

DENGUE FEVER MANAGEMENT

ICU APPROACH IN PREGNANCY



ACKNOWLEDGEMENT



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OVERVIEW

- **GLOBAL BURDEN**
- **50 MILLION INFECTIONS ANNUALLY, 2.5B LIVE IN ENDEMIC COUNTRIES**
- **CHANGE IN CLIMATE HAS IMPACTED BREEDING SITES AND VECTOR DISTRIBUTION**

PATHOPHYSIOLOGY

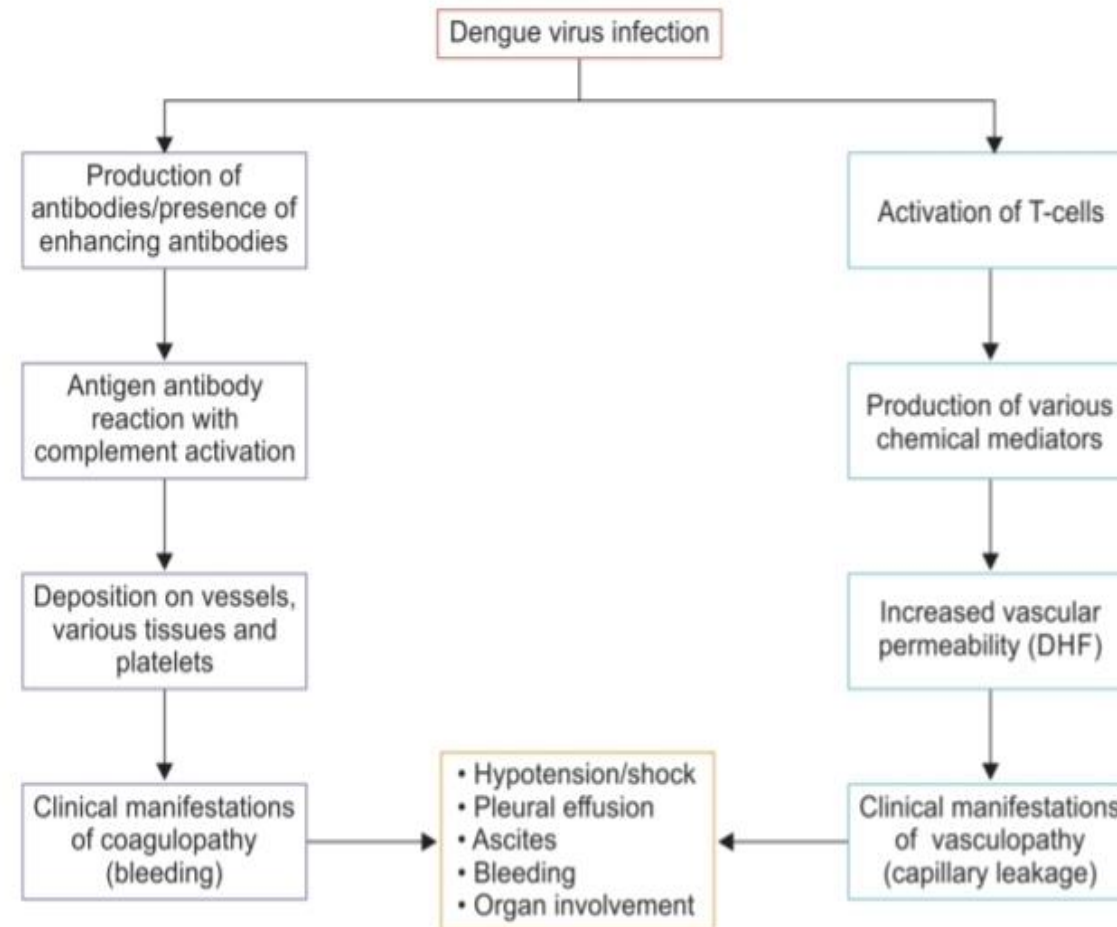
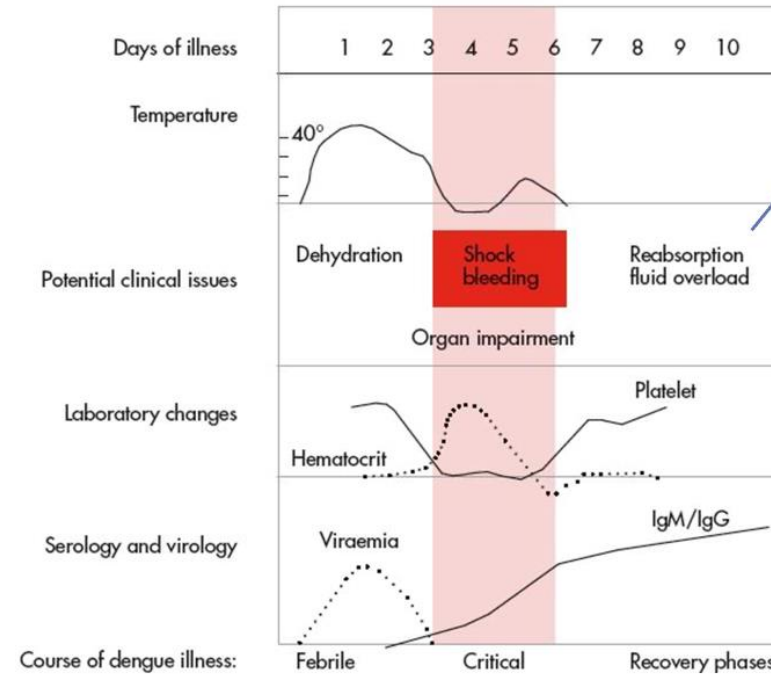


