Cannabis Hyperemesis Syndrome in Children and Adolescents: An Evidence Summary

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Abstract

Background: Cannabis hyperemesis syndrome (CHS) is becoming an increasingly common presentation in pediatrics. However, limited pediatric-specific evidence exist to guide management. This tool aims to summarize current recommendations for pediatric management of CHS and serve as a point-of-care reference for clinicians.

Methods: A PubMed search identified primary sources on pediatric CHS management. A recent narrative review by Ibia and Toce (2025) provided the framework for this tool, with primary sources reviewed in full. The tool includes diagnostic considerations, evaluation, management strategies, and an evidence summary to clarify the strength of recommendations.

Results: Nineteen primary studies were reviewed, including randomized controlled trials (RCTs), cohort studies, and case reports/series. The two RCTs involved adult patients; the remaining studies comprised the pediatric evidence base. Available data support D2 antagonists (haloperidol, droperidol), benzodiazepines, and topical capsaicin as the most effective therapies for pediatric CHS. Notably, intravenous D2 antagonists carry risks of extrapyramidal symptoms and QTc prolongation, which require careful consideration.

Interpretation: High-quality pediatric studies on CHS management are lacking. This tool provides a concise, evidence-based resource for identifying and managing CHS in pediatric patients using the current literature.

Key words: cannabis-hyperemesis, pediatrics, adolescents, management

Introduction

Cannabis hyperemesis syndrome (CHS) is a variant of cyclic vomiting syndrome caused by chronic cannabis use. CHS presents as severe nausea, vomiting, and generalized abdominal pain, often relieved with hot baths or showers. Since the legalization of cannabis in Canada various studies have shown increased prevalence of cannabis use and CHS-related emergency department visits, especially among youth and young adults(1–3). Andrews et al. report a 2-fold increase in treatment prevalence of CHS in Alberta post-legalization in youth aged 16 to 24 years old(3). CHS in pediatrics primarily involves adolescents but case reports include children as young as 10 to 13 years old(4–6). As CHS becomes a growing concern in pediatrics, guidance on management in the pediatric population is needed.

There is a limited body of high-quality evidence on CHS management in general, but even less on pediatric patients. The pediatrics literature consists primarily of case studies and a few retrospective cohort studies, lacking prospective randomized control trials. Another concern from a provider perspective in CHS management, is the hesitancy to use non-traditional antiemetics such as antipsychotics and benzodiazepines in pediatric patients due to the potential serious side effects of these drugs. Studies have shown traditional antiemetics are generally chosen more frequently despite lack of efficacy in CHS and even more so in pediatrics(5). A recent narrative review has adapted data from adult studies and the available pediatric studies to create recommendations to guide practitioners on pediatric CHS management based on the current literature base(7). The objective of this tool was to consolidate the guidance for pediatric CHS management, as well as provide clarity on the level of evidence that recommendations are based on to guide practitioner decision making.

There are a limited number of tools available to guide pediatric CHS management. There is one publicly available point-of-care clinical algorithm for emergency department management of CHS in pediatrics by University of California San Francisco Benioff Children's Hospital(8). This was last updated in May of 2022 and has a few variations from current recommendations. The only other tool from my search was a 22-page clinical pathway for CHS management in both pediatric emergency department and inpatient settings(9). This was created in August of 2025 by John Hopkins All Children's Hospital and provides in-depth and up-to-date information. However, its level of detail makes it unsuitable to be used as a point-of-care tool. This project aims to fill this gap to be a clinician facing, up-to-date and succinct point-of-care tool with transparency of the quality of evidence supporting recommendations.

This tool will be relevant to all aspects of primary care. It will be particularly useful for emergency department providers who work with pediatric population for guidance on CHS management. This tool will also be useful to clinic practitioners to aid in recognition and prevention of CHS as it becomes a more prevalent concern in pediatrics. Cannabis is generally perceived in society as an antiemetic and patients with CHS frequently do not accept cannabis as the precipitating factor for CHS(10). Family practitioners are key to addressing this misinformation and helping patients with the only definitive treatment for CHS, which is cessation of cannabis use.

