

Gold Cyanide: The Insidious Poison & How to Fight It

Ramathibodi Poison Center



A 42-year old female
Intentionally ingested
“Potassium Gold Cyanide Powder”
20 hours prior to ER visit

Case

- 10 min after ingestion:
vomiting, abdominal pain, diarrhea
- At ER of regional hospital (20 hr after ingestion):
alert, dizzy,
BP 70/40 mmHg, HR 110/min → load IV fluid 2 L
BP 72/40 mmHg, HR 108/min → on vasopressor

Case

- Metabolic acidosis:
Na 141, K 3.5, Cl 105, HCO₃ 11, Anion gap 25
pH 7.3, pCO₂ 28, pO₂ 110

Case: receive cyanide antidote



Sodium nitrite



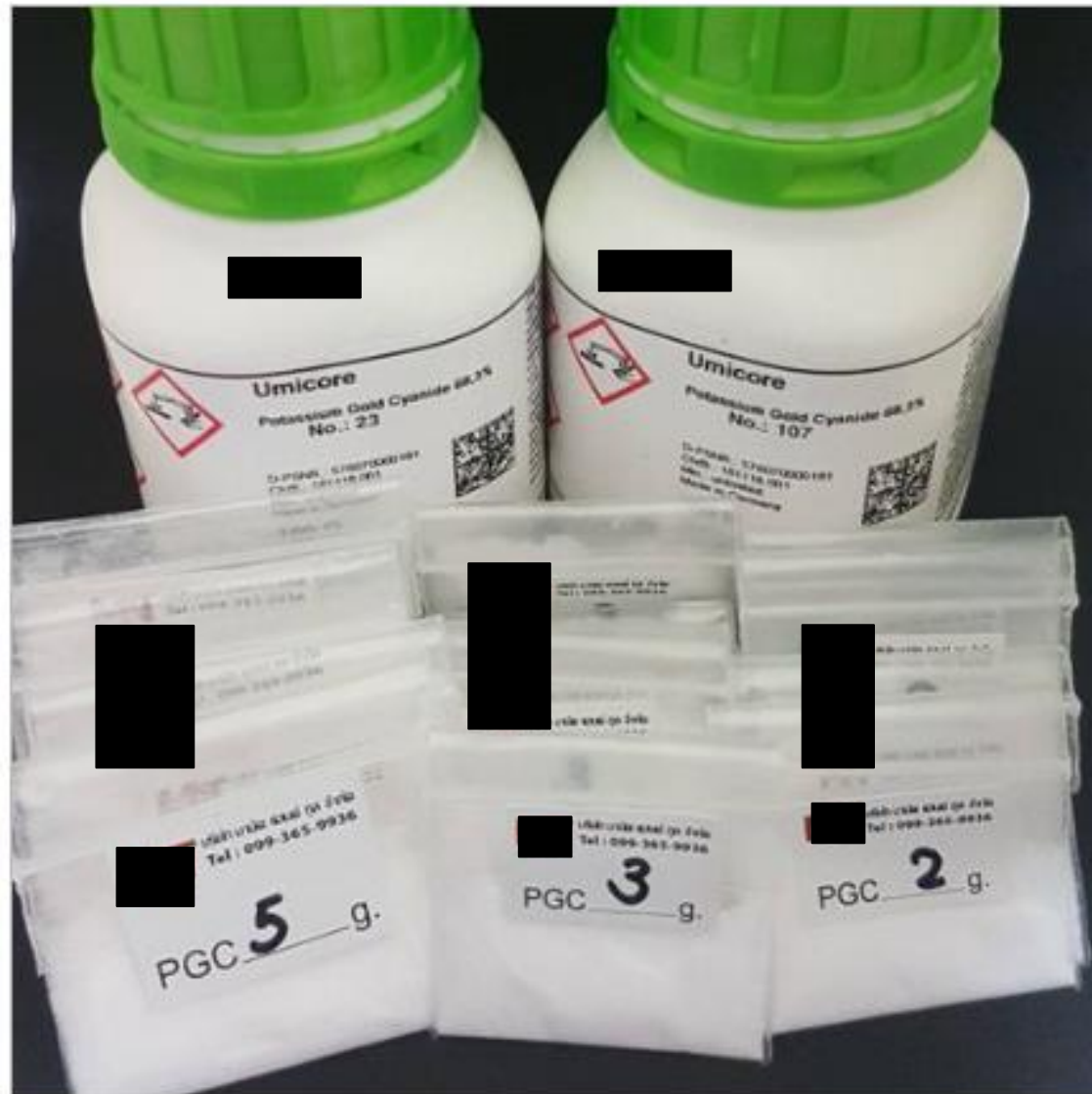
Sodium thiosulfate

Case: after antidote

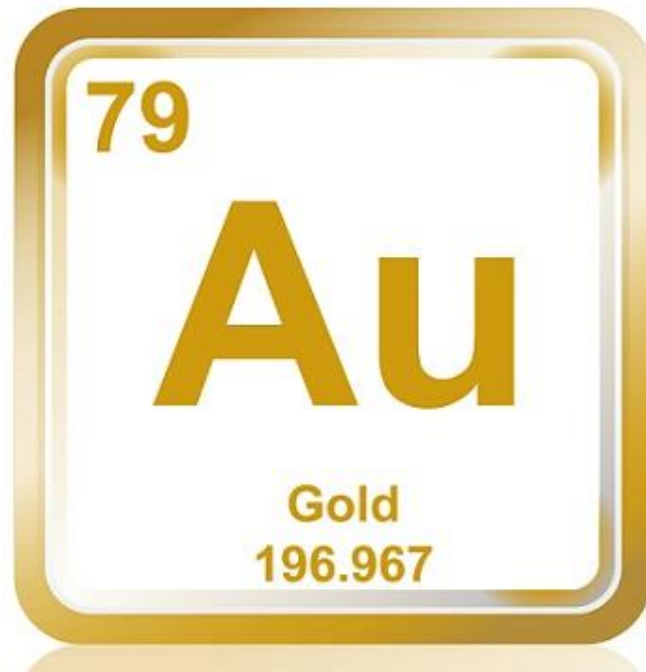
- BP 85-90/40-50 mmHg; can not taper vasopressor
Metabolic acidosis, and jaundice

