



Liver failure in ICU

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Define

- Acute liver failure
- Acute liver injury
- Acute on chronic liver failure

Definitions

- Acute liver failure
 - **Coagulopathy** (INR>1.5) and **encephalopathy** in someone with a previously healthy liver.
- Acute liver injury
 - **Coagulopathy** without encephalopathy
- Acute on chronic liver failure
 - Acute decline in liver function in patients with chronic liver disease

Hyperacute liver failure (HALF)

Drug/toxins
Viral
Pregnancy-related
Vascular *
Other

Acute liver failure (ALF)

Drug/toxins
Viral
Pregnancy-related
Vascular*
Other

Subacute liver failure (SALF)

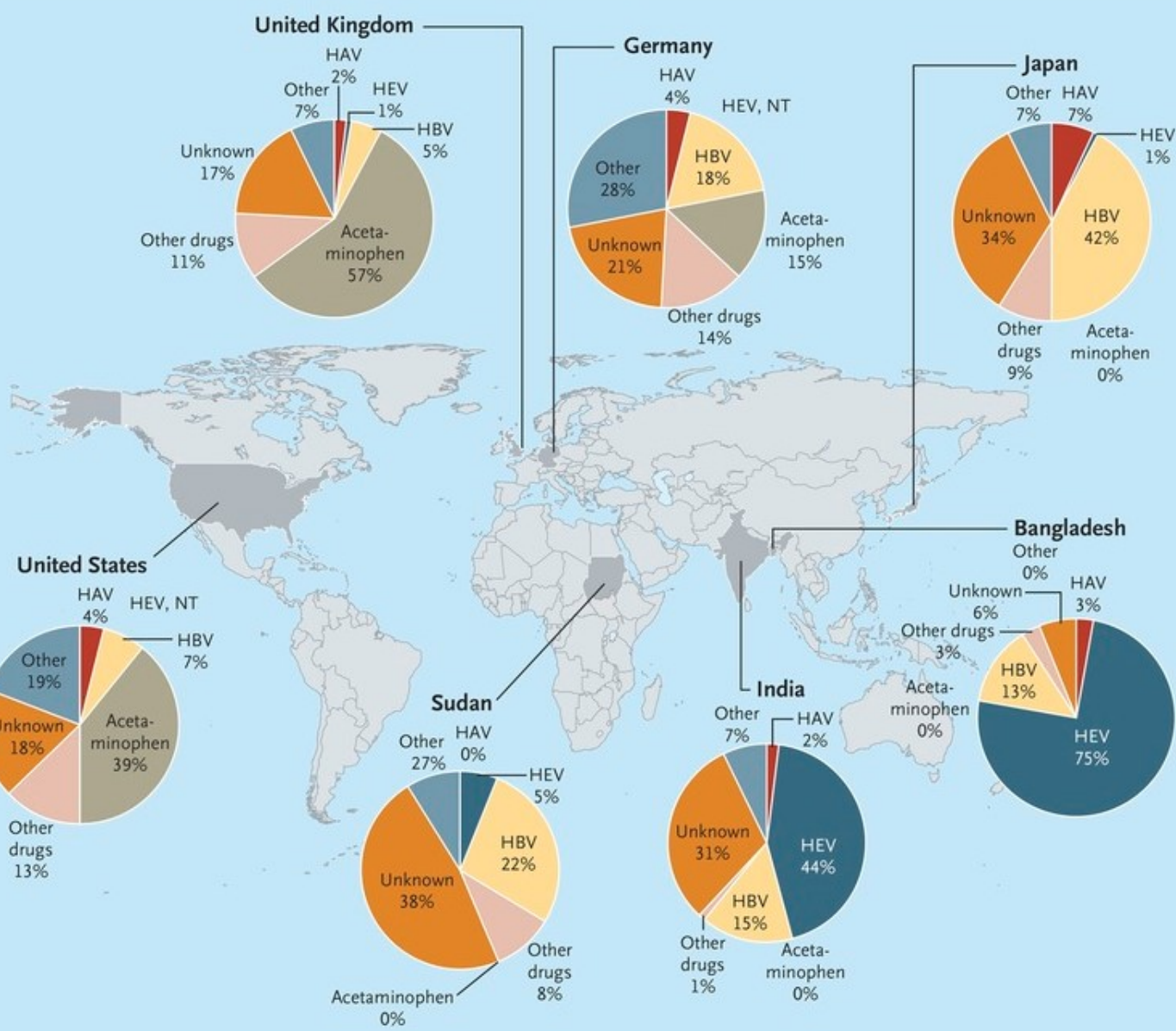
Drug/toxins
Seronegative hepatitis
Vascular
Other

Timeframe from onset of jaundice to developing hepatic encephalopathy

< 7 Days

8–28 Days

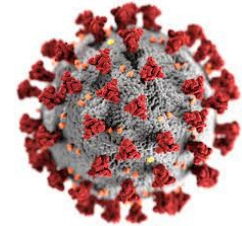
29 Days–12 Weeks



Causes of acute liver failure?

Causes

- Toxins; Paracetamol, Chemo, statins, Flucloxacillin, carbamazepine, TB drugs, carbamazepine, phenytoin.
- Virus; Hep A,B,C,E. HIV. EBV. HSV. VZV.
- Pregnancy; PET, HELLP, Fatty liver.
- Vascular; Hypoxic, Budd-Chiari
- Also; Wilson's, HLH, autoimmune, heat stroke, cancer.



Critical Care

Airway/Breathing

A/B; Intubated in Encephalopathy III/IV.

Neuroprotective measures; RSI drugs/ P_{CO_2} /Tubes/
PEEP limitation.

Critical Care Circulation

- High output state with **low SVR** should be addressed with vasopressors. Crystalloid, albumin volume restoration.
- Restoration of electrolytes
- Cardiac output monitoring. Terlipressin increases ICP (more used in cirrhosis)
- Consider cortisol.

Neuro

- ICH associated with high mortality
- Risk groups; young, acute presentation, renal/cardiac dysfunction, SIRS, Ammonia $>200\mu\text{mol/L}$
- Clinical signs are insensitive and late
- Use **neuroprotective measures**....
- Intensive CVVHF, target sodium 145-150mmol/L

- No survival benefit demonstrated from ICP bolts



Renal



Failure will occur in 50% of patients

More in paracetamol toxicity

Associated with a worse prognosis (80% 2 weeks)

Use **higher filtration rates** in hyperammonaemia

Avoid citrate anti coagulation as liver metabolism of citrate diminished

Complications; Coagulopathy

- Beware INR not indicative of bleeding risk.
 - Reduced synthesis of anti-coagulant products.
- Hypocoagulable state in 20%, normal in 45%, and a hypercoagulable in 35%.
- POC testing recommended.
- Routine correction of coagulopathy not recommended.
- Invasive procedures; platelets $>30 \times 10^9/L$ and a fibrinogen concentration of $>1-1.5 \text{ g L}$



Complications; Sepsis

- Pathophys
 - Immune dysfunction
 - Altered macrophage and neutrophil dysfunction
 - Reduced complement, phagocytosis and opsonisation.
- Bacteraemia 80%, fungaemia 30%
- Diagnosis difficult as pyrexia and raised clinical markers often absent
- Prophylactic treatment sometimes used
- Sepsis can lead to delisting



Metabolic disturbance

- Hypoglycaemia
 - Avoid high volume hypotonic solutions
- Magnesium/calcium/phosphate/potassium
- 25-30kcal/kg/day
- Minimise TPN due to sepsis risk

Kings college criteria

Transplant in ALF

- Paracetamol
 - pH<7.25 or lactate >3mmol/L post 24hrs resus
 - **Or** PT>100s, Grade 3+enceph, Creat>300μmol/L
- Non-paracetamol
 - PT>100s
 - **Or** 3 of; Age<10/>40, PT>50s, Seronegative/drug induced ALF, jaundice to encephalopathy>7 days, Bili>100μmol/L

Treatment options

- N-Acetyl Cysteine
 - In non paracetamol ALF aswell
- Steroids in auto-immune hepatitis
- Lamivudine in acute hepatitis B
- D-Penicillamine in Wilsons disease
- High volume plasma exchange
 - Removal of toxic metabolites
 - >15% plasma exchange
- Mechanical assistance
 - MARS, SPAD
 - ELAD ELAN
 - No evidence...yet

Treatment options

- Transplant has boosted outcomes
- >80% survival at 5 years
- Poor prognosis
 - Age>60, FiO₂>0.8, Cardiac dysfunction, high vasopressor requirement.
- Contra-indicated
 - Metastases, irreversible brain damage, uncontrolled sepsis
- Spontaneous recovery has desirable outcomes compared to transplant

References

- Agarwal B, Wright G, Gatt A et al. Evaluation of coagulation abnormalities in acute liver failure. J Hepatol 2012; 57:780e6
- BJA acute liver failure in ICU