GASTROINTESTINAL TRACT PROTOZOAL and HELMINTHIC INFECTIONS

CHI Formulary Development Project

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Council of Health Insurance

INDICATION UPDATE

ADDENDUM- December 2023

To the CHI Original Gastrointestinal Tract Protozoal and Helminthic Infections Clinical Guidance- Issued April 2020

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Related Documents

Related SOPs

- IDF-FR-P-02-01-IndicationsReview&IDFUpdates
- IDF-FR-P-05-01-UpdatedIndicationReview&IDFUpdates

Related WI:

- IDF-FR-WI-01-01SearchMethodologyGuideForNewIndications

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Abbreviations

CDC	Centers for Disease Control and Prevention
CPG	Clinical Practice Guideline
KSA	Kingdom of Saudi Arabia
CHI	Council of Health Insurance
IDF	Insurance Drug Formulary
SFDA	Saudi Food and Drug Authority
IPI	Intestinal Parasite Infection

Executive Summary

Parasitic infections, caused by organisms thriving in the human body, necessitate a host for sustenance and reproduction[1]. Primarily affecting the intestines, these infections often present with symptoms like diarrhea and vomiting, though manifestations can extend to skin rashes or impact other organs such as the brain and lungs[1]. Categorized into three main types—protozoa, helminths, and ectoparasites—these parasites can infiltrate the blood, intestinal tract, skin, and various other body parts[1]. Common parasitic infections worldwide encompass malaria, toxoplasmosis, head lice, giardiasis, and pinworms, among others[1]. Symptoms vary based on the infected body part, including fever, muscle aches, nausea, and neurological or skin-related issues[1]. Transmission occurs through contaminated water or food, insect bites, unprotected sex, and contact with contaminated surfaces[1]. Those at higher risk include young children, caregivers, and individuals with compromised immune systems[1]. Diagnosis involves identifying parasites or their eggs in body fluids or tissues, and treatment relies on specific medications, often a combination of antiparasitics, antibiotics, and antifungals[1]. Preventive measures encompass hand hygiene, safe food practices, and protection against insect bites[1]. The outlook depends on the type and severity of the infection, the individual's immune status, and their response to treatment, with ongoing management sometimes necessary[1]. In some infection, surgical intervention is required.

Worldwide, approximately 3.5 billion individuals experience the impact of intestinal parasitic infections, leading to an annual report of over 200,000 deaths[2].

The Kingdom of Saudi Arabia (KSA) faces a significant health challenge due to the prevalence of intestinal parasite infections (IPIs), particularly in children[3]. Previous studies have reported varying prevalence rates ranging from 9.5% to 47.4% in symptomatic and asymptomatic children in different regions of KSA[3]. Recent evidence indicates that the prevalence of IPIs in KSA varies across cities, with rates such as 33.8% in Jeddah, 21.2% in Al-Baha, and 20.8% in Riyadh[3]. The majority of IPIs in KSA are caused by protozoa, with *Blastocystis hominis*, *Entamoeba histolytica/dispar*, and *Giardia lamblia* being the most prevalent parasites[3]. The prevalence of specific parasites varies across regions, with different cities in KSA exhibiting different rates. For instance, *G. lamblia* is the most widespread parasite contributing to intestinal infections, followed by *E. histolytica* and *B. hominis*[3].

CHI issued Gastrointestinal Tract Protozoal and Helminthic Infections clinical guidelines after thorough review of renowned international and national clinical guidelines in April 2020. Updating clinical practice guidelines (CPGs) is a crucial process for maintaining the validity of recommendations.

This report functions as an addendum to the prior CHI Gastrointestinal Tract Protozoal and Helminthic Infections clinical guidance and seeks to offer guidance for the effective management of Gastrointestinal Tract Protozoal and Helminthic

Infections. It provides an **update on the Gastrointestinal Tract Protozoal and Helminthic Infections Guidelines** for CHI Formulary with the ultimate objective of updating the IDF (CHI Drug Formulary) while addressing **the most updated best available clinical and economic evidence related to drug therapies.**

Main triggers for the update were summarized, being **the issuance updated versions of previously reviewed guidelines** namely the CDC Parasites Treatment Recommendations. Moreover, **new treatment recommendations were added,** mainly for Anisakiasis, Balantidiasis, Blastocystis spp., Capillariasis, Nonpathogenic intestinal protozoa, Clonorchis, Cryptosporidium, Cyclosporiasis (Cyclospora Infection), Cystoisosporiasis (formerly known as isosporiasis), Dientamoeba fragilis, Diphyllobothrium latum, Dipylidium Infection (also known as Dog and Cat Flea Tapeworm), Fasciolopsis buski, Hymenolepiasis (also known as Hymenolepis nana infection), and Strongyloidiasis.

After carefully examining clinical guidelines and reviewing the SFDA drug list, the following drugs are to be added to the CHI formulary: Ivermectin, Tetracycline, TMP-SMX, and Ciprofloxacin. No new drugs have recently been approved by the FDA.