“Partially response”

เกลือทอง [REDACTED] (Gold Potassium Cyanide)



Part 2: Gold



Gold

- “Gold” has been used as anti-inflammatory drug for treatment of rheumatoid arthritis
- Gold sodium thiomalate IM injection
 - Aurothiomalate
 - Myocrisin
 - Sanocrysin

Gold: adverse effect

- Skin: allergic dermatitis, exfoliative dermatitis
- Mucosa: stomatitis, enterocolitis,
- Liver injury
- Renal injury
- ↓ WBC, ↓ RBC, ↓ platelets,
- Anaphylactoid reaction

Gold: adverse effect

Gold in **erythrocytes**, whole blood, and plasma during long-term **chrysotherapy**.

Pedersen SM, Graabaek PM.

Ann Rheum Dis. 1980 Dec;39(6):576-9. doi: 10.1136/ard.39.6.576.

PMID: 7458435 **Free PMC article.**

RBC gold > 500 mcg/L is associated with adverse effect

What about Gold Cyanide

Potassium **Gold** Cyanide

Fatality from **potassium gold cyanide** poisoning.

Harmon E, Lebin J, Murphy D, Watsjold B.

Death; RBC Gold: not report

BMJ Case Rep. 2019 Jul 26;12(7):e229947. doi: 10.1136/bcr-2019-229947.

PMID: 31350229 [Free PMC article.](#)

Cholestatic hepatitis caused by acute **gold potassium cyanide** poisoning.

Wu ML, Tsai WJ, Ger J, Deng JF, Tsay SH, Yang MH.

Survived; RBC Gold: 4,361 mcg/L

J Toxicol Clin Toxicol. 2001;39(7):739-43. doi: 10.1081/clt-100108516.

PMID: 11778673

Acute poisoning with gold cyanide.

Wright IH, Vesey CJ.

Death; RBC Gold: 14,200 mcg/L

Anaesthesia. 1986 Sep;41(9):936-9. doi: 10.1111/j.1365-2044.1986.tb12920.x.

PMID: 3022615 [Free article.](#)

Potassium Gold Cyanide

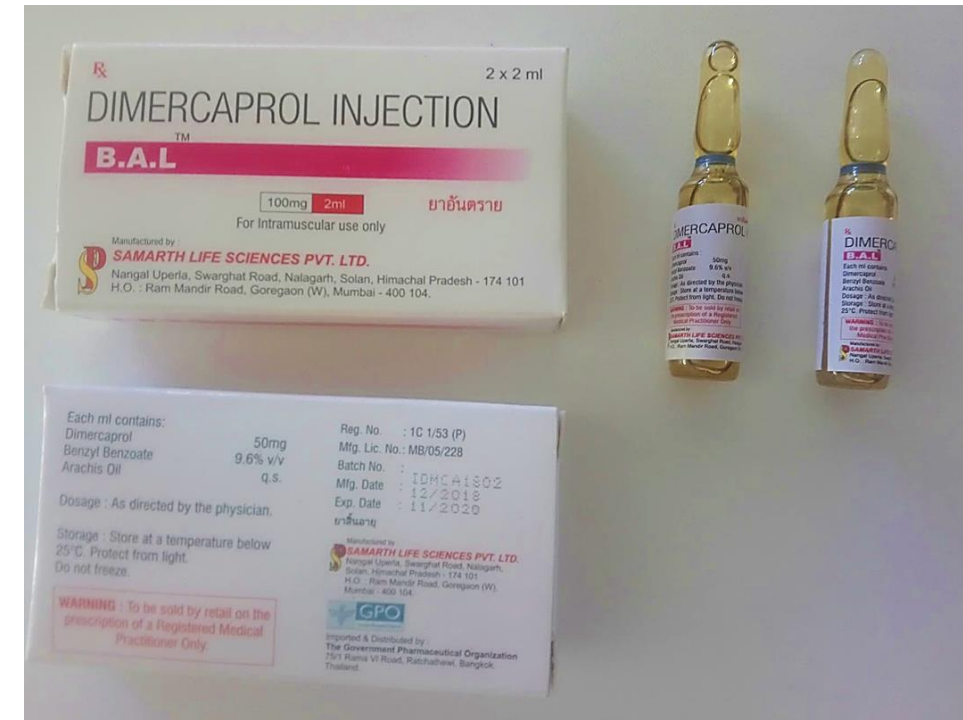
- Shock, hepatitis, multiorgan failure, acidosis
- **2 cases died despite CN antidote**
- **None receive Gold chelation**
- **RBC gold level are very high**
- ? Role for anti-inflammatory drug

Case: What we do

- Give **cyanide antidote**
- Chelate Gold using
“Dimercaprol”
(British Anti-Lewisite, BAL)
- Treat like severe allergic reaction
Using adrenaline, steroid, antihistamine

Case: progression

- Chelation with BAL
- Give adrenaline IM 1 dose
Steroid and antihistamine
- Clinical improve can tape off vasopressor
Fully recovery
- Continue chelation using BAL for 2 weeks
then switch to d-penicillamine