Study Design

A literature review was conducted using PubMed to identify studies on pediatric CHS management. Search terms focused on pediatrics, cannabis hyperemesis, and emergency management, yielding 42 articles, which were screened by abstract for relevance. Results were cross-referenced with the most recent narrative review to ensure comprehensive coverage of the literature. Relevant primary studies and up-to-date reviews were included. Additional PubMed and Google searches identified publicly available clinical tools for pediatric CHS management, of which two relevant tools were reviewed in full.

The tool was developed in PowerPoint, with visuals adapted from Canva. The target audience includes primary care clinicians, particularly emergency department providers caring for pediatric patients, as well as family physicians for recognition and education in outpatient settings. The tool was designed for both electronic and print distribution, ensuring clarity and accessibility as an email attachment or printable resource for emergency departments. The language and use of standard medical abbreviations were tailored to healthcare professionals. A consistent font and color scheme were used to enhance readability.

The tool includes key sections on CHS diagnosis, a simplified management algorithm with guidance on appropriate workup, pediatric-specific medication dosing, and an evidence summary with supporting references. The evidence summary provides transparency regarding the strength of the recommendations and allows clinicians to review the underlying literature in greater detail.

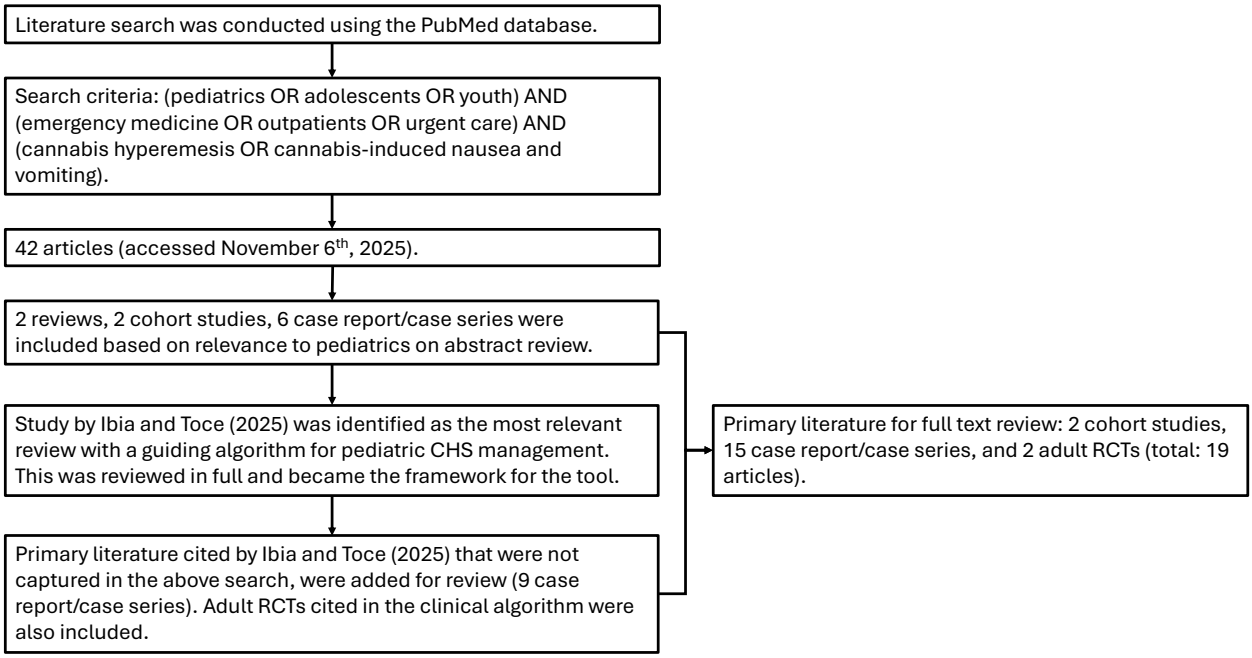

Figure 1 Literature review article selection

Results

Diagnosis of CHS

CHS is a clinical diagnosis that can be difficult to differentiate from other pathologies. The Rome IV criteria(11) are often cited as standard diagnostic criteria in adult literature (table 1). Lonsdale et al. (2021) conducted the largest single-institution case series for pediatric data on CHS (n=34). This study found only 9% of patients fulfilled the full set of Rome IV diagnostic criteria. The criterion primarily responsible for this discordance was criterion 3, “relief of vomiting following cannabis cessation”, whereas 85% of patients fulfilled the first two criteria(6). This highlights the impracticality of the Rome IV criteria in diagnosing CHS in the

acute setting. Lonsdale et al. proposed “pragmatic criteria” that fit their pediatric study population (table 2), to help practitioners with identifying pediatric patients with CHS. The major criteria were present in all study patients with CHS, and minor criteria were present in 62-91% of patients with CHS(6).

Table 1 Rome IV diagnostic criteria for CHS(11)

