1. Does your patient qualify?

**Case duration** > 3 hrs
**OR** anticipated EBL > 300 mL

**YES**

**Major open case** (such as, but not limited to):
- **Colorectal**: ex-lap, open colectomy, APR, exenteration
- **Hepatobiliary**: open hepatectomy, pancreatectomy
- **Urology**: open nephrectomy
- **Gynecology**: open myomectomy
- **Gyn-Onc**: open hysterectomy, debulking, ex-lap
- **OHNS**: long free-flap cases
- **Spine**: >4 level fusion (follow Adult Complex Spine Protocol)

**NO**

**Normal Fluid Therapy**
(i.e. ERAS guidelines, NTE 2L)

**NO**

**All laparoscopic or robotic cases**

**Fluid Suggestion**

**Induction**: 10ml/kg

**Maintain**: 8ml/kg/hr unless >4 hrs

**Use ideal body weight**

**YES**

**High Risk Patient** (any 1 will qualify)
- Age ≥ 70
- Cardiac History:
  - Low EF (<50%), mod-severe diastolic dysfunction (grade 2 or 3)
  - CAD (including non-obstructive), PCI, CABG, or MI
  - Mod-severe valvular disease
  - COPD or history of heavy smoking (> 20 pack-years)
  - CKD (baseline Cr ≥ 1.5 mg/dL)
  - Insulin-dependent diabetes mellitus
  - Obesity (BMI ≥ 35)

**NO**

**YES**

Qualifies for **Goal Directed Fluid Therapy**!
Recommend arterial line placement for monitoring of SPV/PPV
2. Fluid management algorithm

- No spontaneous breathing
- No cardiac arrhythmias

Monitor MAP
- PPV or SPV

- PPV > 13% or SPV > 10
  - Fluid responsiveness is **likely** if there is no RV failure or IAH
  - Recommend rapid 250ml Pyle or LR bolus

- 9% < PPV < 13% or SPV / PPV > 5% baseline
  - Consider a tidal volume challenge**

- PPV < 9% or SPV < 10
  - Fluid responsiveness **unlikely**

**Tidal volume challenge is mechanical ventilation with >8ml/kg tidal volumes

Consider only if:
- Hypotension requiring escalating pressors
- Oliguria
- Increased lactate
### 3. FAQs

| What Crystalloid Solution is Preferred? | **Plasmalyte**  
LR is an acceptable alternative  
Do not use 0.9% NaCl (normal saline) unless for a specific indication |
|----------------------------------------|---------------------------------------------------------------|
| What about Colloid Products?           | **Should not be 1st line therapy**  
**Acceptable to switch to Albumin (5%) if:**  
rapid resuscitation is needed, EBL>1L, Crystalloid > 3L, or other specific indication  
**Continue GDFT with 250mL albumin boluses**  
Do not use Hextend/Hetastarches |
| What about Blood Products?             | **Transfuse pRBCs** to maintain Hgb > 7 g/dL intraop (or Hgb > 8 if actively bleeding)  
**Administer FFP/platelets** instead of Plyte/LR/Albumin if clinically indicated |
| Any other caveats?                     | **Spine Cases:** Please follow the [Adult Complex Spine Deformity Surgery Anesthesia Protocol](#)  
If patient is prone, SPV and PPV may **not** be a good prediction of fluid responsiveness for:  
• BMI > 30, or  
• Low lung compliance, i.e. peak pressures > 30 cmH2O  
Anesthesiologists **may abort GDFT algorithm at any time** if patient is not improving or the algorithm is thought to be harming the patient’s condition |
4. Interpreting SPV/PPV with the GE monitor

**Systolic Pressure Variation (SPV)**

- If respiratory variation is creating differences of SBP such that SPV is greater than 10 mmHg, in the right clinical context this is suggestive that patient may be fluid responsive.

- If SPV is less than 10 mmHg, there could be other reasons causing soft blood pressures, and additional fluids are less likely to help.

**Display SPV on GE Monitor:** select Monitor Setup, select Screen Setup; select Lower Parameter Area; in an unused space scroll up to SPV. (displays averaged SPV value in mmHg updated serially, also displays PPV %)

**Manually calculate SPV on GE Monitor:** select SPV window; allow curve to be drawn, select Freeze; adjust SBPmax and SBPmin lines with toggle buttons. (displays this SPV value in mmHg until next manual calculation)

**Pulse Pressure Variation (PPV)**

\[ PPV = \frac{PP_{\text{max}} - PP_{\text{min}}}{PP_{\text{mean}}} \times 100 \]

- PPV > 13% : likely fluid responsive
- PPV < 9% : not fluid responsive
- 9% < PPV < 13% : “gray zone”

**Limitations**
- Requires arterial BP monitoring
- Extreme bradycardia or high RR
- Arrhythmia/irregular HR (e.g. atrial fibrillation)
- ↑ intra-abdominal pressure (e.g. pneumoperitoneum)
- Open thorax
- Spontaneous ventilation, low tidal-volume ventilation
- Low arterial compliance (high-dose vasopressors, severe atherosclerosis/PVD)
- RV and/or LV failure

**References:**
- PMID 21906322 and PMID 19602972
- Miller’s Anesthesiology 8th ed. 2015
- Michard F, Anesthesiology 2005