Introduction:
- Cardiovascular drugs are the substance category with the 3rd increased rate of exposure (Bronstein et al., 2010).
- No systematic review has been published for the treatment CCB poisoning.
- CCB poisoning carries a high mortality (6%) and, morbidity (50%) (St-Onge et al., 2012).

Objective:
Evaluate the efficacy of interventions considered for the treatment of CCB poisoning in adults.

Research question:
P: In adults poisoned with a CCB
I: which intervention(s)
C: when compared to no-intervention or to other intervention(s)
O: improve primary outcomes (mortality, hemodynamics, functional outcomes) or secondary outcomes (hospital LOS, ICU, LOS, duration of vasopressors, CCB serum level)
S: as shown by any type of study?

Eligibility criteria:
- All types of studies including case reports published/unpublished in any language.
- In-hospital adults or animals treated for a CCB poisoning.
- Defined intervention(s) meant to improve the targeted outcomes.

Information sources (up to August 2012):
- Cochrane, Medline/OVID, Pubmed, EMBASE, Toxline, International pharmaceutical abstracts, conference abstracts, trials registries, Google scholar searched, and selected authors contacted.

Study selection, data abstraction and quality analysis:
- Qualified independent reviewers using pilot tested forms.
- Cochrane risk of bias (CT), STROBE checklist (OS), Thomas’ tool (OS), Institute of Health Economics’ tool (CS), Arrive and, NRCNA checklist (AS).

Reported improvement in survival in the literature:
- OS: high-dose insulin (HDI) and extracorporeal life-support (ECLS)
- AS and CS: calcium, epinephrine, dopamine, norepinephrine
- AS: lipid emulsion for IV CCB intoxication

Reported improvement in hemodynamics in the literature:
- OS: HDI and ECLS
- AS and CS: epinephrine, dopamine, norepinephrine, 4-aminopyridine, levosimendan, plasma exchange
- AS: lipid emulsion, liposomes
- Inconsistent results: atropine, calcium, glucagon, pacemaker

Interrater agreement:
- OS – STROBE checklist: Kappa of 0.90 (95%CI 0.82-0.99)
- CS – IHE tool: Kappa of 0.80 (95%CI 0.76-0.84)
- AS – ARRIVE checklist: Kappa of 0.90 (95%CI 0.88-0.92)
- AS – NRCNA checklist: Kappa of 0.98 (95%CI 0.96-0.99)

Summary and quality of evidence (QOE):
- This systematic review demonstrates a possible benefit of HDI on hemodynamics and on mortality while increasing the risks of hypoglycemia and hypokalemia. (low QOE)
- It underlines a possible role for the use of ECLS to improve survival in patients in cardiac arrest or severe shock. Complications included bleeding, thrombosis or limb ischemia when a femoral cannulae is used. (low QOE)
- Calcium, dopamine, norepinephrine, epinephrine may improve hemodynamics. (very low QOE)
- Lipid emulsion may improve hemodynamics in models of IV verapamil overdose. Atropine, glucagon, the use of a pacemaker and plasma exchange demonstrated inconsistent results.

Conclusion:
This study is the first systematic review to summarize the evidence concerning the effects of treatments for CCB poisoning.
- Head-to-head comparisons in human clinical trials should be done concerning the use of vasopressors, HDI and ECLS.