Niclosamide is no longer SFDA-registered, and it is advisable to delist it from CHI formulary.

All recommendations are well supported by reference guidelines, Grade of Recommendation (GoR), Level of Evidence (LoE) and Strength of Agreement (SoA) in all tables reflecting specific drug classes' role in Gastrointestinal Tract Protozoal and Helminthic Infections therapeutic management.

Below is a table summarizing the major changes based on the different Gastrointestinal Tract Protozoal and Helminthic Infections guidelines used to issue this report:

Table 1. General Recommendations for the Management of Gastrointestinal Tract Protozoal and Helminthic Infections

Management of Gastrointestinal Tract Protozoal and Helminthic Infections		
General Recommendations	**Level of Evidence/ Grade of Recommendation**	**Reference**
Amebiasis- Entamoeba histolytica o Symptomatic infection: Metronidazole or Tinidazole, then iodoquinol or paromomycin	N/A	CDC Amebiasis-Entamoeba histolytica Infection[4]

○ Asymptomatic: iodoquinol or paromomycin ○ Large liver abscesses >5cm: drain and give metronidazole or tinidazole		
Giardia Lamblia ○ Metronidazole ○ Tinidazole ○ Nitazoxanide ○ Paromomycin ○ Quinacrine ○ Furazolidone	N/A	CDC Giardia Lamblia (Giardiasis) Treatment[5]
Enterobiasis ○ Mebendazole ○ Pyrantel Pamoate ○ Albendazole	N/A	CDC Enterobiasis (also known as Pinworm Infection)[6]
Ascaris lumbricoides ○ Albendazole ○ Mebendazole ○ Ivermectin	N/A	CDC Ascaris lumbricoides (Ascaris or ascariasis)[7]
Hookworm ○ Albendazole ○ Mebendazole ○ Pyrantel Pamoate	N/A	CDC Hookworm[8]
Trichuriasis (Whipworm) ○ Albendazole ○ Mebendazole ○ Ivermectin	N/A	CDC Trichuriasis (Whipworm Infection)[9]
Trichinellosis ○ Albendazole ○ Mebendazole	N/A	CDC Trichinellosis (Trichinosis)[10]
Taeniasis ○ Praziquantel ○ Niclosamide ○ Albendazole	N/A	CDC Taeniasis[11]

Schistosomiasis: Praziquantel	N/A	CDC Schistosomiasis[12]
Anisakiasis o Surgery may be required o Albendazole in cases of presumptive diagnosis	N/A	CDC Anisakiasis[13]
Balantidiasis o Tetracycline o Metronidazole o Iodoquinol o Nitazoxanide has been tried	N/A	CDC Balantidiasis[14]
Blastocystis spp. o Metronidazole o TMP/SMX o Nitazoxanide	N/A	CDC Blastocystis spp. [15]
Capillariasis o Mebendazole o Albendazole	N/A	CDC Capillariasis[16]
Clonorchis o Praziquantel o Albendazole	N/A	CDC Clonorchis[17]
Cryptosporidium: Nitazoxanide	N/A	CDC Cryptosporidium[18]
Cyclosporiasis: TMP-SMX	N/A	CDC Cyclosporiasis (Cyclospora Infection)[19]
Cystoisosporiasis o TMP-SMX or Pyrimethamine o Ciprofloxacine 2nd line alternative	N/A	CDC Cystoisosporiasis (formerly known as isosporiasis)[20]
Dientamoeba Fragilis o Iodoquinol o Paromomycin o Metronidazole	N/A	CDC Dientamoeba fragilis[21]

Diphyllobothrium latum o Praziquantel o Niclosamide	N/A	CDC Diphyllobothrium latum[22]
Dipylidium o Praziquantel o Niclosamide	N/A	CDC Dipylidium Infection (also known as Dog and Cat Flea Tapeworm)[23]
Fasciolopsis buski: Praziquantel	N/A	CDC Fasciolopsis buski[24]
Hymenolepiasis o Praziquantel o Niclosamide o Notazoxanide	N/A	CDC Hymenolepiasis (also known as Hymenolepis nana infection)[25]
Strongyloidiasis o Acute and chronic strongyloidiasis: First line therapy: Ivermectin o Alebndazole (Alternative) o Hyperinfection Syndrome/ Disseminated Strongyloidiasis: Ivermectin	N/A	CDC Strongyloidiasis[26]

At the end of the report, a key recommendation synthesis section is added highlighting the latest updates in **Gastrointestinal Tract Protozoal and Helminthic Infections clinical and therapeutic management**.

Section 1.0 Summary of Reviewed Clinical Guidelines and Evidence

This section is divided into two parts: the first includes recommendations from **updated versions of guidelines** mentioned in the previous CHI Gastrointestinal Tract Protozoal and Helminthic Infections report, and the second includes **newly added guidelines** that have helped generate this report.