Must include all of the following: 1. Stereotypical episodic vomiting resembling cyclic vomiting syndrome (CVS) in terms of onset, duration, and frequency 2. Presentation after prolonged excessive cannabis use 3. Relief of vomiting episodes by sustained cessation of cannabis use
Criteria fulfilled for the last 3 months with symptom onset at least 6 months before diagnosis
Supportive remarks: • May be associated with pathologic bathing behavior (prolonged hot baths or showers).

Table 2 Pragmatic diagnostic criteria suggested by Lonsdale et al. study(6)

Major criteria[a]: 1. Regular (≥ 2 times per week) cannabis use for ≥ 3 months 2. Onset or worsening of episodic nausea and vomiting resembling CVS after the start of regular cannabis use 3. Absence of other underlying medical conditions which could explain the symptoms, after all appropriate negative investigations
Supporting criteria[b]: 1. Symptomatic relief with hot showers or baths 2. Abdominal pain 3. Change in bowel movements 4. Weight loss

[a]Major criteria reported in all patients in the study.

[b]Minor criteria reported in 91%, 91%, 63%, 62% of patients, respectively.

This clinical diagnosis of CHS is further complicated by overlapping symptoms with cyclic vomiting syndrome (CVS) and cannabis withdrawal syndrome (CWS). Adult cross-sectional data shows 21% of CVS patients endorse regular cannabis use, therefore it is not a unique feature of CHS. As well, the pathologic bathing phenomenon, thought to be a specific feature of CHS, is present in 56% of CVS patients without regular cannabis use (vs 73% with regular cannabis use)(12). Similarly, CHS can be difficult to distinguish from CWS in the acute setting. Literature review by Razban et al. (2022) present features to aid in distinguishing the two distinct entities. Features that suggest CWS include associated psychiatric symptoms (insomnia, restlessness, mood changes), greater than 24 hours since last cannabis use, and quantity of cannabis use proportional to severity of symptoms. CHS typically presents acutely within 24 hours of last use, however this can be variable. As well, pathologic bathing relieving symptoms is more suggestive of CHS (13).

Complications of CHS in Pediatric Patients

There were several case reports and case series in the primary literature commenting on significant complications of CHS in pediatric patients. Many report consequences of dehydration such as acute kidney injury and metabolic derangements including severe hypokalemia, hypomagnesemia, hypophosphatemia and metabolic alkalosis(14,15). Similarly, there were case reports of sequalae of esophageal injury associated with cyclic vomiting such as Mallory Weiss tears, Boerhaave's esophagus, pneumomediastinum and pneumorrhacis(16,17). As well, there were three case reports of superior mesenteric artery syndrome presenting in adolescents with CHS, presumed to be secondary to rapid weight loss(18–20).