Fig. 1: Pathophysiology of dengue virus infection

The course of dengue illness*



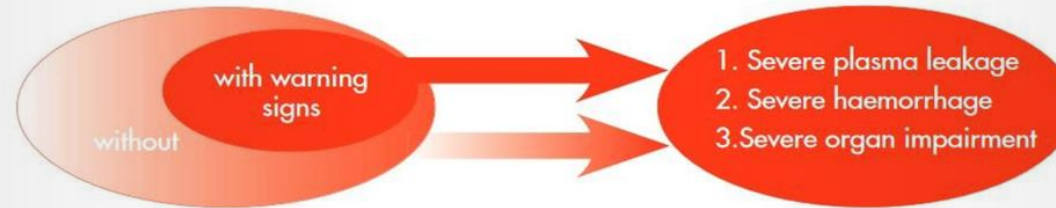
If too much IV fluids are given

Serology reflective of primary dengue



DENGUE ± WARNING SIGNS

SEVERE DENGUE



1. Severe plasma leakage
2. Severe haemorrhage
3. Severe organ impairment

CRITERIA FOR DENGUE ± WARNING SIGNS

Probable dengue

live in /travel to dengue endemic area.

Fever and 2 of the following criteria:

- Nausea, vomiting
- Rash
- Aches and pains
- Tourniquet test positive
- Leukopenia
- Any warning sign

Laboratory-confirmed dengue

(important when no sign of plasma leakage)

Warning signs*

- Abdominal pain or tenderness
- Persistent vomiting
- Clinical fluid accumulation
- Mucosal bleed
- Lethargy, restlessness
- Liver enlargement >2 cm
- Laboratory: increase in HCT concurrent with rapid decrease in platelet count

*[requiring strict observation and medical intervention]

CRITERIA FOR SEVERE DENGUE

Severe plasma leakage

leading to:

- Shock (DSS)
- Fluid accumulation with respiratory distress

Severe bleeding

as evaluated by clinician

Severe organ involvement

- Liver: AST or ALT $\geq$ 1000
- CNS: Impaired consciousness
- Heart and other organs

World Health Organization, 2009. Dengue: Guidelines for Treatment, Prevention and Control. Geneva: World Health Organization.)