1.1 Revised Guidelines

This part contains the updated versions of the guidelines mentioned in the April 2020 CHI Gastrointestinal Tract Protozoal and Helminthic Infections Report and the corresponding recommendations:

Table 2. Clinical Guidelines Requiring Revision

Guidelines Requiring Revision	
Old Versions	**Updated Versions**
CDC Amebiasis Treatment Information 2013	CDC Amebiasis Treatment Information (2024)[4]
CDC Diagnosis and Treatment Giardia Lamblia	CDC Diagnosis and Treatment Giardia Lamblia (2021)[5]
CDC Enterobiasis / Pinworm	CDC Yellow Book (2024)[6]
CDC Ascariasis Health Professionals	CDC Ascariasis (2020)[7]
CDC Resources for Health Professionals Hookworm 2019[8]	N/A*
Parasites - Trichuriasis (also known as Whipworm Infection) 2019 CDC[9]	N/A*
Parasites - Trichinellosis (also known as Trichinosis) Resources for Health Professionals CDC 2019[10]	N/A*
Resources for Health Professionals Taeniasis Parasites CDC	CDC (2020)[12]
Resources for Health Professionals Schistosomiasis	CDC (2020)[12]

**: No updated versions available*

1.1.1 Centers for Disease Control and Prevention (CDC) – Parasites (Resources for Health Professionals)

There are no evidence levels and grades of recommendations. The following recommendations are provided by the CDC:

Table 3. CDC Updated Treatment Recommendations

Parasitic Infections	
Amebiasis-Entamoeba histolytica Infection[4]	Patients with symptomatic intestinal infection and extraintestinal disease: treat with **metronidazole or tinidazole**, then treat with **iodoquinol or paromomycin**. Treat asymptomatic patients infected with E. histolytica with **iodoquinol or paromomycin** because they can infect others and because 4%–10% of asymptomatic patients develop disease within 1 year if untreated. In patients with large amebic liver abscesses (>5 cm in diameter), draining the abscess in addition to treating with **metronidazole or tinidazole** can aid in the early resolution of pain and tenderness.
	Nitazoxanide and Diloxanide furoate (luminal amebicides) are recommended as they act only on the intestinal lumen and are used to treat amoebic, not dysenteric, colitis[27]. Diloxanide Furoate: According to Lexicomp, in **ADULTS** for Amebiasis, intestinal: Oral: 500 mg 3 times daily for 10 days. In **PEDIATRICS**: Amebiasis, intestinal: Children and Adolescents: Oral: 20 mg/kg/day in divided doses for 10 days (maximum: 1,500 mg/day). Entamoeba moshkovskii is also a pathogenic strain with a similar treatment to Entamoeba histolytica.
Giardia Lamblia (Giardiasis) Treatment[5]	Effective treatments include **metronidazole, tinidazole, and nitazoxanide.** Other medications include **paromomycin, quinacrine, and furazolidone**. Recurrent Giardiasis Infections and Treatment Failures People treated for giardiasis may continue to experience illness symptoms or have positive tests for *Giardia*. In such cases, before switching therapies doctors should consider the following steps:

	Dehydration due to diarrhea can be a particular risk among pregnant women and can be life-threatening for infants. For this reason, rehydration is especially important for these groups. 1. Determine if the patient is still infected. Test 3 stool samples over several days by antigen testing or microscopy. 2. If *Giardia* is not found after 3 stool exams, and if a parasite concentration method is used to process the stool specimen before the exam, it is highly probable that the patient is no longer infected. o Please note that the patient may remain symptomatic for weeks to months following clearance of infection. 3. Consider possible reinfection through the environment—home or daycare—or household members, rather than treatment failure. 4. Consider inadequate dosing and duration of treatment. Confirm that the patient took the entire course of medication as prescribed. 5. If *Giardia* is confirmed by a positive stool test, reinfection and inadequate dosing have been ruled out, and the patient remains symptomatic, consider combination therapy. Combination therapy can be safe, effective, and useful in the case of treatment failure. The treating physician can wait at least 2 weeks after the last dose of anti-*Giardia* medication is taken by the patient and then re-examine stool specimens as outlined in Step One for the presence of *Giardia*. If stool specimens remain positive for *Giardia*, consider an underlying immunodeficiency that may be impeding clearance of the infection. Workup for other diseases may be conducted during a combination therapy regimen.
	Albendazole is recommended as a single dose of 400 mg/day for 5 days. Albendazole was found to be equally as effective as metronidazole.

