Fulminant Liver Failure- Summary of Admission and Management

On Admission:

1. Inform GI SpR of admission
2. Bloods - Liase with GI SpR - what is already done. See list
3. **Drugs:**
   Intubated patients: Propofol and Alfentanil
   a. Antibiotic prophylaxis (following intubation):
      i. Co-amoxiclav 1.2g tds
      ii. If Pen allergic then Ciprofloxacin 400mg bd plus Vancomycin
   b. Antifungal (following intubation): Fluconazole 400mg daily IV
   c. Pantoprazole 20mg IV daily (note dose reduced from 40mg)
   d. N-Acetyl cysteine (check what patient has already received)
      i. 150mg/kg in 200mls N Saline over 1 hour then:
      ii. 50mg/kg in 500mls N Saline over 4 hours then:
      iii. 100mg/kg in 1000mls N Saline over 16 hours- keep repeating this last infusion until prothrombin time falling or transplant

Admission Investigations
See Fulminant Liver order set on Trak
- Check what has already been done
- Aim NOT to repeat complex Ix if done recently

Fulminant set includes:
FBC, Clotting Screen, ROTEM, U+E, LFT's, GGT, Ca, Mg, PO4, HIV status, Hepatitis Screen- Hep A,B,C, EBV,CMV

Not in Trak fulminant set but required
- Ammonia (during working hours)
- Hepatitis E, HSV
- ABG (NB glucose, lactate)
- Group and Save
- Microbiology as appropriate

Post Admission Routine Investigations
Hourly (minimum): Blood Glucose, ABG
Twice Daily:
FBC, Clotting screen, U+Es, LFTs
Others as indicated

Management by Systems:

CVS:

- **Lines** - Leave LIJ free of lines
  - CVP 5 lumen (RIJV) + RIJ MAC Line (if patient for transplant)
  - Quinton line Femoral or RIJ (if MAC line not required)
  - A line (L radial)
- Appropriate fluid resuscitation – be aware that excessive fluid may exacerbate cerebral oedema
- MAP >70mmhg (if signs of raised ICP aim MAP > 80mmHg)
- Noradrenaline +/- Steroids +/- Vasopressin (max rate of 1.2 units/hour i.e 3mls/hour) for vasodilated shock

CNS:

- Encephalopathy common - intubate and ventilate if depressed conscious level or agitation
- DO NOT sedate patients with encephalopathy (i.e. benzos/haloperidol) may worsen cerebral oedema and raise ICP
- Raised ICP is a common cause of death therefore strict adherence to measures to minimise raised ICP is essential
- **Following liver transplant for fulminant liver failure, risk of cerebral oedema remains high. Do not do sedation hold for at least 2 days after transplant and only perform following agreement with oncall transplant anaesthetist**

Basic neuroprotective management for all ventilated patients:

1. 30° Head up position and tape ETT
2. Deep sedation (RASS -5) – NO SEDATION HOLDS
3. Mandatory ventilation (optimise synchrony)
4. $PaCO_2$ 4.5-5.0kPa and PaO_2 10-12kPa
5. Aim Na 145-150mmol/L give hypertonic therapy to achieve (125mls 5% NaCl over 15min, repeat as necessary)
6. Avoidance of hyperthermia essential - active cooling with artic sun maybe required
7. Hourly pupil check including NPIs and treatment with hypertonic therapy (dose above) where required
8. Daily ammonia (ammonia >150 risk of cerebral oedema, >200 risk of cerebral herniation, daily trend also important)
9. Consider neuromuscular blockade
10. Assess risk of cerebral oedema
    - Patients at high risk of cerebral oedema require immediate high dose renal replacement therapy see renal section on next page for patients at high risk and dosing of renal replacement therapy

Critical Care Guidelines
FOR CRITICAL CARE USE ONLY

Renal:

- Indications for Renal Replacement Therapy (RRT):
    1. Standard indications metabolic acidosis/urea
    2. **Neuroprotection in patients at risk high risk of cerebral oedema -**
        - **Ventilated patients with > 2 of the following risk factors require immediate RRT (even if patient has acceptable renal function/urine output):**
            - Age < 40 (most important risk factor)
            - Hyperacute presentation (i.e. paracetamol overdose or drug induced)
            - Ammonia > 150
            - High level of vasopressor support
            - Renal dysfunction/significant metabolic acidosis

- Dosing of RRT:
    - When commencing RRT in this patient population always use high (maximum) volume exchanges no matter the indication
        - Choose Acute Liver failure settings (see renal replacement protocol page 11 for more info and troubleshooting):
            1. No anti-coagulation in first instance
            2. **Aim for maximum dose of renal replacement by setting flows to:**
                a. **Blood flow 250-350mls/min (if tolerated)**
                b. **Dialysate flow to 4.8Litres/hour**
            3. **Commence 5% hypertonic saline infusion initially at 50mls/hour to try and maintain therapeutic hypernatraemia of > 145mmol/L. (Boluses of 5% hypertonic saline 125mls can still be given in-addition for raised ICP, pupillary changes and hyponatraemia)**
            4. Consider fluid removal if tolerated to ensure patient not becoming overloaded

GI:

- Hourly BM's. Start dextrose 50% only **if BMs fall below 3.5mmol/L**
- If commenced on 50% dextrose keep BM 6-10mmol/L. When patient stable check daily to see if patient has ongoing dextrose requirement by stopping the dextrose. Restart if patient has further hypoglycaemia as above.
- NG tube if intubated- decompress stomach and start NG feed

Liver/Haematology:

- Bloods as per routine listed- keep Hb >80g/l

Coagulopathy:

- A very important monitor of liver function and a transplant criterion
- **ONLY TREAT COAGULAOATHY IF REACHES TRANSPLANT CRITERIA/BLEEDING UNCONTROLLABLY- DISCUSS WITH CONSULTANT**
- Platelet cover can be given for invasive procedures if required as not part of transplant criteria

Referrals from other health boards

- No patient with ALF should be refused admission (even if there are no ITU beds) without discussing the case with the critical care and transplant consultants on-call
- If there is a delay in admission to RIE ICU this protocol should be sent to the referring intensive care unit so that appropriate fulminant care can be delivered in a timely fashion.

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