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| **Supplemental Table 1: Recommendation table** |
| **Intervention** | **Clinical presentation(s) for which the recommendation applies** | **Rationale** | **Desired effects** | **Risks** | **Resources and costs** | **Level of evidence** | **Recommendation**(M = median on Likert scale (1-9), L/UIQ = lower/upper interquartile 9as appropriate), DI = disagreement index) |
| Asymptomatic | Symptomatic (first line) | Refractory to first line  | Refractory shock or peri-arrest (rescue treatment) |  In cardiac arrest |
| **IN FAVOUR** |
| Calcium IV |  | **X** | **X** | **X** | **X** | Increase transmembrane gradient which may overcome competitive antagonism of CCB | Hemodynamic improvement in some cases (blood pressure, contractility) | - Extravasation of chloride salt may lead to severe local tissue injury- Hypercalcemia | Available | D: case series and animal studies of poor to fair quality | Level 1: strongly in favour (M: 8, LIQ: 7, DI 0.2)Typical dose:- Calcium chloride 10% IV:Adults: 10-20 ml (1-2g) Q10-20 min or infusion at 0.2-0.4 ml/kg/h (0.02-0.04 g/kg/h)- Calcium gluconate 10% IV: Adults: 30-60 ml (3-6g) Q10-20 min or infusion at 0.6-1.2 ml/kg/h (0.06-0.12 g/kg/h) |
| High-dose insulin |  | **X** | **X** | **X** |  | - Direct positive inotropic effect while increasing calcium entry into the cell- Facilitates the use of carbohydrates by the myocardium | - Possible improvement in survival- Hemodynamic improvement (blood pressure, contractility)- Decrease in vasopressors requirement | - Hypoglycemia- Hypokalemia- Volume overload | - Available - Requires intensive monitoring and additional resources | D: observational studies of poor quality, case series of poor to fair quality and animal studies of good quality | Level 1: strongly in favour when combined with fluids, calcium and vasopressors in the presence of myocardial dysfunction (M: 8, LIQ: 7, DI: 0.3)Level 2: weakly in favour when combined with fluids, calcium and vasopressors without evidence of myocardial dysfunction (M: 8, LIQ: 6.5, DI: 0.2) or alone in the presence of myocardial dysfunction (M: 7, LIQ: 4.5, DI: 0.5)Typical dose (insulin regular):1U/kg bolus followed by an infusion at 1U/kg/h (maintain euglycemia with dextrose if needed) |
| Atropine |  | **X** | **X** | **X** | **X** | Inhibits action of acetylcholine on autonomic effectors | Possible hemodynamic improvement (heart rate) | - Anticholinergic effects | Available | D: case series and animal studies of poor to fair quality | Level 2: weakly in favour (M:7, LIQ: 6.5, DI: 0)Typical dose:0.02 mg/kg (min 0.1 mg and max 0.5 mg) |
| Norepinephrine (NE), epinephrine |  | **X** | **X** | **X** | **X** | NE has a strong alpha and moderate beta-1 effects; epinephrine has a strong beta-1, alpha with moderate beta-2 effects | Hemodynamic improvement (blood pressure, +/- contractility, +/- heart rate) | - Organ/tissue ischemia- Increase in lactate and glucose with epinephrine | Available | D: case series and animal studies of poor to fair quality | Level 1: strongly in favour in presence of undifferentiated shock (M: 8, LIQ: 7-7.5, DI: 0-0.2), but preferentially norepinephrine in presence of vasodilatory shock (M: 8, LIQ: 7.5, DI: 0.1) |
| Dobutamine |  | **X** | **X** | **X** |  | Strong beta-1 and weak beta-2 effects | Possible hemodynamic improvement (contractility, heart rate) | Worsening hypotension | Available | D: case series of fair quality, but small number of patients | Level 2: weakly in favour in patients presenting with documented cardiogenic shock (M: 7, LIQ: 5, DI 0.2) |
| Incremental doses of high-dose insulin |  |  | **X** | **X** |  | - Direct positive inotropic effect while increasing calcium entry into the cell- Aids the heart to use carbohydrates as a source of metabolism | - Hemodynamic improvement (blood pressure, contractility)- Decrease in vasopressors requirement | - Hypoglycemia- Hypokalemia- Volume overload | - Available - Requires intensive monitoring and additional resources | D: one small case series of fair quality | Level 2: when refractory to first line treatments, weakly in favour in the presence of myocardial dysfunction (M: 7, LIQ: 6, DI: 0.4)Level 1: for rescue treatment, strongly in favour in the presence of myocardial dysfunction (M:7, LIQ: 7 DI 0.2) Level 2: for rescue treatment, weakly in favour with no documented evidence of myocardial dysfunction (M: 7, LIQ: 4.5, DI 0.4)Typical dose (insulin regular):Progressive increase of the infusion rate up to 10U/kg/h (maintain euglycemia with dextrose if needed) |