	According to Lexicomp, in **ADUTLS** Is used off-label: Giardiasis (Giardia duodenalis) (alternative agent): Oral: 400 mg once daily for 5 days. In pediatrics, Giardiasis (Giardia duodenalis) (alternative therapy): Limited data available: Children ≥2 years and Adolescents: Oral: 10 to 15 mg/kg/dose once daily for 5 to 10 days; maximum dose: 400 mg/dose[28]
Enterobiasis (also known as Pinworm Infection)[6]	The medications used for the treatment of pinworm are either **mebendazole, pyrantel pamoate, or albendazole**. Any of these drugs are given in one dose initially, and then another single dose of the same drug two weeks later. Pyrantel pamoate is available without prescription. The medication does not reliably kill pinworm eggs. Therefore, the second dose is to prevent re-infection by adult worms that hatch from any eggs not killed by the first treatment. Health practitioners and parents should weigh the health risks and benefits of these drugs for patients under 2 years of age. Repeated infections should be treated by the same method as the first infection. In households where more than one member is infected or where repeated, symptomatic infections occur, it is recommended that all household members be treated at the same time. In institutions, mass and simultaneous treatment, repeated in 2 weeks, can be effective.
Ascaris lumbricoides (sometimes called just Ascaris or ascariasis)[7]	Ascariasis is treated with **albendazole, mebendazole, or ivermectin**. Dosage is the same for children as for adults. Albendazole should be taken with food. Ivermectin should be taken on an empty stomach with water. The safety of ivermectin for treating children who weigh less than 15 kg has not been established. **Albendazole**: 400 mg orally once **Mebendazole**: 100 mg orally twice daily for 3 days or 500 mg orally once **Ivermectin**: 150-200 mcg/kg orally once
	• Pyrantel pamoate is used off-label according to Lexicomp: Ascariasis (Ascaris lumbricoides) (roundworm) (alternative agent) (off-label use): Oral: 11 mg/kg (maximum: 1 g/dose) as a single dose

	• In PEDIATRICS: Ascariasis (Ascaris lumbricoides) (roundworm): Limited data available: Children and Adolescents: Oral: 11 mg/kg once daily for 3 days; maximum dose: 1,000 mg/dose.
Hookworm[8]	Hookworm infection is treated with **albendazole**, **mebendazole**, or **pyrantel pamoate**. Dosage is the same for children as for adults. Albendazole should be taken with food. Albendazole is not FDA-approved for treating hookworm infection. **Albendazole:** 400 mg orally once **Mebendazole:** 100 mg orally twice a day for 3 days or 500 mg orally once (less effective than 3 days) **Pyrantel pamoate:** 11 mg/kg (up to a maximum of 1 g) orally daily for 3 days
Trichuriasis (Whipworm Infection)[9]	Whipworm is effectively treated with **albendazole, mebendazole or ivermectin**. Each drug needs to be taken for 3 days. Dosage guidelines are the same for children as for adults. Albendazole should be taken with food. Ivermectin should be taken with water on an empty stomach and the safety of ivermectin for children weighing less than 15 kg has not been established. Neither albendazole nor ivermectin is FDA-approved for treating whipworm. Albendazole: 400 mg orally for 3 days Mebendazole: 100 mg orally twice a day for 3 days Ivermectin: 200 mcg/kg/day orally for 3 days
Trichinellosis (Trichinosis)[10]	Prompt treatment with antiparasitic drugs can help prevent the progression of trichinellosis by killing the adult worms and so preventing further release of larvae. Once the larvae have become established in skeletal muscle cells, usually by 3 to 4 weeks post infection, treatment may not completely eliminate the infection and associated symptoms. Treatment with either mebendazole or albendazole is recommended. If treatment is not initiated within the first several days of infection, more prolonged or repeated courses of treatment may be necessary. Both drugs are considered relatively safe but have been associated with side effects including bone marrow suppression. Patients on longer courses of therapy should be monitored by serial

	complete blood counts to detect any adverse effects promptly and discontinue treatment. Albendazole and mebendazole are not approved for use in pregnant women or children under the age of 2 years. In addition to antiparasitic medication, treatment with steroids is sometimes required in more severe cases. **Albendazole**: 400 mg twice a day by mouth for 8 to 14 days **Mebendazole**: 200 to 400 mg three times a day by mouth for 3 days, then 400 to 500 mg three times a day by mouth for 10 days
Taeniasis[11]	**Praziquantel** is the medication most often used to treat active taeniasis, given at 5-10 mg/kg orally once for adults and 5-10 mg/kg orally once for children. Available evidence suggests that using 10mg/kg once orally may have a higher rate of cure than the 5mg/kg dose. **Niclosamide** is an alternative, given at 2 g orally once for adults and 50 mg/kg orally once for children. **Albendazole**, given 400mg daily for three days, may be used as another option for the treatment of taeniasis, although this is based on studies treating small numbers of infected individuals with T. solium or T. saginata. Stools may be collected for 3 days after treatment to search for proglottids or scolices for species identification if necessary. Stools should be re-examined for Taenia eggs 1 and 3 months after treatment to be sure the infection is cleared. Both praziquantel and albendazole should be used cautiously in patients suspected to have cysticercosis. There are case reports of seizures that may have been temporally associated with treatment.
Schistosomiasis[12]	Infections with all major Schistosoma species can be treated with **praziquantel**. The timing of treatment is important since praziquantel is most effective against the adult worm and requires the presence of a mature antibody response to the parasite. For travelers, treatment should be at least 6-8 weeks after last exposure to potentially contaminated freshwater. One study has suggested an effect of praziquantel on