REFERRALS

- MULTI ORGAN FAILURE
- ✓ SHOCK, HEMORRHAGE
- ✓ RESPIRATORY FAILURE
- ✓ ENCEPHALOPATHY
- ✓ ALTERED CONSCIOUSNESS

IMPACT OF DENGUE ON PREGNANCY:

- ADVERSE PREGNANCY OUTCOME
 - PRETERM BIRTH, LOW-BIRTH WEIGHT AND CAESAREAN DELIVERIES
- RISK OF VERTICAL TRANSMISSION
- SIGNIFICANT IMPACT OF DENGUE AT PARTURITION
 - SEVERE BLEEDING MAY COMPLICATE DELIVERY AND/OR SURGICAL PROCEDURES PERFORMED ON PREGNANT PATIENTS WITH DENGUE DURING THE CRITICAL PHASE,
 - I.E. THE PERIOD COINCIDING WITH MARKED THROMBOCYTOPENIA WITH OR WITHOUT COAGULOPATHY AND VASCULOPATHY.

	Normal Pregnancy	Dengue	HELLP
Fever	Blunted febrile response	+	-
Bleeding	Bleeding can be due to obstetrical cause	+(mild to severe)	-(DIVC in severe disease)
Abdominal pain	+/-	+/-	+/-
Ascites, pleural effusion	-	+ in plasma leakage	-
WBC	Elevated	Leukopenia	No specific changes
Thrombocytopenia	+	+ unique FBC changes	+
Haematocrit	↓ (haemodilution after the second trimester)	↑ in plasma leakage	Maybe normal / ↓
Haemolysis	-	-	+
Liver enzymes	Mild ↑	Mild to severe ↑	Mild to moderate ↑

SYMPTOMS OF HYPEREMESIS(1ST TRIMESTER)= WARNING SIGNS OF SEVERE DENGUE

✓ MAY DELAY THE RECOGNITION OF SEVERE DENGUE

2ND TRIMESTER - ↑ CIRCULATING BLOOD VOLUME + GENERALIZED VASODILATATION= ↑ BASELINE HR
AND LOWER BASELINE BP, + LOWER BASELINE HEMATOCRIT.