Antiemetic Choice

Traditional antiemetics (ondansetron, phenothiazines, antihistamines, metoclopramide) have been shown to be less effective than non-traditional antiemetics (antipsychotics, benzodiazepines, topical capsaicin) in both adult and pediatric studies(5,21). However, Geraci et al. show they continue to be chosen more often than non-traditional antiemetics in patients suspected of CHS(5). There have been two adult randomized controlled trials (RCTs) on antiemetic efficacy in CHS. Dean et al. (2020; n = 30) conducted a double-blind, randomized, placebo-controlled trial that demonstrated a significant reduction in nausea scores with 0.1% topical capsaicin compared with placebo. Complete resolution of nausea occurred in 29% of participants in the capsaicin group, compared with 0% in the placebo group.(22). The HaVOC trial (n=30) was a triple-blind RCT comparing haloperidol low dose (0.05 mg/kg IV), high dose haloperidol (0.1 mg/kg IV) and ondansetron (8 mg IV). It found superiority of low dose and high dose haloperidol over the ondansetron with regards to nausea and abdominal pain scores and use of rescue antiemetics(23).

Robust pediatric data is limited. Case series report efficacy of topical capsaicin, D2-blockers (haloperidol and droperidol), and lorazepam(24,25). As well, case series by Brown et al. (2023) showed resolution of symptoms in adolescents with combination therapy of intravenous haloperidol with either intravenous lorazepam or topical capsaicin(25). Cohort studies show clinical effect of these medications but do not reach statistical significance with adolescent

data(5,26,27). H2-blockers, PPIs and opioids have been shown to be ineffective across multiple pediatric case reports/series(21,24,28).

Medication Side Effects

Non-traditional antiemetics come with a wide range of potential side effects. Topical capsaicin is generally well-tolerated. There is a risk of skin irritation, with "burning sensation" causing discontinuation in a few patients among pediatric studies(5,26,27,29). Lorazepam is also generally well-tolerated in the studies it is used. There is a risk of sedation, and respiratory depression, as well as higher risk of paradoxical reaction (hyperactivity, aggression) in pediatric patients(30). Side effects with lorazepam use were not reported in any of the above studies(5,25).

D2-blockers (haloperidol and droperidol) have the potential for significant and life-threatening side-effects. The two primary side effects of concern include extrapyramidal symptoms (EPS) and QTc prolongation. With regards to EPS, the HaVOC trial (adult study) showed 1/8 patients treated with high-dose haloperidol had moderate akathisia, 2/8 re-presented with dystonic reactions. Importantly, all EPS presentations were on the higher dose regimen (haloperidol 0.1 mg/kg IV), none on the low-dose regimen (0.05 mg/kg IV) had EPS(23). The study by Lee et al. (2019) show 1/13 patients developed a dystonic reaction with IV droperidol, responding immediately to IV benztropine(31). Prophylactic diphenhydramine is recommended with IV haloperidol for prevention of EPS(32).

QTc prolongation is a dose-dependent effect and is of higher risk with the IV formulation. It is important to consider concurrent risk factors for QTc prolongation such as electrolyte

abnormalities, underlying cardiac abnormalities, other QT prolonging medication use, and cannabis use itself can prolong QTc (30,33,34). There are six case reports of QTc prolongation, with three presumed torsades de pointes in young adults with CHS. Importantly, these cases all had concurrent risk factor(s) for QTc prolongation such as underlying cardiac disease or electrolyte abnormalities(15). Overall, there are multiple potential risk factors for QTc prolongation in CHS patients, so it is important to screen for concurrent risk factors and obtain an ECG prior to consideration of intravenous D2-blocker.