Case: progression

- Her whole blood gold concentration:
6,767 mcg/L
- After 2 wk of BAL & 2 wk of d-penicillamine
Gold level decrease to **232 mcg/L**

เกลือทอง

(Gold Potassium Cyanide)

GI symptom

Shock

Acidosis

Multiple organ injury



CN antidote

Chelation

Mx as severe inflammatory response

Notify authority

- We found 3 other cases (total 4 cases)
 - All developed severe hypotension and metabolic acidosis
 - 2 of 4 survive both received CN antidote, chelators, steroids
 - 1 death is delay presenter
 - 1 death has GI perforation (pack powder into capsule)
- 2 wk after that “Gold cyanide” was not temporally found on Thai electronic commercial platforms

Potassium Gold Cyanide

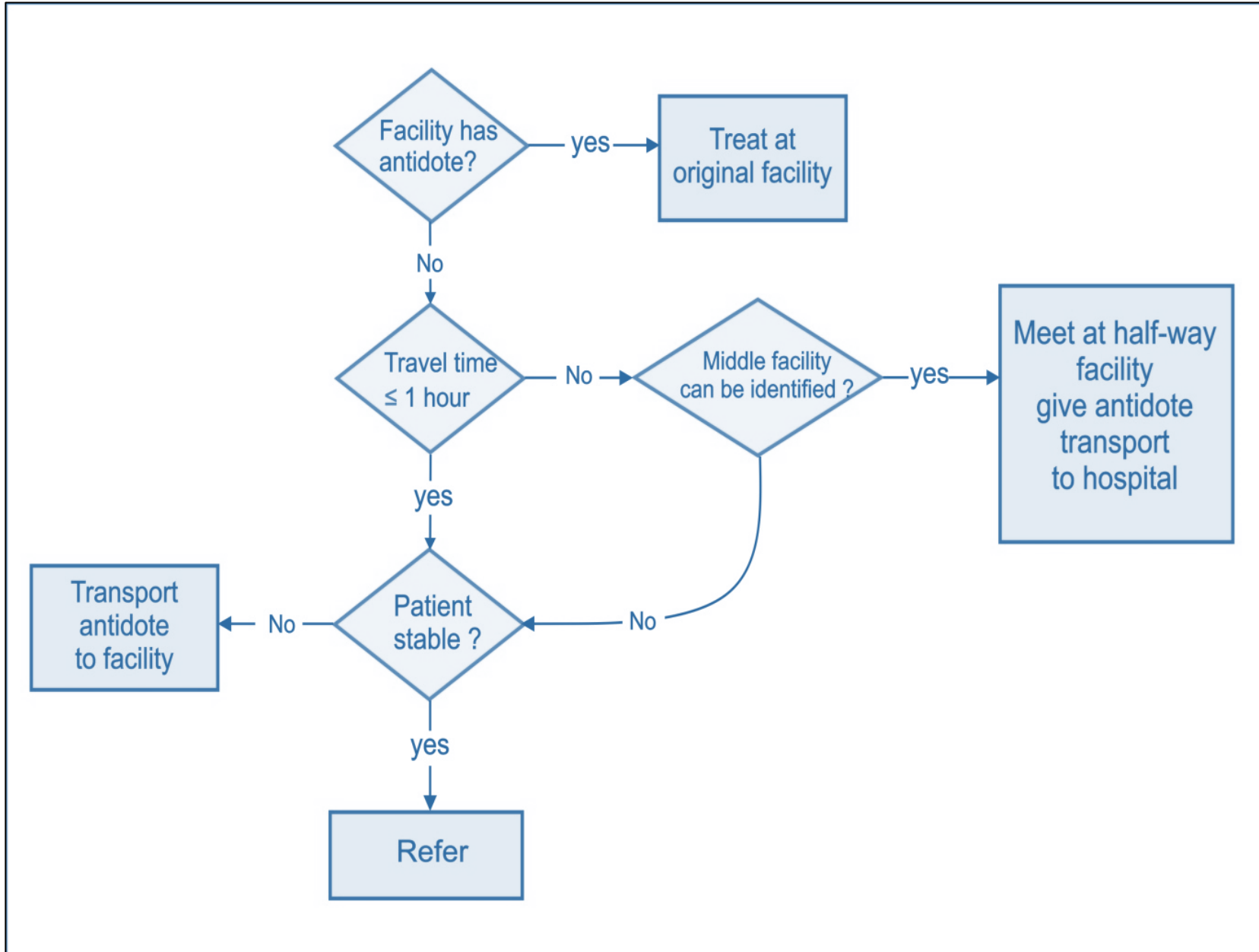
- Cyanide → CN antidote
- Gold → Chelation
- Severe inflammatory response → Steroid
- Supportive care