✓ NOT TO BE CONFUSED AS SHOCK

✓ LOW HEMATOCRIT – ESTABLISH BASELINE HCT (2-3 DAYS OF FEVER)FOR EARLY DETECTION OF PLASMA
LEAKAGE

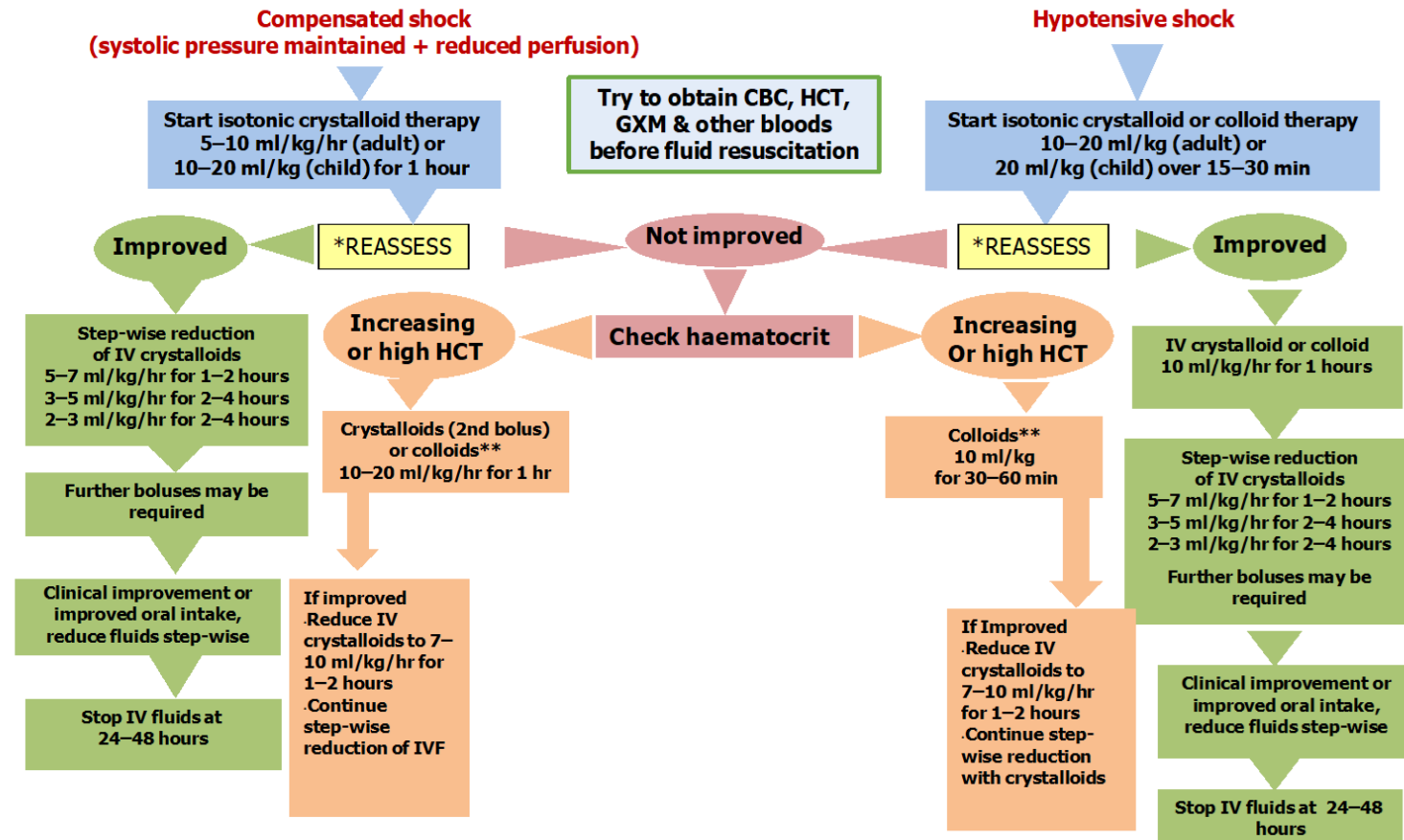
✓ CLINICAL SIGNS SUCH AS PLEURAL EFFUSION AND ASCITES MIGHT BE DIFFICULT IN THE PRESENCE
OF A GRAVID UTERUS