| Pacemaker |  |  | **X** | **X** |  | Direct chronotropic stimulation | Possible hemodynamic improvement (heart rate) | - Discomfort- Capture and pacing problems | Transcutaneous more available and faster to initiate than transvenous | D: case series of poor quality | Level 2: for patients refractory to first-line therapy or as a rescue therapy, weakly in favour in the presence of unstable bradycardia or high-grade AV block and no significant alteration in inotropism (M:8, LIQ: 5.5, DI: 0.2-0.8) |
| Lipid emulsion therapy |  |  | **X** | **X** | **X** | - Lipid sink for redistribution of the toxicant - Provides fatty acids that may be used by the myocardium | Possible hemodynamic improvement (blood pressure +/- heart rate) | - Hyperlipemia- Venous thrombosis- Possible fat embolism- Possible decrease efficacy of other treatments- Laboratory interference: ABG, SatO2, CBC, lytes | Available in most centers | D: animal studies of fair quality and case reports | Level 2: for patients refractory to first-line therapy, weakly in favor (M: 7, LIQ: 5.5, DI: 0.2)Level 1: for rescue treatment, strongly in favour (M: 8, LIQ: 7, DI 0.2)Level 1-2: in cardiac arrest, strongly in favour if not administered previously (M: 8, LIQ: 7, DI: 0.1), and weakly in favour if a previously administered (M: 7, LIQ: 6, DI: 0.3) |
| VA-ECMO (or ECLS) |  |  |  | **X** | **X** | Hemodynamic support as a bridge to recovery | - Survival benefit- Hemodynamic improvement (mean arterial pressure) | - Limb ischemia- Thrombosis - Bleeding | - Available only in certain centers- Cost should not preclude consideration of the therapy where it is available (St-Onge et al., 2014) | D: one observational study of good quality including all cardiotoxicants and case series of fair quality | Level 2 for rescue treatments: weakly in favour in patients presenting with cardiogenic shock (M:7, LIQ: 5.5, DI: 0.2)Level 2 in cardiac arrest: weakly in favour in patients with a low flow of less than 5 min, but weakly against if low flow more than 15 min (M: 7, LIQ: 5.5, DI 0.4) |
| **AGAINST** |
| Glucagon | **X** | **X** | **X** | **X** | **X** | Bypasses the beta receptors to activate the same secondary messengers and improve inotropism | Unclear | - Vomiting- Hyperglycemia- Tachyphylaxis | Limited availability | D: case series of fair quality | Level 2: weakly against (M:3, UIQ: 5.5, DI: 0.4-0.7)  |
| Dopamine | **X** | **X** |  |  |  | Acts on dopaminergic, beta-1 and alpha receptors | Unclear | Ischemic complications | Available | D: case series and animal studies of poor to fair quality | Level 2: weakly against in patients presenting with undifferentiated or vasopleglic shock (M: 3, UIQ: 5, DI 0.2) |
| Vasopressin | **X** | **X** |  |  |  | Vasopressin agonist | Unclear | Ischemic complications | Available | D: case series and animal studies of poor to fair quality | Level 2: weakly against in documented cardiogenic shock (M: 3, UIQ: 4, DI: 0.5)  |
| Methylene blue | **X** | **X** |  |  |  | - Inhibits guanylate cyclase, thus decreasing cGMP and vascular tone- Scavenges NO and inhibit NO synthesis | Possible hemodynamic improvement when used as a last resort | - Vomiting- Blue-green discoloration of body fluids - Serotonin syndrome in patients taking serotonin agents- Large doses: methemoglobinemia, hypoxia | Available | D: Case reports | Level 1: strongly against (M: 2, UIQ: 3, DI 0.1)  |
| Other treatments not recommended or not suggested: intra-aortic balloon pump, CVVHDF, charcoal hemoperfusion, albumin dialysis, MARS, plasma exchange, amrinone or other PDE-inhibitors, L-carnitine, levosimendan, digoxin, , liposomes, fructose 1,6 diphosphate, cyclodextrin, triidothyronine, PK11195, BK8644, CPG28932 or potassium antagonists. |