	schistosome eggs lodged in tissues. Limited evidence of parasite resistance to praziquantel has been reported based on low cure rates in recently exposed or heavily infected populations; however, widespread clinical resistance has not occurred. Thus, praziquantel remains the drug of choice for treatment of schistosomiasis. Host immune response differences may impact individual response to treatment with praziquantel. Although a single course of treatment is usually curative, the immune response in lightly infected patients may be less robust and repeat treatment may be needed after 2 to 4 weeks to increase effectiveness. If the pre-treatment stool or urine examination was positive for schistosome eggs, follow up examination at 1 to 2 months post-treatment is suggested to help confirm successful cure. Schistosoma species infection & Praziquantel dose and Duration: Schistosoma mansoni, S. haematobium, S. intercalatum: 40 mg/kg per day orally in two divided doses for one day S. japonicum, S. mekongi: 60 mg/kg per day orally in three divided doses for one day There is a lack of safety trial data for the use of praziquantel in children less than 4 years of age or pregnant women. However, this drug has been distributed widely in mass drug administration programs and WHO now recommends that pregnant women should be treated as part of those campaigns based on extensive experience with the drug and review of the veterinary and human evidence. Similarly, WHO reports that there is growing evidence that infected children as young as 1 year old can be effectively treated with praziquantel without serious side effects; however, the drug is commonly available in the form of large, hard-to-swallow pills, which puts young children at risk for choking and other difficulties swallowing the drug.

1.2 Additional Guidelines

This part includes the added guidelines to the previous CHI Gastrointestinal Tract Protozoal and Helminthic Infections report, along with their recommendations.

Table 4. List of Additional Guidelines

Additional Guidelines
CDC Anisakiasis[13]
CDC Balantidiasis[14]
CDC Blastocystis spp. [15]
CDC Capillariasis[16]
CDC Nonpathogenic intestinal protozoa[29]
CDC Clonorchis[17]
CDC Cryptosporidium [18]
CDC Cyclosporiasis (Cyclospora Infection)[19]
CDC Cystoisosporiasis (formerly known as isosporiasis)[20]
CDC Dientamoeba fragilis[21]
CDC Diphyllobothrium latum[22]
CDC Dipylidium Infection (also known as Dog and Cat Flea Tapeworm)[23]
CDC Fasciolopsis buski[24]
CDC Hymenolepiasis (also known as Hymenolepis nana infection)[25]
CDC Strongyloidiasis[26]

1.2.1 Centers for Disease Control and Prevention (CDC) – Parasites (Resources for Health Professionals)

There are no evidence levels and grades of recommendations. The following recommendations are provided by the CDC (2022)

Table 5. Additional Treatment Recommendations from the CDC

Parasitic Infections	
Anisakiasis [13]	It is often possible to diagnose and treat gastric anisakiasis by removal of the worm using an endoscope. Diagnosis of enteric anisakiasis is more difficult; however, it can generally be managed without removal of the worm because the worm will eventually die. Surgery may be required for intestinal or extraintestinal infections when intestinal obstruction, appendicitis, or peritonitis occurs. Successful treatment of anisakiasis with **albendazole*** 400 mg orally twice daily for 6 to 21 days has been reported in cases with presumptive (highly suggestive history and/or serology) diagnoses.
Balantidiasis (also known as Balantidium coli Infection)[14]	Three medications are used most often to treat Balantidium coli: **tetracycline, metronidazole, and iodoquinol**. **Tetracycline***: adults, 500 mg orally four times daily for 10 days; children ≥ 8 years old, 40 mg/kg/day (max. 2 grams) orally in four doses for 10 days. (Note: Tetracyclines are contraindicated in pregnancy and in children < 8 years old. Tetracycline should be taken 1 hour before or 2 hours after meals or ingestion of dairy products.) Alternatives: **Metronidazole***: adults, 500-750 mg orally three times daily for 5 days; children, 35-50 mg/kg/day orally in three doses for 5 days. OR **Iodoquinol***: adults, 650 mg orally three times daily for 20 days; children, 30-40 mg/kg/day (max 2 g) orally in three doses for 20 days. (Note: iodoquinol should be taken after meals.) **Nitazoxanide***: has been tried in small studies, which suggest some therapeutic benefit (adults, 500 mg orally twice daily for 3 days; children ages 4-11 years old 200 mg orally twice daily for 3 days; children 1-3 years old 100 mg orally twice daily for 3 days).
Blastocystis spp. [15]	The clinical significance of Blastocystis spp. Is controversial.