Discussion

The literature search shows the lack of robust studies on CHS management in pediatric patients. Current pediatric recommendations are largely extrapolated from adult RCTs and limited pediatric data derived from case reports/series and a small number of cohort studies. In their 2025 review, Ibia and Toce propose a clinical algorithm for acute management of CHS, which forms the basis for this tool (appendix 1). They recommend ondansetron as an initial empiric therapy in undifferentiated patients, as it is commonly administered in triage, generally well tolerated, and associated with a low risk of QTc prolongation when given orally. If unsuccessful, the next antiemetic recommended is either topical capsaicin, intravenous lorazepam or intravenous haloperidol. A screening ECG is recommended prior to haloperidol administration to assess for baseline QTc prolongation(7). Despite evidence supporting its use, intravenous haloperidol is not approved by Health Canada for pediatric patients due to

insufficient safety and efficacy data(34). Whereas parenteral droperidol is approved for children older than two years for the treatment of postoperative nausea and vomiting(33).

The tool is organized into three sections: diagnostic criteria for CHS, a pediatric management algorithm outlining recommended investigations and medication dosing, and an evidence summary. The first page is designed to be a quick reference for point of care use by clinicians to guide diagnosis and management of pediatric patients suspected of CHS in the clinical setting. The second page provides a concise synthesis of the literature supporting the recommendations, allowing clinicians to assess the strength and quality of the evidence. This evidence summary may also be used at the point of care to support clinical decision-making. A complete list of references is included on the third page for clinicians who wish to review the primary literature in detail.

This project highlights the significant gaps in high-quality evidence for pediatric CHS management. This calls for further research particularly regarding the safety and efficacy of antiemetic therapies, given the limited effectiveness of traditional agents. The tool aims to disseminate current evidence, identify key knowledge gaps, and provide a practical reference to support both clinical care and future research.

Strengths & Limitations

A key strength of this tool is its concise, point-of-care format, designed to help clinicians identify pediatric patients with CHS and apply evidence-based management strategies in the acute setting. It also includes a table of pediatric weight-based medication dosing supported by

the literature. The primary limitation is the lack of high-quality pediatric studies, as the recommendations are largely extrapolated from adult RCTs and limited pediatric case reports, case series, and cohort studies. An additional limitation is that intravenous haloperidol—although supported by the literature body—is not approved by Health Canada for pediatric use due to insufficient safety and efficacy data. These uncertainties require clinicians to rely on their clinical judgment when selecting therapies and the evidence summary is intended to support decision-making in this context.

Conclusion

CHS is an increasingly important concern in pediatric care and remains challenging to manage acutely, with the only definitive treatment being cannabis cessation. High-quality pediatric studies are lacking, and current management recommendations are largely extrapolated from few adult randomized controlled trials and limited pediatric data from case reports, case series, and a small number of cohort studies. The most effective treatments include D2 antagonists (haloperidol and droperidol), benzodiazepines, and topical capsaicin. However, intravenous D2 antagonists carry significant risks, including extrapyramidal symptoms and QTc prolongation, which must be considered prior to use. This tool provides a point-of-care summary of current evidence-based recommendations for the identification and acute management of pediatric CHS, along with a concise overview of the literature body to support clinical decision-making.

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Appendix 1 CHS in Children & Adolescents: An Evidence Summary

Cannabis Hyperemesis Syndrome in Children & Adolescents

An Evidence Summary for Health Care Professionals

What is Cannabis Hyperemesis Syndrome (CHS)?

CHS is a form of cyclic vomiting syndrome (CVS) associated with chronic cannabis use. It presents as recurrent flares of nausea, emesis and abdominal pain, that is classically relieved with hot showers/baths.

Table 1 Diagnostic Criteria[1]

Major criteria[a]:
- Regular (≥ 2 times per week) cannabis use for ≥ 3 months
- Onset or worsening of episodic nausea and vomiting resembling CVS after the start of regular cannabis use
- Absence of other underlying medical conditions which could explain the symptoms, after all appropriate negative investigations

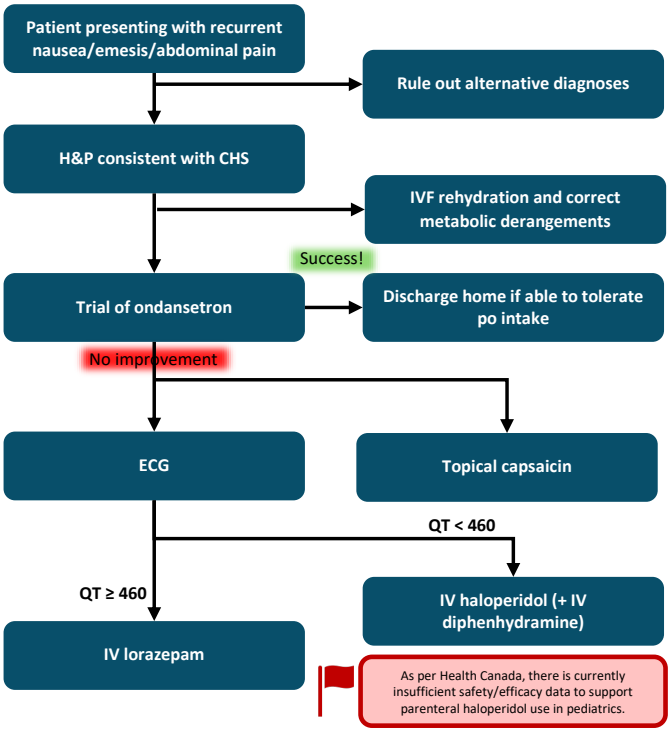
Supporting criteria[b]:
- Symptomatic relief with hot showers or baths
- Abdominal pain
- Change in bowel movements
- Weight loss

[a]Major criteria reported in all patients in the study.
[b]Minor criteria reported in 91%, 91%, 63%, 62% of patients, respectively

Table 2 Differentiating Cannabis Withdrawal Syndrome (CWS) versus CHS[2,3]

	CHS	CWS
Relief with hot showers/baths?	✓	✗
Associated insomnia, restlessness, mood changes?	✗	✓
Quantity of use proportional to severity of symptoms?	✗	✓

CHS Management



CHS management adapted from Ibia and Toce (2025)[2]

Box 1 Evaluation of suspected CHS

Consider urgent alternative diagnoses:
- **GI**: SBO, malrotation, volvulus, biliary pathology, appendicitis, pancreatitis
- **GU**: pregnancy, torsion, pyelonephritis, renal stone
- **CNS**: Elevated ICP, CVA, central vertigo
- **Other**: ingestion, DKA

Investigations:
- UDS, urinalysis, urine pregnancy test
- CBC, electrolytes, extended electrolytes, kidney function, liver enzymes, lipase
- Imaging if suspicious for surgical pathology

Red flags (suggestive of alternative diagnosis):
- Bloody/bilious emesis, bloody stools/melena, dysuria, hematuria
- Toxic-appearing, hypotension, fever, peritonitis, ALOC, neurologic deficit
- Negative UDS, WBC >20, AST/ALT >100, lipase >4x ULN, positive UA, positive B-HCG

Table 3 Recommended medication dosing for pediatrics

Medication	Dose
Ondansetron (po/ODT/IV)	1-11 y/o: 4mg ≥ 12 y/o: 8 mg
Capsaicin 0.025% (topical)	1mm thick coating to abdomen
Haloperidol (IV)	25-50 kg: 0.05 mg/kg ≥ 50 kg: 5 mg
Diphenhydramine (IV)	<25 kg: 0.5 mg/kg 25-50 kg: 25 mg ≥ 50 kg: 50 mg
Lorazepam (IV)	0.025 mg/kg (max 2 mg)