✓ REASONABLE MAP TARGET – TO AVOID OVER HYDRATION



MANAGEMENT

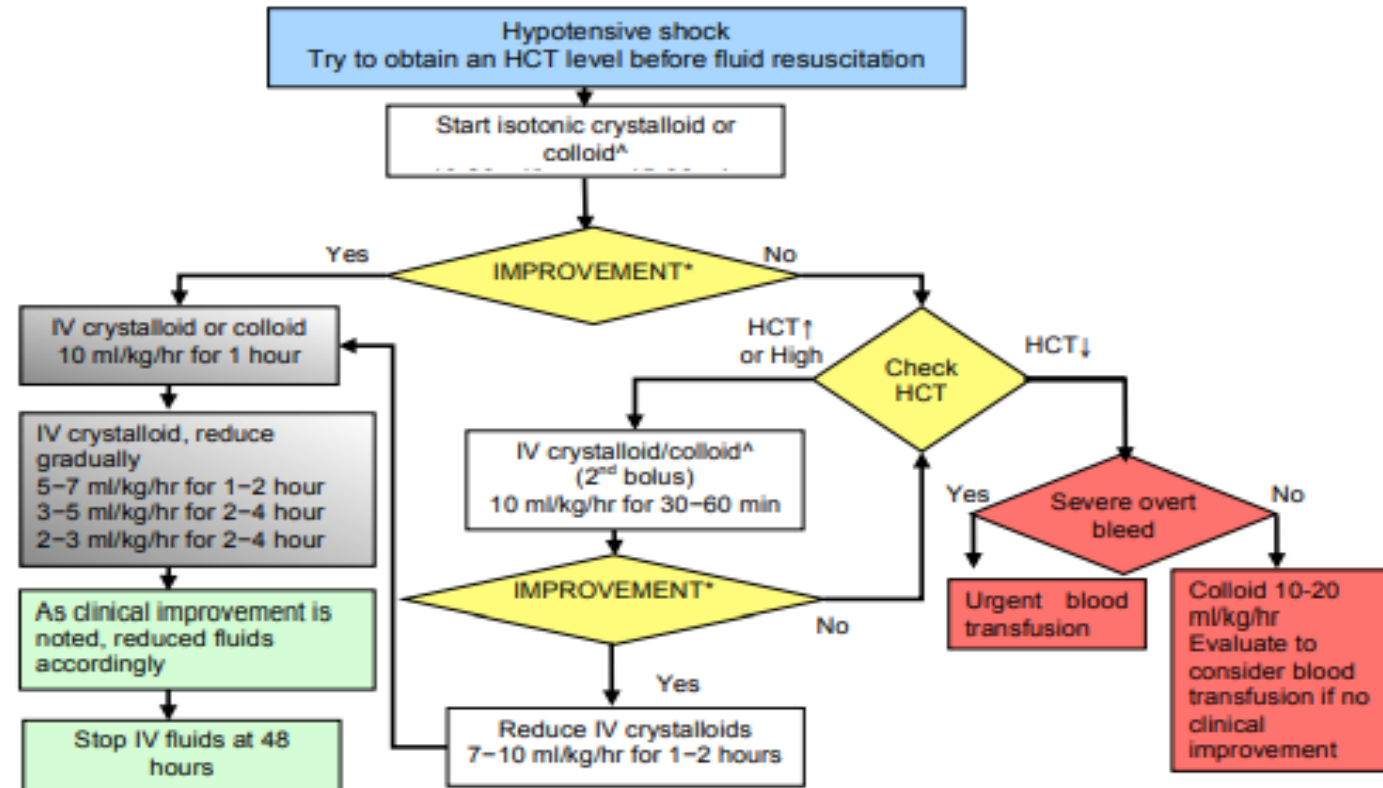
Group C: Emergency treatment – Summary



* Reassess the patient's clinical condition: vital signs, pulse volume, capillary refill time and temperature of extremities; decide on the situation.

**** Colloids are preferable if the patient has already received several boluses of crystalloid.**

Fig. 7. Algorithm for fluid management in hypotensive shock – infants, children and adults



^AColloid is preferable if the patient has already received previous boluses of crystalloid

*Reassess the patient's clinical condition, vital signs, pulse volume, capillary refill time and temperature of extremities.

IV = intravenous; HCT = haematocrit; ↑ = increased; ↓ = decreased

IN PREGNANCY...

- **NOT MUCH DIFFERENCE IN FLUID THERAPY COMPARED WITH THE NON-PREGNANT STATE , HOWEVER IT IS IMPORTANT TO NOTE THAT THE**
- GROWING GRAVID UTERUS MAY RESULT IN NARROWER TOLERANCE OF FLUID ACCUMULATION IN THE PERITONEAL AND PLEURAL CAVITY FROM PLASMA LEAKAGE.

HENCE EXCESSIVE FLUID REPLACEMENT SHOULD BE AVOIDED.