	Treatment with **metronidazole*** at various doses has been reported, for example (adults): 250 mg to 750 mg metronidazole* orally 3 times daily for 10 days 1500 mg metronidazole* orally once daily for 10 days Note: Lack of response to metronidazole has been noted in some areas. Treatment with **trimethoprim (TMP)*/sulfamethoxazole (SMX)*** at various doses has been reported, for example (adults): 6 mg/kg TMP*, 30 mg/kg SMX* once daily for 7 days 320mg TMP*, 1600 mg SMX* once daily for 7 days 160 mg TMP*, 800 mg SMX* twice daily for 7 days Treatment with **nitazoxanide*** has been shown to be effective in clearing organisms and improving symptoms at the following doses: Adults, 500 mg **nitazoxanide*** orally twice daily for 3 days. Children, 200 mg nitazoxanide* orally twice daily for 3 days in patients aged 4–11 years, and 100 mg nitazoxanide* orally twice daily for 3 days in patients aged 1–3 years. **Tinidazole*, paromomycin*, iodoquinol*, and ketoconazole*** have also been used for clearing Blastocystis, as presented in case reports or small series.
Capillariasis (also known as Capillaria Infection)[16]	**Mebendazole***, is the drug of choice for adults, 200 mg orally twice a day for 20 days; the pediatric dosage is the same. Alternative: **Albendazole***, adults, 400 mg orally once a day for 10 days; the pediatric dosage is the same. (Note: Albendazole must be taken with food; a fatty meal increases oral bioavailability.)
The nonpathogenic intestinal protozoa include[29]**:** • **Chilomastix mesnili** • **Endolimax nana** • **Entamoeba coli**	**No treatment is necessary; these protozoa are harmless.**

• **Entamoeba dispar** • **Entamoeba hartmanni** • **Entamoeba polecki** • **Iodamoeba buetschlii**	
Clonorchis[17]	**Praziquantel**, adults, 75mg/kg/day orally, three doses per day for 2 days; the pediatric dosage is the same. Praziquantel should be taken with liquids during meals. Alternative: **Albendazole*** is an alternative drug; the dosage for adults is 10mg/kg/day for 7 days. The pediatric dosage is the same. Albendazole should be taken with food; a fatty meal increases the bioavailability.
Cryptosporidium[18]	FDA licensed **nitazoxanide** (Alinia®, Romark Laboratories, Tampa, FL, USA) for treatment of cryptosporidiosis in children aged 1-11 years in November 2002. In June 2004, nitazoxanide was also licensed for older children and adults. It can now be prescribed for all patients ≥ 1 year of age. In 2004, the FDA licensed nitazoxanide for all persons ≥ 1 year of age. It had previously been licensed in 2002 for only children aged 1-11 years. What is the dosage used for nitazoxanide? Immunocompetent Persons: Adult dosage: 500 mg BID x 3 days Pediatric dosage: - 1-3 years: 100 mg BID x 3 days - 4-11 years: 200 mg BID x 3 days Nitazoxanide oral suspension (100 mg/5ml; patients ≥ 1 year of age) and Nitazoxanide tablets (500 mg; patients ≥ 12 years of age) are indicated for the treatment of diarrhea caused by Cryptosporidium. Nitazoxanide appears to be well tolerated and different treatment regimens have been used for a variety of infections. Immunocompetent persons with cryptosporidiosis have been treated with multiple 3-day courses of nitazoxanide. Seven-day courses have also been

	used in early studies for cryptosporidiosis and other parasitic infections. AIDS patients with Cryptosporidium-associated diarrhea received the drug for 28 days.
	Paromycin and azithromycin: • According to Lexicomp, in **ADULTS** Cryptosporidiosis-associated diarrhea in patients with HIV (off-label use): Oral: 500 mg 4 times daily for 14 to 21 days (must be used in conjunction with optimized antiretroviral therapy, electrolyte replacement, symptomatic treatment, and rehydration) • IN **PEDIATRICS**: Cryptosporidiosis, immunocompromised or nutritionally deficient patients (alternative therapy): Limited data available: • Infants, Children, and Adolescents: Oral: 25 to 35 mg/kg/day in 2 to 4 divided doses for 14 days as monotherapy or in combination with azithromycin; longer durations (>14 days) may be needed in solid organ transplant recipients. Note: Usual adult dose: 500 mg 4 times daily. • **HIV-infected:** Adolescents: Oral: 500 mg 4 times daily for 14 to 21 days in combination with optimized antiretroviral therapy, symptomatic treatment, rehydration, and electrolyte replacement. Note: Efficacy data variable; paromomycin is not recommended for infants or children with HIV based on insufficient data **Nitazoxanide plus azithromycin:** According to Lexicomp, in **ADULTS**: Cryptosporidiosis: • Immunocompetent patients: Oral: 500 mg every 12 hours for 3 days. • Patients with HIV (off-label use): Oral: 500 mg to 1 g twice daily for 14 days (must be used in conjunction with optimized antiretroviral therapy, electrolyte replacement, symptomatic treatment, and rehydration). • Solid organ transplant recipients (off-label use): Oral: 500 mg to 1 g twice daily for 14 days, in combination with reduction of immunosuppression, when possible. In patients with severe diarrhea or