Evidence Summary

Diagnostic criteria	Lonsdale et al. (2021) largest single institution case series for pediatric data (n=34) found Rome IV criteria met in 9% of patients[1]. Primarily driven by criterion "relief of symptoms with cannabis cessation". They proposed pragmatic criteria (table 1) to identify pediatric CHS in acute setting. **Limitation:** Difficult to distinguish CHS from CVS. Adult cross-sectional data show 21% of CVS patients endorse regular cannabis use plus pathologic bathing phenomenon present in 56% CVS patients without regular cannabis use[4] (vs 73% with regular cannabis use). CHS in pediatrics= diagnosis of exclusion, ruling out alternative diagnoses is critical (box 1).
Complications of CHS in pediatric patients	Pediatric case report/case series data report the following complications: • Sequelae of dehydration: AKI, metabolic derangements (severe hypokalemia, hypomagnesemia, hypophosphatemia, metabolic alkalosis)[5,6]. • Esophageal injury (Mallory Weiss tears, Boerhaave's esophagus, pneumomediastinum, pneumorrhacis)[7,8]. • Weight loss (3 case reports of SMA syndrome secondary to rapid weight loss)[9-11].
Antiemetic choice	**Ondansetron:** Typically ineffective in CHS (pediatric case reports[12,13], cohort study[14], adult RCT[15]). Commonly given in triage, trial can be considered in an undifferentiated presentation. **Topical capsaicin**: Adult RCT (n=30) revealed significant reduction in nausea scores at 60 minutes[16]. Pediatric case series demonstrated resolution of symptoms in 30 minutes of application[17]. Cohort data[18,19] showing efficacy, but loss of statistical significance in adolescent subgroup analysis (n=25)[18] and no impact on length of stay[19]. Use recommended given the potential for resolution of symptoms and limited side effect profile. **D2 blockers**: HaVOC trial (adult RCT, n=30) showed superiority of low-dose haloperidol IV (0.05 mg/kg) and high-dose haloperidol (0.1 mg/kg) over IV ondansetron[15.] Adolescent cohort data show clinical benefit of haloperidol and droperidol over traditional antiemetics, not reaching statistical significance[14]. Adolescent case series on combination therapy report 4 patients treated with IV haloperidol + IV lorazepam and 1 patient treated with IV haloperidol + topical capsaicin; 5/5 patients had complete resolution of symptoms[20]. Adult observational study (n=76) showed efficacy of droperidol in antiemetic effect and reduced length of stay[21]. **Benzodiazepines (Lorazepam):** Adolescent cohort[14] and case series[20] data above showing efficacy with combination and single agent therapy. Further adult case reports showing resolution with lorazepam[22,23]. No evidence for benefit in pediatrics: H2 blockers, PPIs or opioids[12,17, 24].
Medication side effects	**Topical capsaicin:** skin irritation, generally mild and overall well-tolerated treatment[14,16,17,25]. **D2 blockers:** • **Extrapyramidal symptoms (EPS):** HaVOC trial (adults)- 1/8 patients had moderate akathisia, 2/8 re-presented with dystonic reactions. All EPS presentations were on the higher dose regimen (haloperidol 0.1 mg/kg IV)[15]. Lee et al. study had 1/13 patients develop a dystonic reaction with IV droperidol, responding immediately to IV benztropine[21]. Diphenhydramine can be considered as prophylactic agent for EPS[26]. • **QTc prolongation:** dose-dependent effect, higher risk with IV formulation, electrolyte abnormalities (hypokalemia, hypomagnesemia), underlying cardiac abnormalities, concurrent QT prolonging medications and cannabis use[27-29]. Six case reports of QTc prolongation, 3 presumed torsades de pointes in young adults with CHS and concurrent risk factor(s)[6]. Overall, multiple potential risk factors for QTc prolongation in CHS patients, so it is important to screen for concurrent risk factors and obtain an ECG prior to consideration of IV D2 blocker. • **Safety and efficacy of parenteral haloperidol has not been established in pediatrics[28]. Parenteral droperidol is approved in children >2 years old for postoperative nausea and vomiting, recommending screening ECG prior to administration[27]**. **Lorazepam:** Pediatrics higher risk for paradoxical reaction (hyperactivity, aggression)[29]. No adverse effects reported in above pediatric studies. Data limited to cohort study(n=19)[14] and case series(n=6)20.

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