1. Does your patient qualify?

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

**NO**

**YES**

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

**NO**

**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

Alternative data from LiDCO monitor
2. Fluid management algorithm and 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
- Continue GDFT with boluses of blood product if feasible

**Any other caveats?**
- 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
3. Interpreting SPV/PPV with the GE monitor

**Systolic Pressure Variation (SPV)**

- 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

"Every breath is a bolus"

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

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

References:
PMID 21906322 and PMID 19602972
Miller's Anesthesiology 8th ed. 2015
Michard F, Anesthesiology 2005
4. Algorithm Variant if using LiDCO

* Sepsis/SIRS, anticipated or planned blood product transfusion, chronic lung disease
† Set PEEP 5, lowest FiO2 to maintain baseline SpO2
‡ Recommend assessment at least every 30 min (or more frequent if clinically indicated)
§ PPV, SPV, and PVI > 10-15% lends support to the decision to administer fluid bolus in the SVV-driven algorithm
** MAP goal > 65 mmHg or within 20% of baseline (whichever number is higher)
†† Consider use of SedLine monitor

Note key difference:
SVV = Stroke volume variation
- Useful for continuous monitoring of fluid responsiveness
- Gold standard for assessing successful fluid challenge

Note:
In the presence of dysrhythmia, Stroke Volume (SV) monitoring remains useful in a GDFT algorithm

Do not use SVV, PPV, SPV, or PVI.
5. Interpreting Stroke Volume (SV) and Stroke Volume Variation (SVV) with the LiDCO monitor

Materials needed

1) Regular arterial line (preferred) OR
2) CNAP sensor

Hemodynamic Window

\[ nSV = \text{scaled stroke volume, based on patient parameters from a nomogram (height, weight, age)} \]
\[ nCO = \text{scaled cardiac output (i.e., } nSV \times \text{HR)} \]

Dynamic Preload Parameters Window

Evidence shows that stroke volume variation >10-15% may indicate fluid responsiveness

Blood Pressure Window

References:
LiDCO website (www.lidco.com)

For the curious: LiDCO uses a proprietary PulseCO algorithm that converts an arterial pressure waveform into a presumed stroke volume

Pitfalls:
• Overdamped or Underdamped arterial lines
• Pathologies affecting vascular compliance (PAD, aortic regurgitation, IABP)
• Spontaneous breathing
• Low tidal volumes (<8ml/kg)
• Arrhythmias
• Pediatric patients (nomogram is not established)