Antidotes Transportation

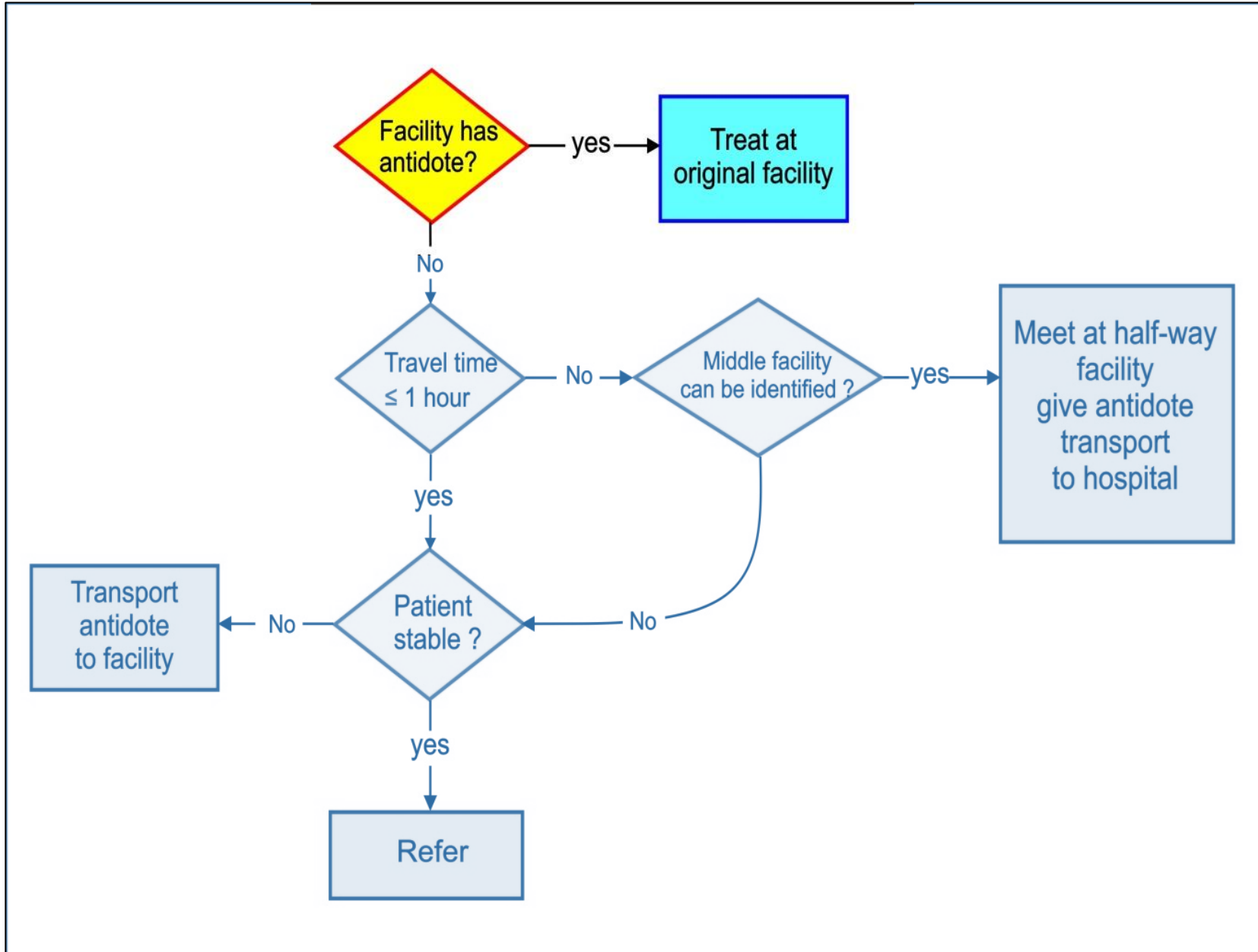
Priority of Antidote

Category	List of Antidote
1. Critical Antidote (0-1 hr.)	Cyanide Antidote
2. Emergency Antidote (1-6 hr.)	Methylene blue Antivenom for neurotoxin Antivenom for hematotoxin in case severe systemic bleeding BAL: Acute arsenic poisoning Lead encephalopathy CaNa ₂ EDTA : Lead encephalopathy Diphenhydramine
3. Urgency Antidote (6-24 hr.)	Botulinum antitoxin CaNa ₂ EDTA Dimercaprol (BAL) Antivenom hematotoxin Diphtheria antitoxin
4. Non-urgency Antidote	Succimer

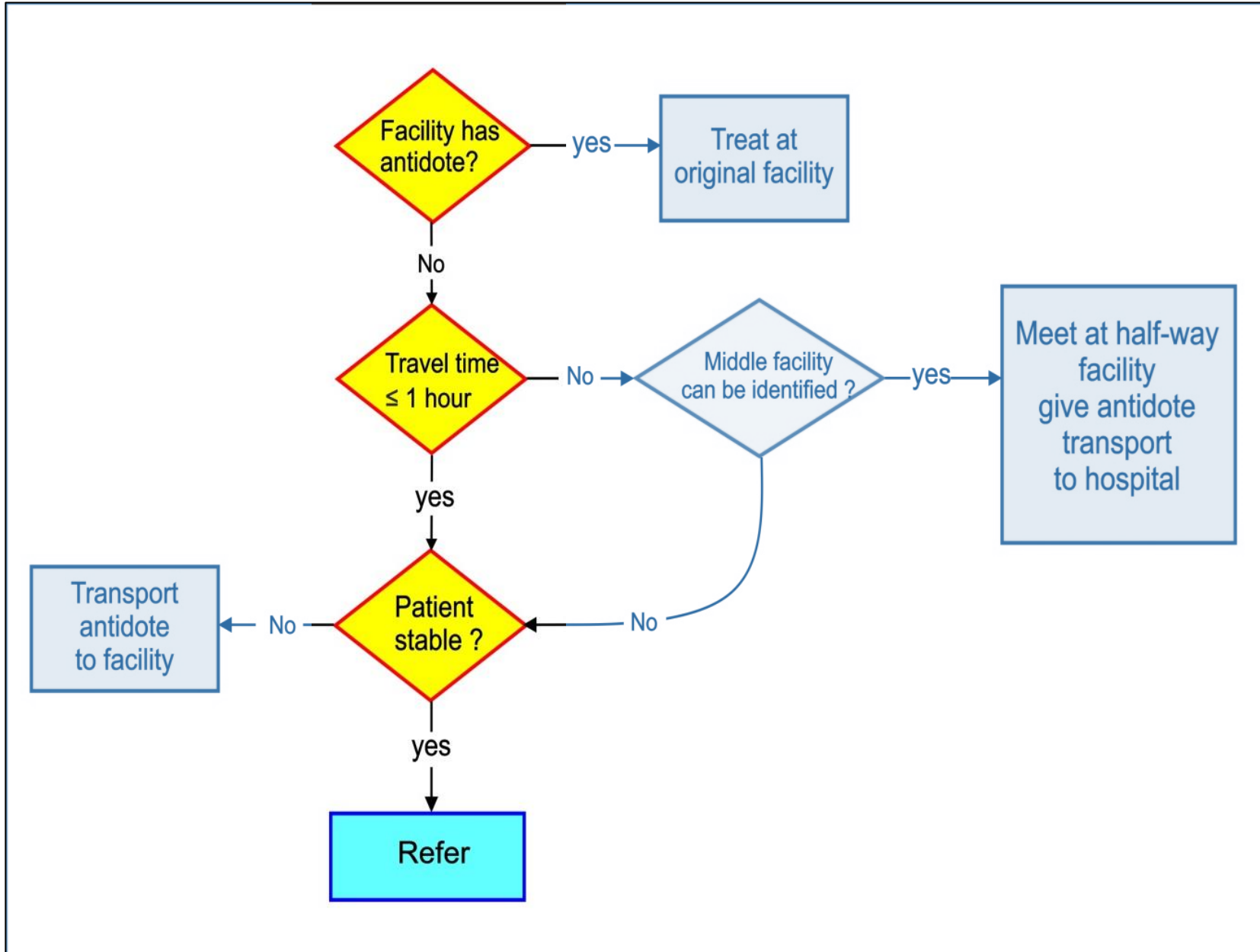
Logistic Model Transportation of Antidote



