BCEHS | BC Emergency Health Services

Author: Benjamin Johnson and Claire Ishoy
Reviewed and approved by: Claire Ishoy, Dr Jan Trojanowski, David Hilder, and Stuart Wooley
Date of Publication: September 24, 2024

IV Acetaminophen FAQ – Version 1.0

A crew is concerned about one of the cautions for administration of IV acetaminophen. Is there any information I can use to guide that conversation?

HYPOTENSION

- Intravenous acetaminophen has been shown to cause transient episodes of hypotension that are most impactful in critically ill patients. This does not occur with the oral formulation.
- IV acetaminophen is shown to lower blood pressure in both healthy and critically ill individuals.
- Blood pressure drops on average 10mmhg and occurs between 15 and 30 minutes following administration and lasts approximately 60 minutes.
- Approximately 30% of patients have a decrease in blood pressure. In critically ill individuals, about 15% required an intervention to resolve the low blood pressure.
- The mechanism by which acetaminophen causes hypotension is unclear but seems to be a result of transient vasodilation caused by metabolites of the drug.

ACTION

- Always consider the oral route as the primary option for acetaminophen where possible.
- Weigh the risks and benefits of providing IV acetaminophen:
    a. Low blood pressure is a caution, not a contraindication.
    b. In critically ill patients or those who are hypovolemic/hypotensive, consider the impact of the blood pressure drop and ability of crews to intervene on low blood pressure.
    c. There is also increased risk of hepatic injury in hypovolemic patients due to severe dehydration or blood loss if IV acetaminophen is administered.

MALNUTRITION

- As a result of a shift to gluconeogenesis during fasting or during a state of malnourishment, hepatic metabolism of some medications may be impaired. This results in a reduced ability for the body to metabolize acetaminophen and increases the risk of toxicity for patients who are in a chronically malnourished state.

ACTION

- If a patient has chronic malnutrition or is extremely cachectic, we should consider that any previously consumed acetaminophen will take longer to be metabolized thus increasing risk for hepatoxicity. Consider risk/benefit for each patient individually.

HEAVY CHRONIC ALCOHOL CONSUMPTION

- In individuals with chronic heavy alcohol consumption there is a risk of undiagnosed liver disease and caution should be used when providing acetaminophen for pain.
- For patients without a history of chronic alcohol consumption but who have recently consumed alcohol, acetaminophen is safe.

ACTION

- Consider reducing the 24-hour maximum to 2,000mg from all sources if you suspect liver damage due to heavy chronic alcohol consumption. A 1000 mg single dose is still considered safe.

SAFETY IN PREGNANCY AND BREASTFEEDING

- Acetaminophen is considered safe in both pregnancy and breastfeeding
- IV acetaminophen is less well studied than oral acetaminophen.

Pregnancy

- Acetaminophen does cross the placenta, but it is safe for both pregnant patients and their fetus at recommended dosages.
- Studies have shown there is not increased risk of spontaneous abortion or birth defects.
- Acetaminophen overdose does increase risk of spontaneous abortion, but as long as we stay within our therapeutic doses it is safe.

Breastfeeding

- Acetaminophen will be present in breast milk in small concentrations after being taken by the mother. One study estimated it to be present in breast milk at 0.14% (0.04 – 0.23%) of the maternal dose, and other studies have shown similar levels (0.18%). This is within the safe dose for an infant and will not cause harm.
- Half-life of Acetaminophen in breast milk is approximately 2 hours with full clearance within 12 hours.

ACTION

- Oral acetaminophen should always be considered the primary route of administration where possible.
- Ensure an informed consent discussion with the mother weighing the risks and benefits.
- Reassure the mother that acetaminophen is considered very safe during pregnancy and breastfeeding.

MIXING INSTRUCTIONS FOR DOSES UNDER 1,000mg

- Calculate the weight-based dose.
- Withdraw the volume to be administered to the patient.
- **Suggest double check the volume as 10-fold errors with acetaminophen are well documented.**
- Put the contents in an empty viaflex bag available in the kit.
- Administer over 15 minutes.
- **NOTE:** This medication should NOT be mixed in a normal saline bag.

Y-SITE COMPATABILITY

- Do NOT mix medications into the IV bag containing acetaminophen.
- See chart below for Y-site compatibility.