	treatment failure, consider 500 mg twice daily in combination with azithromycin. In **PEDIATRICS**: Cryptosporidiosis (Cryptosporidium parvum infection): • Note: Treatment duration is 3 days in immunocompetent patients. For immunocompromised patients, including those who are HIV-exposed/infected, suggested treatment duration is 3 to 14 days or longer, despite uncertain efficacy; HIV-infected patients should also receive optimized combination antiretroviral therapy. • Children 1 to <4 years: Oral suspension: Oral: 100 mg every 12 hours. • Children 4 to <12 years: Oral suspension: Oral: 200 mg every 12 hours. • Children ≥12 years and Adolescents: Oral suspension, tablet: Oral: 500 mg every 12 hours.
Cyclosporiasis (Cyclospora Infection)[19]	**Trimethoprim-sulfamethoxazole (TMP-SMX),** or Bactrim*, Septra*, or Cotrim*, is the treatment of choice. The typical regimen for immunocompetent adults is TMP 160 mg plus SMX 800 mg (one double-strength tablet), orally, twice a day, for 7–10 days. HIV-infected patients may need longer courses of therapy. No highly effective alternatives have been identified yet for persons who are allergic to (or are intolerant of) TMP-SMX. Approaches to consider for such persons include observation and symptomatic treatment, use of an antibiotic whose effectiveness against Cyclospora is based on limited data, or desensitization to TMP-SMX. The latter approach should be considered only for selected patients who require treatment, have been evaluated by an allergist, and do not have a life-threatening allergy. Anecdotal or unpublished data suggest that the following drugs are ineffective: albendazole, trimethoprim (when used as a single agent), azithromycin, nalidixic acid, tinidazole, metronidazole, quinacrine, tetracycline, doxycycline, and diloxanide furoate. Although data from a small study among HIV-infected patients in Haiti suggested that ciprofloxacin might have modest activity against Cyclospora, substantial

	anecdotal experience among many immunocompetent persons suggests that ciprofloxacin is ineffective.
Cystoisosporiasis (formerly known as isosporiasis)[20]	**Trimethoprim-sulfamethoxazole (TMP-SMX),** sold under the trade names Bactrim*, Septra*, and Cotrim*, is the medication of choice for Cystoisospora infection. The typical treatment regimen for adults is TMP 160 mg plus SMX 800 mg (one double-strength tablet), orally, twice a day, for 7 to 10 days. Expert consultation is recommended if the patient is immunosuppressed, for example, has AIDS. Such patients may need to be treated longer and/or with higher daily doses. This is an example of an alternative regimen of TMP-SMX for adults: one double-strength tablet of TMP-SMX, orally, four times a day, for up to 3 or 4 weeks. Patients with AIDS also may need maintenance therapy (secondary prophylaxis) with TMP-SMX to prevent recurrence of symptomatic infection. Only limited data are available regarding potential alternatives to TMP-SMX. Patients who are allergic to (or are intolerant of) TMP-SMX usually are treated with **pyrimethamine**. For adults, the typical daily dose of pyrimethamine is in the range of 50 to 75 mg. This daily dose is given orally, either once a day or divided into 2 separate doses. For example, 50 mg can be given in one dose, or 25 mg can be given twice a day. Pyrimethamine can suppress the bone marrow. To help prevent this, patients treated with pyrimethamine also take leucovorin, orally, in a daily dose in the range of 10 to 25 mg. Folinic acid is another name for leucovorin. **Ciprofloxacin** is a **second-line alternative**. It is less effective than TMP-SMX but might have some activity against Cystoisospora. For adults, the treatment regimen is 500 mg, orally, twice a day, for 7 days.
Dientamoeba fragilis[21]	Examples of several of the most commonly used treatments are provided in the table below. As always, treatment decisions should be individualized. **Iodoquinol**: 650 mg orally three times daily for 20 days OR

	Paromomycin: 25–35 mg per kg per day orally, in three divided doses, for 7 days OR **Metronidazole****: 500–750 mg orally three times daily for 10 days
Diphyllobothrium latum[22]	**Praziquantel***, adults, 5-10 mg/kg orally in a single-dose therapy; the dosage for children is the same. (Note: praziquantel should be taken with liquids during a meal.) Alternative: Adults, **niclosamide** 2 gm orally once; children, 50 mg/kg (max 2 gm) orally once. (Note: niclosamide must be chewed thoroughly or crushed and swallowed with a small amount of water.)
Dipylidium[23]	**Praziquantel**, adults, 5-10 mg/kg orally in a single-dose therapy. Praziquantel is not approved for treatment of children less than 4 years old but this drug has been used successfully to treat cases of D. caninum infection in children as young as 6 months. **Niclosamide** is effective. No purge or follow-up stool examination is indicated, but appearance of proglottids after therapy is indication for retreatment. The infection is self-limiting in the human host and typically spontaneously clears by 6 weeks.
Fasciolopsis buski[24]	**Praziquantel**, adults, 75 mg/kg/day orally in three divided doses for 1 day; the dosage for children is the same. (Note: praziquantel should be taken with liquids during a meal.)
Hymenolepiasis (also known as Hymenolepis nana infection)[25]	**Praziquantel**, adults and children, 25mg/kg in a single-dose therapy. Alternatives: **Niclosamide***: adults, 2 gm in a single dose for 7 days; children 11-34 kg, 1 gm in a single dose on day 1 then 500 mg per day orally for 6 days; children > 34 kg, 1.5 gm in a single dose on day 1 then 1 gm per day orally for 6 days. **Nitazoxanide**: adults, 500 mg orally twice daily for 3 days; children aged 12-47 months, 100 mg orally twice daily for 3 days; children 4-11 years, 200 mg orally twice daily for 3 days.
Strongyloidiasis [26]	**Acute and chronic strongyloidiasis**