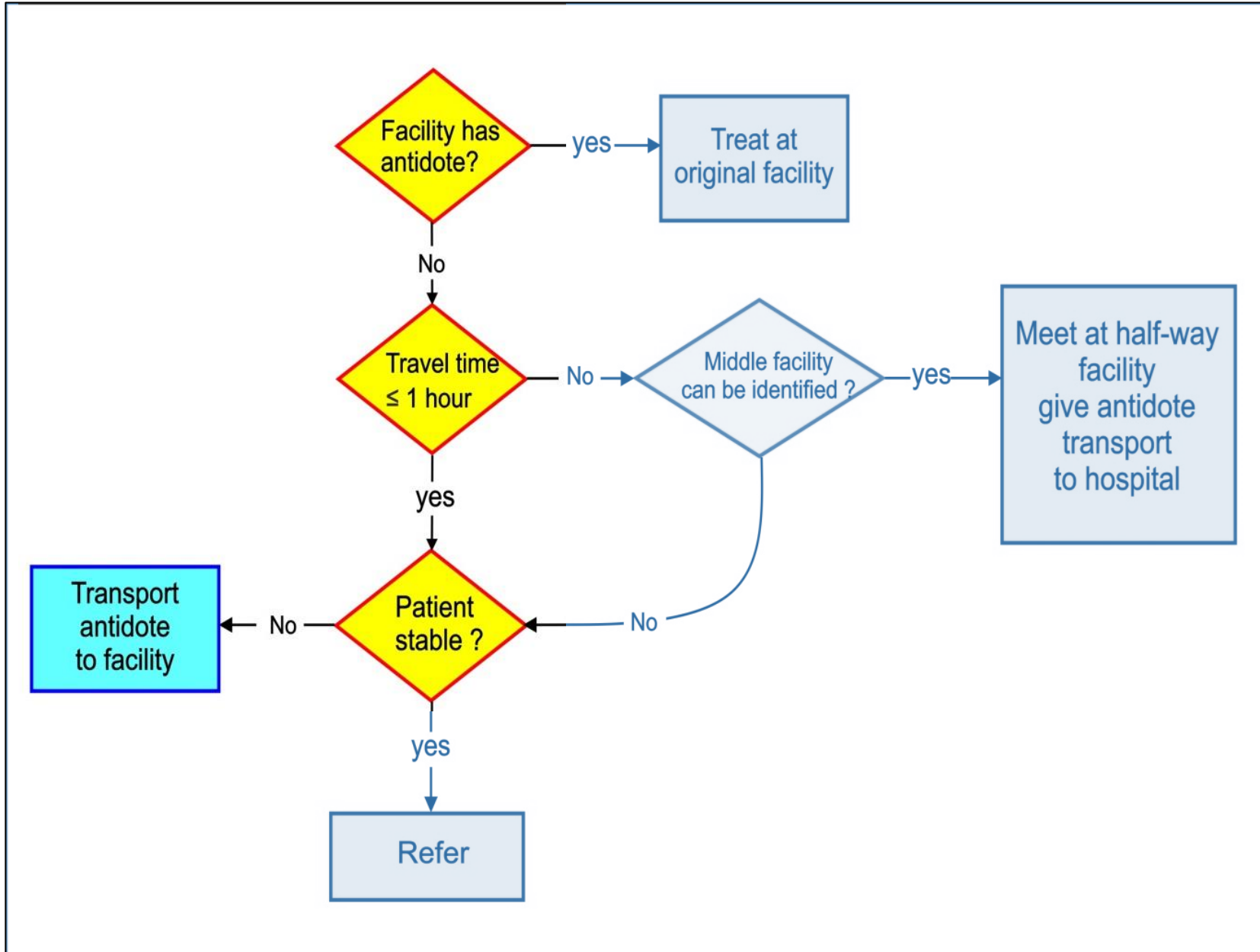
Logistic Model Transportation of Antidote



