has aluminum alloy body
- ▶ It fly faster than previous bomber
- ▶ It has twice the range of previous bomber
- ▶ Crew of 5 people



The pilot

- ▶ *Major Ployer P. Hill, U.S. Army Air Corps (1894–1935)*
- ▶ In 1918, he received flight instruction at the School of Military Aeronautics at Cornell University
- ▶ served as a flying instructor before receiving instruction as a bombardment pilot
- ▶ Since 1932 he is a test pilot and Assistant Chief of Planes and Engines in the Maintenance Unit



The crush

- ▶ The plane takes off
- ▶ Climbs to 300 feet
- ▶ Stalls and crashes
- ▶ 2 crew members including the pilot died from injuries received during the crash



The results of official investigation

- ▶ Nothing was mechanically wrong with the plane
- ▶ The plane is substantially more complex than the previous aircraft
- ▶ The pilot had to manage multiple things: 4 engines, wing flaps, landing gear, speed of the propellers, oil pressure
- ▶ The plane was deemed too difficult to operate



How would you get there?

Formation of B-17 during WWII



Instrument panel A380



Complexity in Trauma

- ▶ Pennsylvania Trauma Study
- ▶ 41,000 trauma patients
- ▶ 1,224 different injury-related diagnoses
- ▶ 32,261 unique combinations



Complexity in ICU

- ▶ An Israeli study:
 - ▶ ICU population
 - ▶ 24 hour observation
- ▶ 178 individual actions per day per patient
- ▶ 1% error rate



Central line placement

- ▶ wash hands with soap
- ▶ clean the patient's skin with chlorhexidine
- ▶ put sterile drapes over the entire patient
- ▶ wear a mask, hat, sterile gown, and gloves
- ▶ put a sterile dressing over the insertion site



The effect of the central line checklist

- ▶ Multicenter study
- ▶ 3 months
 - ▶ Decrease of CL infection rate by 66%
 - ▶ Most ICU's cut CL infection rate to 0%
- ▶ In the first 18 months
 - ▶ Saved >15,000 lives
 - ▶ \$175, 000, 000.00



Examples of the checklists

Old CAART

- ▶ Onset
- ▶ Location
- ▶ Duration
- ▶ Character
- ▶ Alleviating & Aggravating
- ▶ Radiation
- ▶ Time
- ▶ Severity

Old Cart

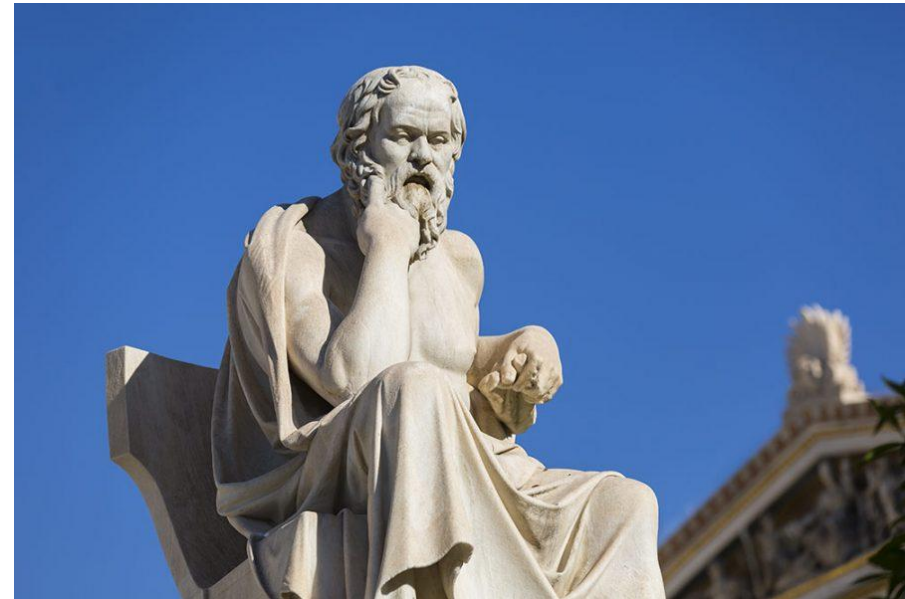


Examples of the checklists

SOCRATES

- ▶ Site
- ▶ Onset
- ▶ Character
- ▶ Radiation
- ▶ Associated symptoms
- ▶ Time/duration
- ▶ Exacerbating & Relieving
- ▶ Severity

Socrates

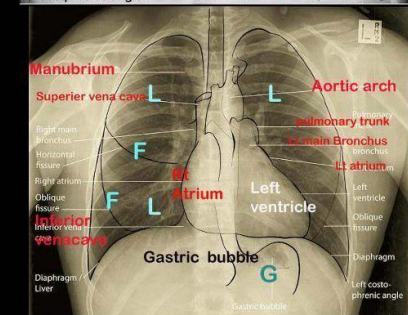
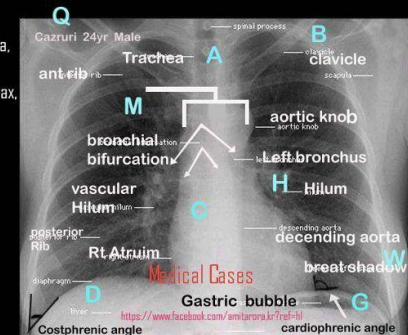


More examples

R Rotation	Unequal lengths of clavicles suggest rotation
I Inspiration	Chest is well inspired
P Penetration	Normal
A Airway	Trachea is central
B Bones	Normal
C Cardiac Silhouette	Normal heart size.
D Diaphragm	There is a significant pleural effusion on the left side and indistinct right diaphragm.
E Edges and External soft tissues	No pneumothorax.
F Fields	There is patchy opacification visible in the mid and lower zones of the right lung
G Gastric bubble	Not seen
H Hilum	Prominence of the superior mediastinum likely due to the thymus
I Insertions/Artefacts	There is a NG tube overlying the stomach. There is a right chest drain lying low within the right hemithorax

Chest Radiograph Interpretation A to X

- A**-Airway - Anatomic and Artificial (ETT Placement, etc.)
- B**-Bony Structures - Cervical Spine, Ribs, Clavicles, Scapula.
- C**-Cardiac Structure - Situs, Heart Size, etc.
- D**-Diaphragm Structure - Pneumoperitoneum, Pneumothorax, Effusions.
- E**-Esophagus
- F**-Fissures - Horizontal Fissure Location vs atelectasis, pneumonia, pneumothorax
- G**-Gastric Bubble vs Situs
- H**-Hilum - Lymph Nodes, Airways, Vessels
- I**-Interstitial disease processes
- J**-Junctional Lines
- K**-Kerley Lines: A, B, C
- L**-Lobes of Lung vs Cardiac Silhouette (Silhouette Sign)
- M**-Mediastinum-Mediastinal Widening, Thymus Size
- O**-OverAeration, Opacification
- P**-Pleura
- Q**-Quickly Check for Correct Name, Date of Birth, Imaging Study, Date, Time
- R**-Respiratory Effort - Inspiratory vs Expiratory Film
- S**-Segments
- T**-Thoracic Underperfusion - Pulmonary Embolism
- U**-UnderPerfusion, Underpenetration, Underventilation
- V**-Vascularity, Vascular Line Placement (Central Lines, Umbilical Artery/Vein Lines)
- W**-Women (Breast Shadows)
- X**-Xtra Equipment: Central Lines, ETT, Chest Tubes, etc.



FAST HUGS BID

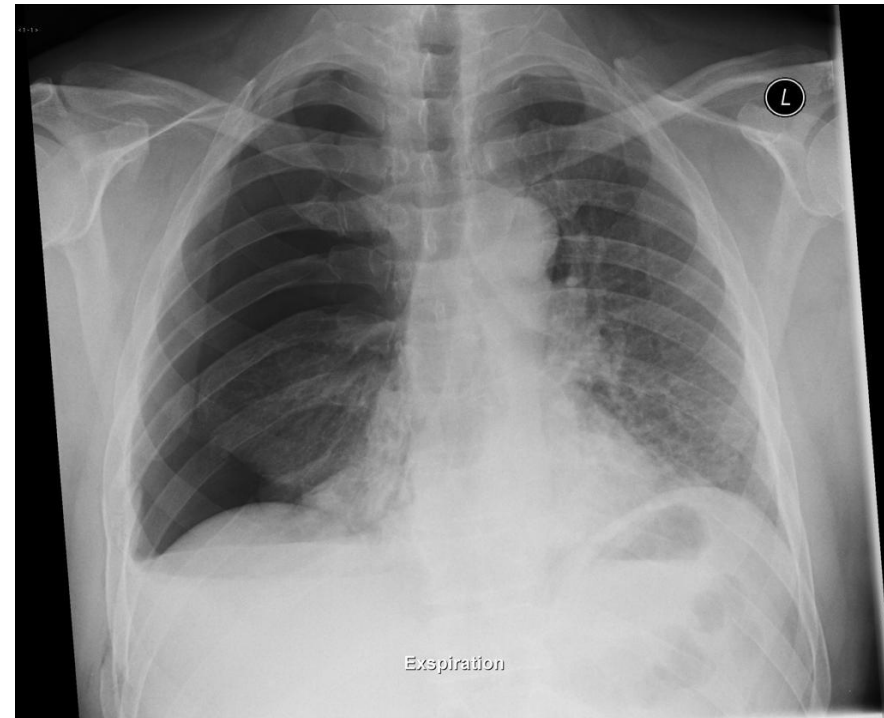
F	• Feeding
A	• Analgesia
S	• Sedation
T	• Thromboprophylaxis
H	• Head up position
U	• Ulcer prophylaxis
G	• Glycemic control
S	• Spontaneous Breathing Trial (SBT)

B	• Bowel Care
I	• Indwelling catheter removal
D	• De-escalation of antibiotics



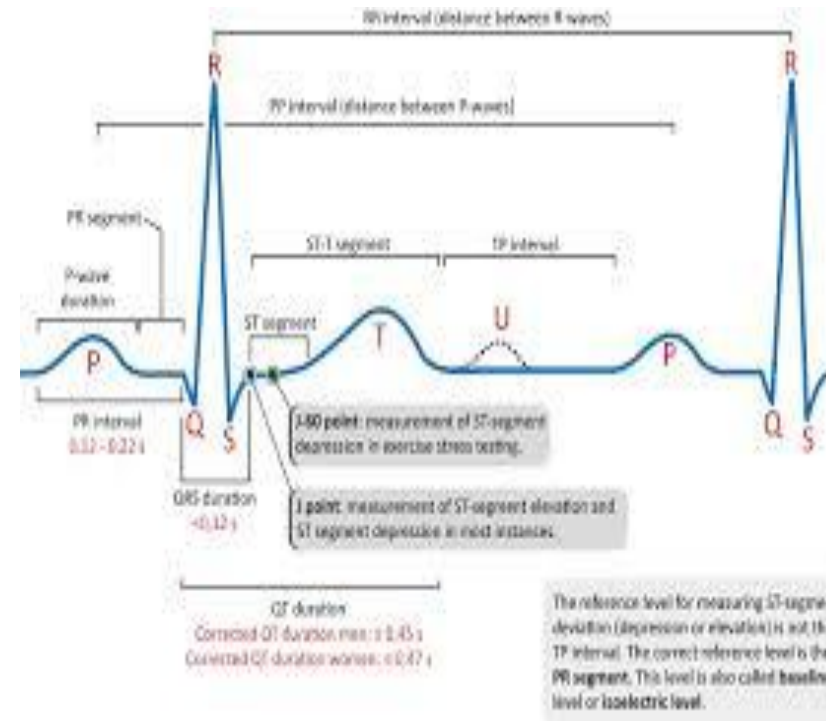
First find:

- ▶ Interpret this CXR:



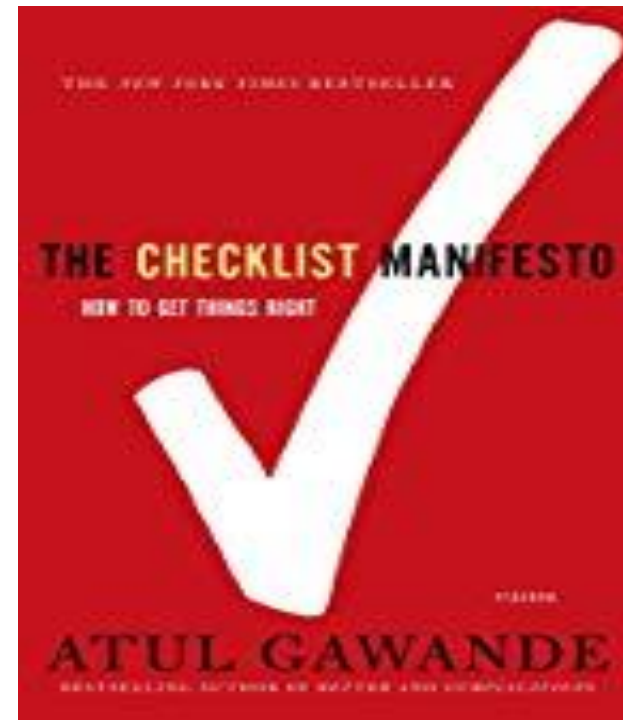
EKG interpretation:

- ▶ Determine Rate
- ▶ Rhythm: regular vs irregular + origin
- ▶ P-waves: normal vs abnormal
- ▶ PR-Interval measurement
- ▶ QRS measurement
- ▶ QT measurement
- ▶ Q-wave: significant vs insignificant
- ▶ T-waves: describe
- ▶ Axis



If you want to read more about it:

- ▶ Atul Gawande
- ▶ The Checklist Manifesto



Questions?