- IF SEVERE HEMORRHAGE OCCURS, REPLACEMENT WITH TRANSFUSION OF FRESH WHOLE BLOOD/FRESH PACKED RED CELLS SHOULD BE PROMPTLY INSTITUTED
- TREATMENT TAILORED TO INDIVIDUAL CASES

Table 4: Dengue management in pregnancy

<i>Gestational age</i>	<i>Uninfected</i>	<i>Infected</i>	<i>Changes in management</i>
1st trimester	Wide pulse pressure	Narrow pulse pressure Increased capillary leak Increased chances of pulmonary edema Reduced plasma volume Increased risk of pre-eclampsia and eclampsia Fever may induce abortion	Frequent vital monitoring Guided rational fluid resuscitation POCUS for fluid overload Fetal well-being on USG Control febrile peak
2nd trimester	Wide pulse pressure Reduced pulse rate, SBP and DBP Increased plasma volume	Risk of complications more than in general population Increased risk of pre-eclampsia and eclampsia	Frequent monitoring for maternal and fetal well-being Guided rational fluid resuscitation POCUS for fluid overload
3rd trimester	Rising heart rate but <100 Plasma volume increases till 34 weeks SBP and DBP rises	No increased risk to mother or fetus if no shock or bleeding Fever may cause preterm labor Careful monitoring for capillary leak	Frequent monitoring Guided rational fluid resuscitation Control fever POCUS for fluid overload Fetal well-being on USG
Postpartum	Return to normal prepregnant state in 2 weeks Heart rate gradually decreases BP rises till day 5–7 postpartum, later decreases to normal	No specific altered physiology Thrombocytopenia may increase risk of postpartum bleeding	Vital monitoring Watch for abnormal bleeding Rational fluid resuscitation

Pearls: How to recognize severe bleeding

Determine if the patient has **UNSTABLE** haemodynamic status



Any **ONE** of the following:

1. Persistent and/or severe overt bleeding, regardless of the HCT level
2. A decreased HCT **after** fluid resuscitation, especially with **colloids**
3. Hypotensive shock with low/normal HCT **before** fluid resuscitation
4. Refractory shock
5. Persistent metabolic acidosis

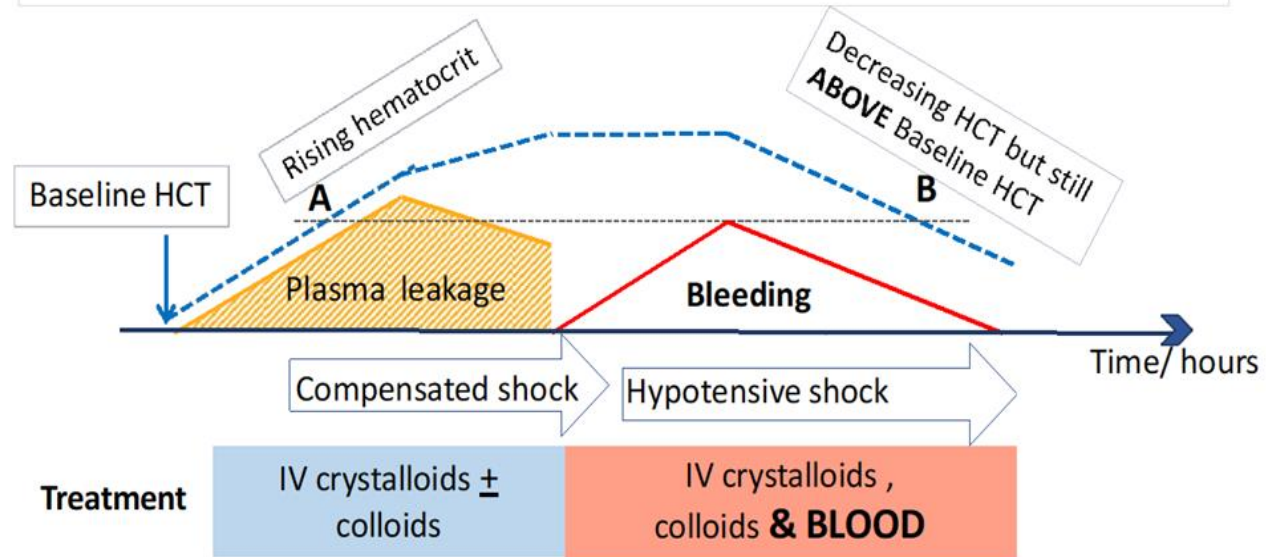
Remember that clinical signs come as a “package”. Mostly and likely, more than one of the above will be observed.

Group and **CROSS MATCH** for all dengue **SHOCK** (esp **Hypotensive**) patients at admission

Time lines (Hours) of Plasma Leakage & Bleeding in Severe Dengue

Plasma leakage precedes severe bleeding;

Even in severe bleeding in patients with severe shock,
hematocrit will not decrease to low levels



Management of Severe Dengue in ICU

Table 2: Expanded dengue syndrome

<i>System involved</i>	<i>Clinical manifestations</i>	<i>Proposed workup</i>	<i>Treatment</i>
CNS	Encephalopathy (multifactorial/metabolic)	Electrolytes, RFT, LFT	Correct metabolic abnormality
	Encephalitis (altered mentation)	MRI, CSF	Supportive T/T
	Seizures (encephalitis)	MRI	BZD, Antiepileptics
	IC Bleed (focal deficits)	NCCT, CECT, MRI	Supportive T/T
GI tract	Hepatitis	LFT, Coagulogram, Sr Ferritin	Avoid paracetamol, supportive T/T
	FHF	LFT, Coagulogram, serum ammonia	NAC infusion, supportive T/T
	Acute pancreatitis	Sr. Ferritin, LDH, TG	Supportive T/T
	Acute cholecystitis (a calculus)	CE CT Abdomen, Sr Amylase, Lipase USG abdomen	Supportive T/T
Renal	AKI/ATN (reduced urine output)	RFT, Sr. Electrolytes,	Fluid resuscitation
	HUS/TTP	Urine R/E Peripheral smear (Retic count, schistocytes to R/O HUS/TTP)	Diuretics Supportive T/T
CVS	Myocarditis (CCF/Arrhythmias)	Cardiac biomarkers	Guided IV fluids
	Pericardial effusion	Echocardiography	Inotropes
	(s/o capillary leak)	ECG monitoring Echocardiography	Antiarrhythmic Supportive T/T
Respiratory	Pleural effusion	CXR, USG chest	Supportive T/T
	Pulmonary edema (SOB, Hypoxia)	CXR, Cardiac biomarkers, Echocardiography	Oxygen,
	ARDS (SOB, Hypoxia)	CXR, HRCT chest	Diuretics
	Pulmonary hemorrhage	Serial Hb, HCT	Supportive T/T
	(SOB, Hypoxia, Falling HCT)	CXR, CECT chest	Oxygenation Supportive T/T Blood and platelet transfusion Supportive T/T
Eyes	Visual loss	Visual acuity	Platelet transfusion
	(Macular hemorrhage, optic neuritis)	Fundus examination	Supportive therapy
	Conjunctival hemorrhage	Platelet count	Steroids

- FLUID OF CHOICE – CRYSTALLOIDS
- CONSIDER COLLOIDS IF BP IS TO BE RESTORED
- PP< 10MMHG – CONSIDER ALBUMIN
- PROPHYLACTIC TRANSFUSION – NOT SUPPORTED
- STEROIDS – AGAINST

CHALLENGES

- **CLEAR FLUID PLANS**
- **FREQUENT REASSESSMENT**
- **DELIVERY PLANS –**
 - ✓ **TIME AND MODE**
 - ✓ **PLT CUT OFF**
- **CONSULTANT OVERVIEW**
- **GUIDELINE FOR THE HOSPITAL**

IN CONCLUSION