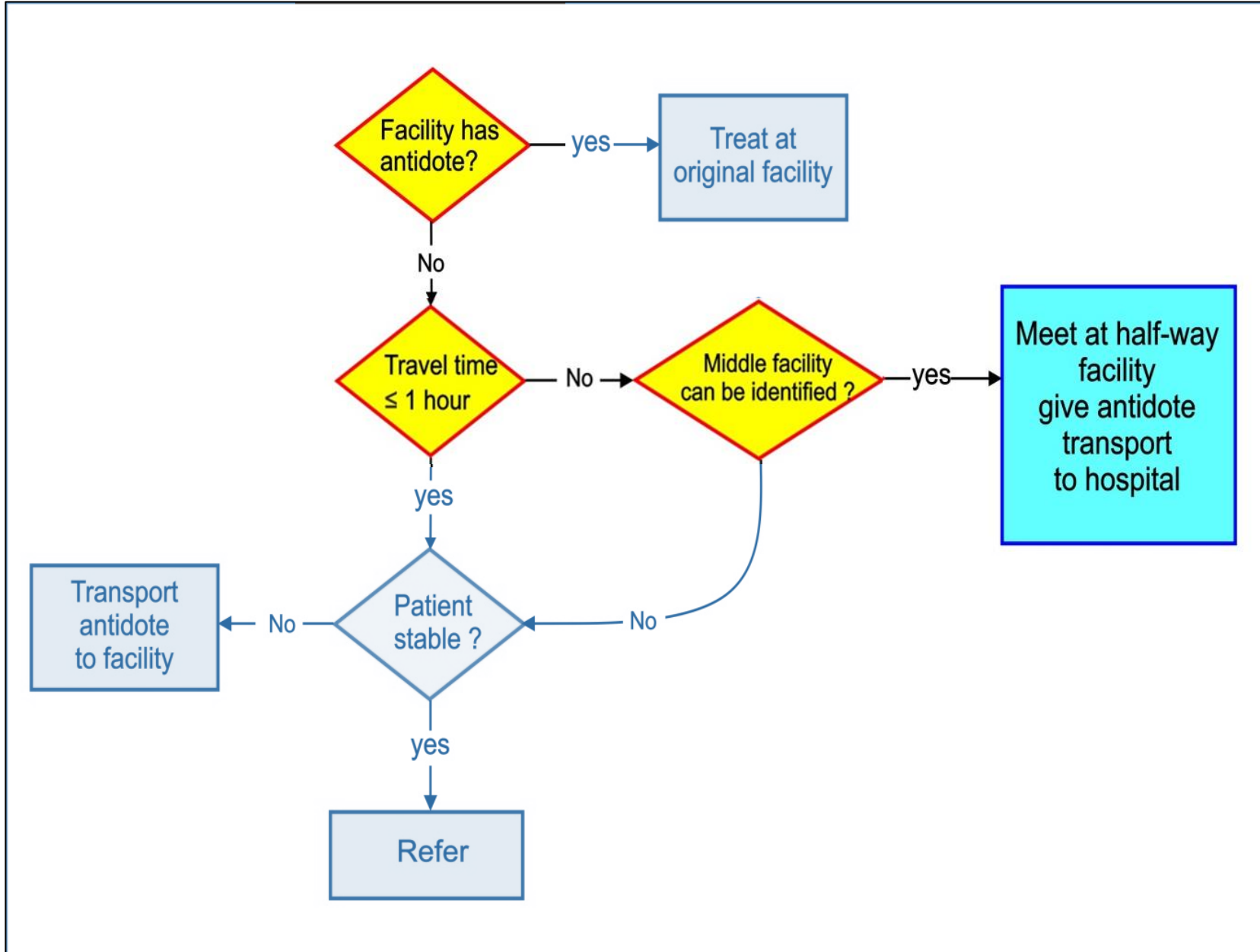
Logistic Model Transportation of Antidote