	First line therapy **Ivermectin**, in a single dose, 200 µg/kg orally for 1—2 days Relative contraindications include the following: Confirmed or suspected concomitant Loa loa infection Persons weighing less than 15kg Pregnant or lactating women **Alternative** **Albendazole**, 400 mg orally two times a day for 7 days. Relative contraindications: Hypersensitivity to benzimidazole compounds or any component of product Use should be avoided in the 1st trimester of pregnancy In patients with positive stool examination for Strongyloides and persistent symptoms, follow-up stool exams should be performed 2—4 weeks after treatment to confirm clearance of infection. If recrudescence of larvae is observed, retreatment is indicated. **Hyperinfection syndrome/Disseminated strongyloidiasis:** If possible, immunosuppressive therapy should be stopped or reduced, and: Ivermectin, 200 µg/kg per day orally until stool and/or sputum exams are negative for 2 weeks. For patients unable to tolerate oral therapy, such as those with ileus, obstruction, or known or suspected malabsorption, published case reports have demonstrated efficacy with rectal administration. If oral and/or rectal administrations are not possible, there have been instances where Investigational New Drug (IND) exemptions for the veterinary subcutaneous formulation of ivermectin have been granted by the FDA.

Section 2.0 Drug Therapy in Gastrointestinal Tract Protozoal and Helminthic Infections

This section comprises three subsections: the first one contains the newly recommended drugs, the second one covers drug modifications, and the third one outlines the drugs that have been withdrawn from the market.

2.1 Additions

The following drugs will be added to the drug summary spreadsheet:

- Ivermectin
- Tetracycline
- TMP-SMX
- Ciprofloxacin
- Pyrimethamine
- Nitazoxanide

2.2 Modifications

The following indications and their respective medications were removed from the previous CHI Report since they do not pertain to GIT Parasites and Helminthic Infections: Loiasis, Lymphatic Filariasis, and Leishmaniasis:

- AMPHOTERICIN B
- DIETHYLCARBAMAZINE
- SODIUM STIBOGLUCONATE

Paromomycin is no longer SFDA-registered, it will be kept as a non-registered drug, and the prescribing edit “Prior Authorization (PA)” was removed.

The prescribing edits “Prior Authorization (PA)” and “AGE” were removed for Albendazole and Mebendazole.

2.3 Delisting

The medications below are no longer SFDA registered[30], therefore, it is advisable to delist the following drugs from CHI formulary. *Please refer to* ***Drug Therapy in Gastrointestinal Tract Protozoal and Helminthic Infections - Section 2*** *of CHI Gastrointestinal Tract Protozoal and Helminthic Infections original clinical guidance*

- NICLOSAMIDE

Section 3.0 Key Recommendations Synthesis

The recommended treatment for each of the indications is as follows:

- **Amebiasis- Entamoeba histolytica**
    - Symptomatic infection: Metronidazole or Tinidazole, then iodoquinol or paromomycin
    - Asymptomatic: iodoquinol or paromomycin
    - Large liver abcesses >5cm: drain and give metronidazole or tinidazole
- **Anisakiasis**
    - Surgery may be required
    - Albendazole in cases of presumptive diagnosis
- **Ascaris lumbricoides**
    - Albendazole
    - Mebendazole
    - Ivermectin
- **Balantidiasis**
    - Tetracycline
    - Metronidazole
    - Iodoquinol
    - Nitazoxanide has been tried
- **Blastocystis spp.**
    - Metronidazole
    - TMP/SMX
    - Nitazoxanide
- **Capillariasis**
    - Mebendazole
    - Albendazole
- **Clonorchis**
    - Praziquantel
    - Albendazole
- **Cryptosporidium**

    - Nitazoxanide
- **Cyclosporiasis:** TMP-SMX
- **Cystoisosporiasis**
    - TMP-SMX or Pyrimethamine
    - Ciprofloxacine 2nd line alternative
- **Dientamoeba Fragilis**
    - Iodoquinol
    - Paromomycin
    - Metronidazole
- **Diphyllobothrium latum**
    - Praziquantel
    - Niclosamide
- **Dipylidium**
    - Praziquantel
    - Niclosamide
- **Fasciolopsis buski:** Praziquantel
- **Giardia Lamblia**
    - Metronidazole
    - Tinidazole
    - Nitazoxanide
    - Paromomycin
    - Quinacrine
    - Furazolidone
- **Hookworm**
    - Albendazole
    - mebendazole
    - Pyrantel Pamoate
- **Hymenolepiasis**
    - Praziquantel
    - Niclosamide

    - Notazoxanide
- **Enterobiasis**
    - Mebendazole
    - Pyrantel Pamoate
    - Albendazole
- **Trichuriasis (Whipworm)**
    - ALbendazole
    - