2003a(4): Outline the potential problems associated with additives used to make medications suitable for IV injection

General: IV medications are a common part of anaesthetic practice
- Enables rapidly available mode of administration
- Faster onset of action than other modes
- Can be administered whilst patient is unconscious

Additives are included in preparations in order to:

↑ solubility of drug → Easy storage
- Emulsifiers → soybean oil / lipids (Propofol / Etomidate)
  - Allergy / anaphylaxis
  - ↑calories
  - Pain on injection
- Propylene glycol (Etomidate / digoxin / phenytoin)
  - Thrombophlebitis
  - Pain
  - ↓BP 2° vasodilation
  - Blood: ↑osmolarity / ↓pH (↑lactate production)
- Benzyl alcohol (diazepam, phenobarbitone)
  - CVS S/E if given too rapidly
- Cremaphor EL *no longer used → previously propofol, Vit K, pregnelone*
  - Anaphylaxis

Stabilising Agent → prevent hydrolysis / oxidation whilst stored → predictable dose / effect
- Sulfites (metabisulfite) → adrenaline / TIVA propofol
  - Trigger asthma (bronchospasm)
  - Allergy / anaphylactoid reactions → Itch
- Lecithin → Propofol →?allergy in those with egg allergy

Maintains optimal pH / Osmolarity → soluble
- HCl maintains pH < 4 → closes ring in midazolam ↑ water solubility / easy storage
- Na₂CO₃
  - Acidic / alkaline solutions can be irritant to veins → minimised by use of large / central veins
  - Pain on injection
  - Thrombophlebitis

Preservatives → prevent contamination
- Benzalkonium Cl (BAC) → Bronchodilators, some ketamine preparations
  - Bronchoconstriction
  - Anaphylactoid reactions
- Chlorbutol → *not used → previously in ketamine*
  - Hypersensitivity
- Parabens → Na Benzoate / benzoic acid / Methyl paraben
  - Multiple agents
  - Very low allergenicity
  - ?vasodilation effect
  - Prevents yeast / funghi growth > bacteria

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