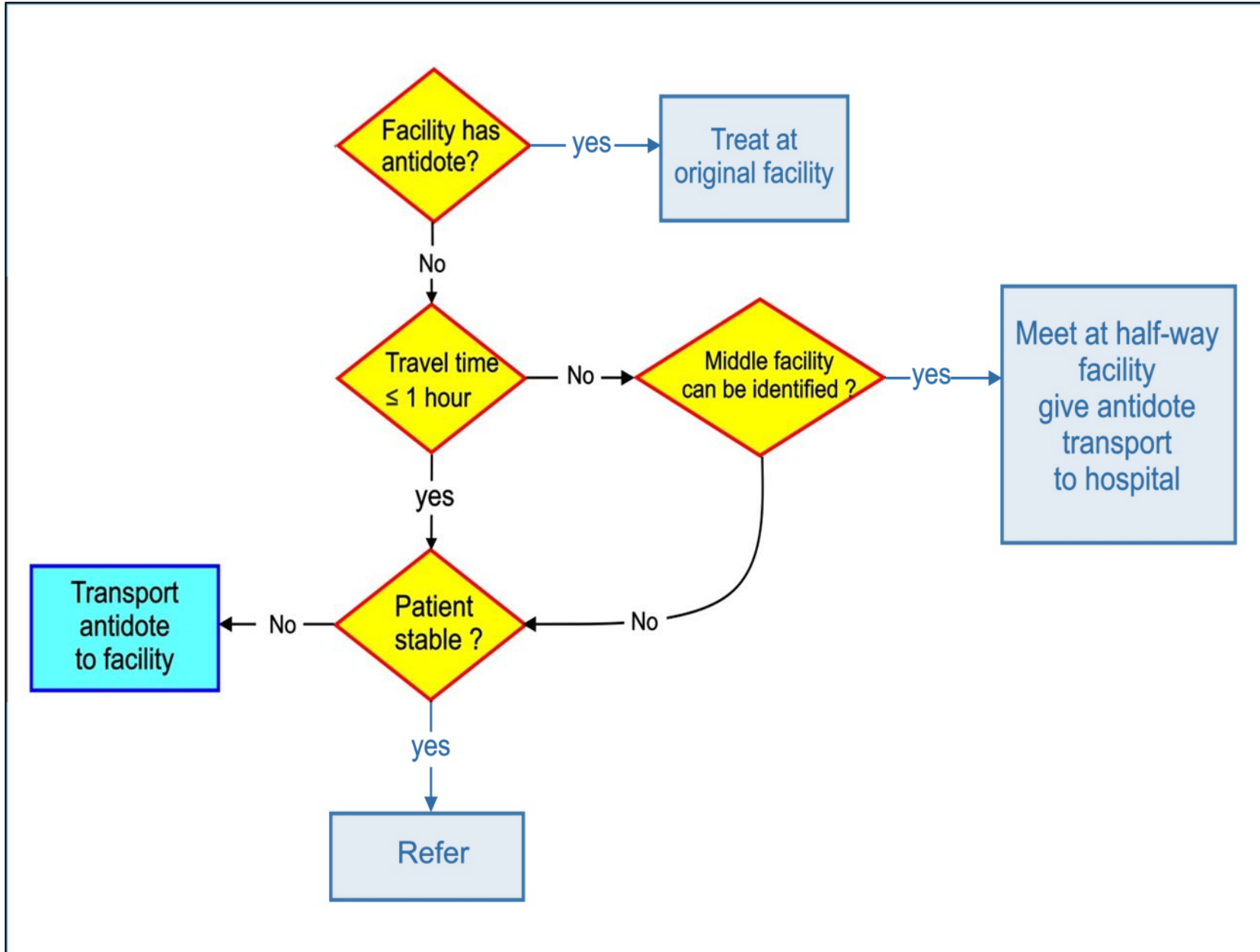
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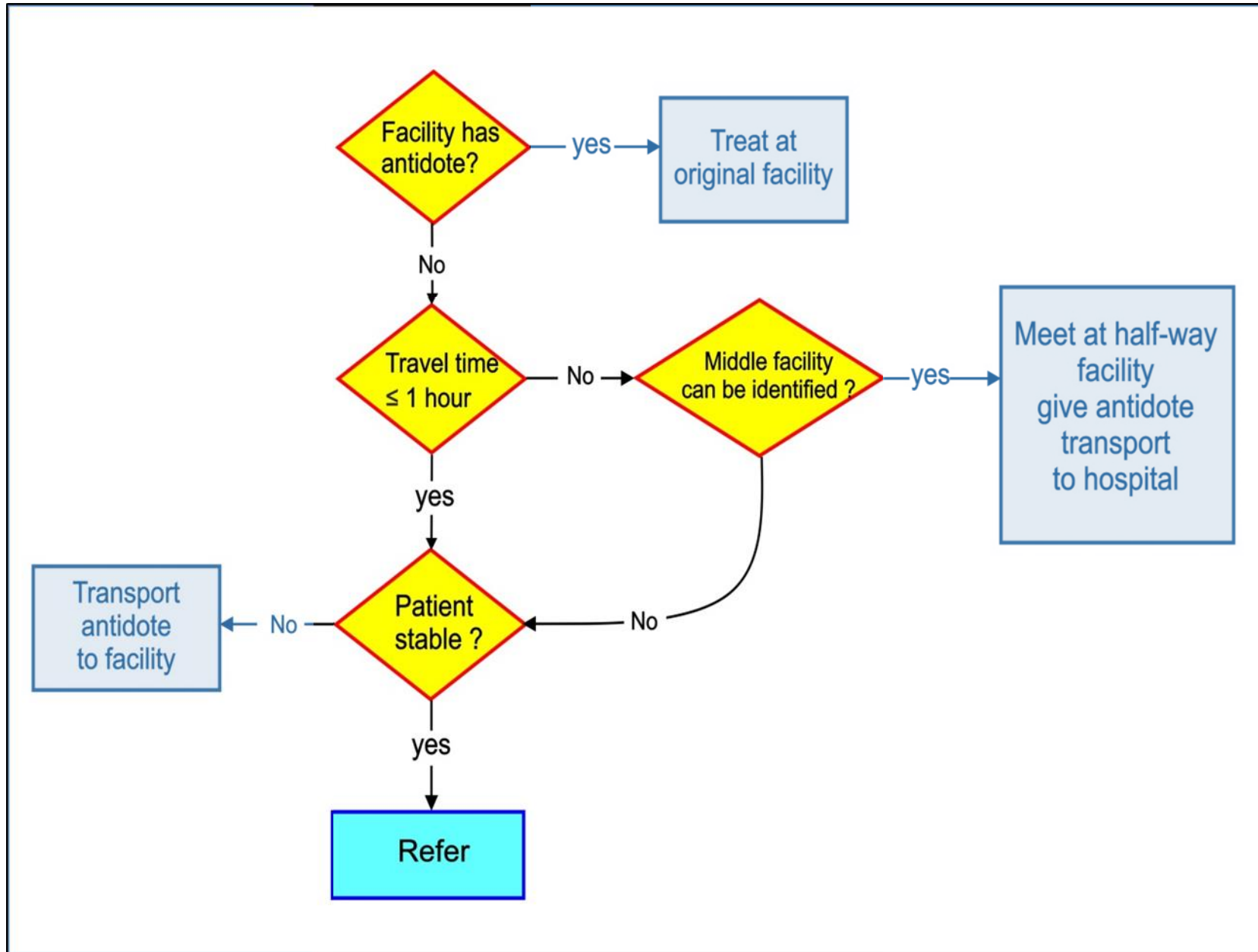
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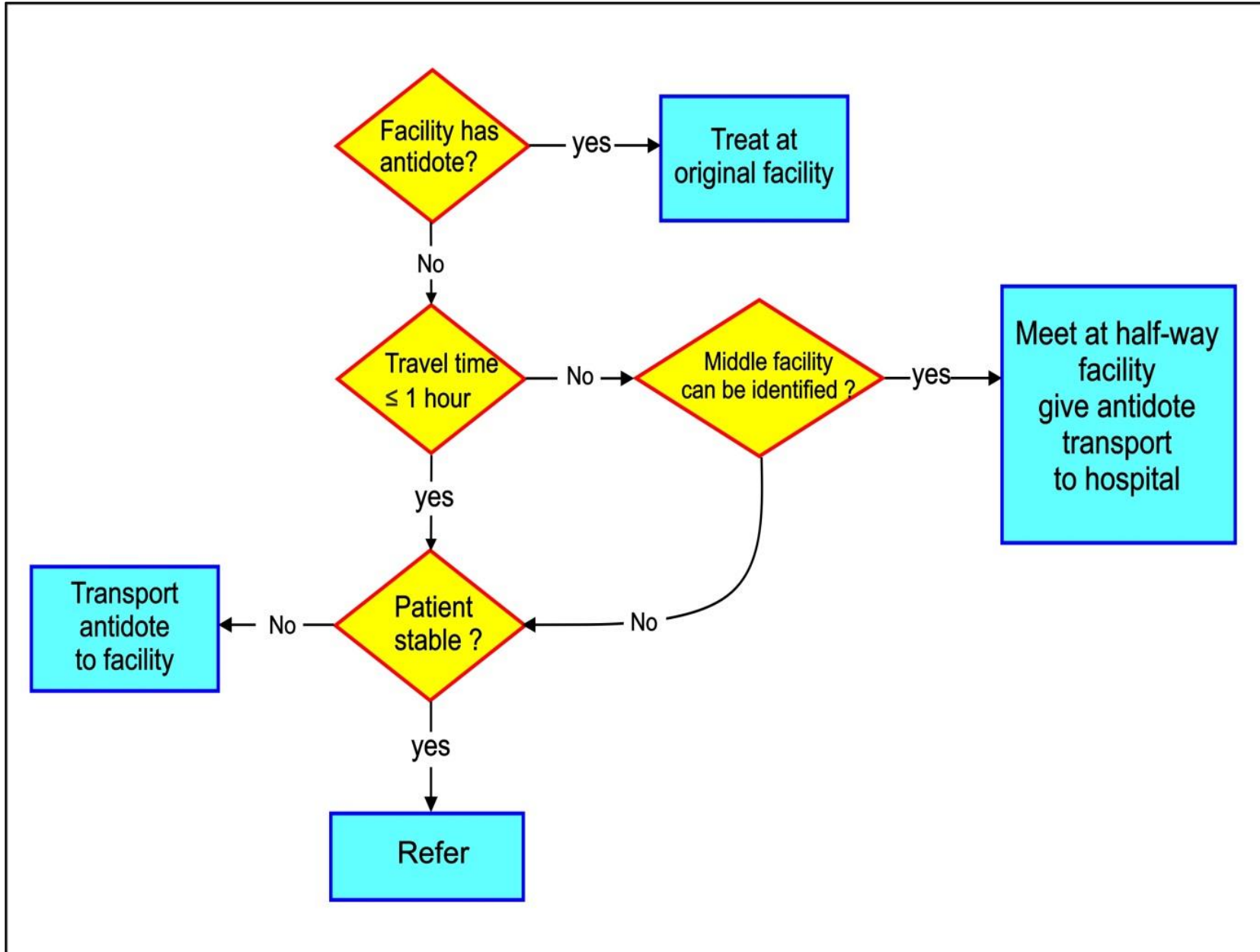
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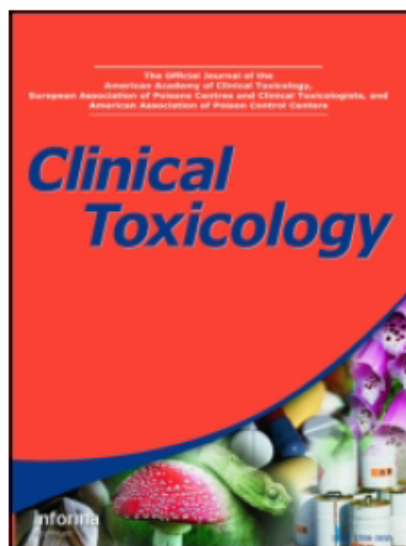


Logistic Model Transportation of Antidote



Logistic Model Transportation of Antidote





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Cyanide poisoning in Thailand before and after establishment of the National Antidote Project

Sahaphume Srisuma, Aimon Pradoo, Panee Rittilert, Sunun Wongvisavakorn, Achara Tongpoo, Charuwan Sriapha, Wannapa Krairojananan, Netnapis Suchonwanich, Sumana Khomvilai & Winai Wananukul

Table 9. Multivariate subgroup analysis of the 80 initial severe cases determining association between presence of the National Antidote Project (NAP), appropriate antidote use, age, sex, intent of exposure, cyanide source, and death.

Parameters	Odd ratio	95% CI	<i>p</i> Value
Presence of the NAP	0.122	0.023–0.633	.012
Appropriate antidote use	0.034	0.007–0.167	<.001
Self-harm intent	33.931	2.559–449.857	.008
Cyanide chemical source	1.669	0.343–8.122	NS
Male sex	0.855	0.214–3.410	NS
Age	0.966	0.92–1.01	NS

CI: confidence interval; NS: non-significant, *p* value $\geq .05$.

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Thank you
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