Drug	IV Compatible? (Yes/No/Uncertain)	Further Information
Adenosine	Uncertain	No studies have been conducted.
Amiodarone	Uncertain	No studies have been conducted.
Atropine	No	One study found particulate matter to precipitate in a test tube.
D10 W	Yes	
Dexamethasone	Yes	Three studies supporting IV compatibility.
Dimenhydrinate	Uncertain	There are no studies to indicate it is safe or unsafe. Uncertain compatibility.
Diphenydramine	Yes	Three studies support IV compatibility.
Epinephrine	Uncertain	No studies have been conducted.
Fentanyl	Yes	Three studies support IV compatible, one study found particulate matter formed in a test tube after 12 hours.
Hydrocortisone	Yes	One study supports IV compatibility.
Ketamine	Yes	One study supports IV compatibility.
Lidocaine	Yes	Two studies support IV compatibility.
Magnesium Sulfate	Yes	One study supports IV compatibility.
Midazolam	Yes	Four studies support IV compatibility.
Morphine	Yes	Three studies support IV compatibility
Naloxone	Uncertain	No studies have been conducted.
Phenylephrine	Uncertain	No studies have been conducted.
RL and Plasma-Lyte	Yes	
Sodium Bicarbonate	Uncertain	No studies have been conducted.

References

Acetaminophen Drug Monograph: BCEHS Clinical Practice Guidelines. https://handbook.bcehs.ca/drug-monographs/acetaminophen/

Acetaminophen (paracetamol): Drug Information. UpToDate Lexidrug. https://www.uptodate.com/contents/acetaminophen-paracetamol-drug-information?search=acetaminophen&source=panel_search_result&selectedTitle=1%7E150&usage_type=panel&kp_tab=drug_general&display_rank=1#

Acetaminophen: Micromedex. https://www.micromedexsolutions.com/micromedex2/librarian/CS/E42007/ND_PR/evidencexpert/ND_P/evidencexpert/DUPLICATIONSHIELDSYNC/B9B092/ND_PG/evidencexpert/ND_B/evidencexpert/ND_AppProduct/evidencexpert/ND_T/evidencexpert/PFActionId/evidencexpert.DoIntegratedSearch?SearchTerm=acetaminophen&UserSearchTerm=acetaminophen&SearchFilter=filterNone&navitem=searchALL#

Cantais A, Schnell D, Wincent F, Hammouda Z, Perinel S, Blaichard S, Abrough F, Zeni F, Meziani F, Bornstain C, DarmonM. (2016). Acetaminophen-Induced changes in Systemic Blood Pressure in Critically Ill Patients: Results of a Multicenter Cohort Study. Critical Care Medicine (12):2192-2198. https://pubmed.ncbi.nlm.nih.gov/27414476/

Chiam E, Weinberg L, Bailey M, McNicol L, Bellomo R. (2016). British Journal of Clinical Pharmacology. 81(4):605. https://bpspubs.onlinelibrary.wiley.com/doi/10.1111/bcp.12841

Inage S, Yajima R, Nagahara S, Kazama A, Takamura M, Shoji T, Kadoi M, Tashiro Y, Ise Y. (2022). Acetaminophen-induced hypotension in sepsis. Journal of Pharmaceutical health Care and Sciences. https://jphcs.biomedcentral.com/articles/10.1186/s40780-022-00245-y

Kuffner E, Dart R. (2001). Acetaminophen Use in Patients Who Drink Alcohol: Current Study Evidence. The American Journal of Managed Care. https://www.ajmc.com/view/dec01-262ps592

Maxwell EN, Johnson B, Cammillen J, Ferreira JA. (2019). Intravenous Acetaminophen-Induced Hypotension: A Review of the Current Literature. Annals of Pharmacotherapy. 53(10); 1033. https://journals.sagepub.com/doi/10.1177/1060028019849716?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Steary D. E08: Pain Management. BCEHS Clinical Practice Guidelines. https://handbook.bcehs.ca/clinical-practice-guidelines/e-medical-emergencies/e08-pain-management/

Schwenk E. (2024). Nonopioid Pharmacotherapy for Acute Pain in Adults. UpToDate. https://www.uptodate.com/contents/nonopioid-pharmacotherapy-for-acute-pain-in-adults?search=iv+acetaminophen&source=search_result&selectedTitle=10%7E150&usage_type=default&display_rank=9

Townsend R. (2023). NSAIDs and Acetaminophen: Effects on Blood Pressure and Hypertension. UpToDate. https://www.uptodate.com/contents/nsaids-and-acetaminophen-effects-on-blood-pressure-and-hypertension?search=Acetaminophen%20hypotension&source=search_result&selectedTitle=1%7E150&usage_type=default&display_rank=1

Zillen D, Movig K, Kant G, Masselink J, Mian P. (2021). Clinical Case Reports. 9(11). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8593780/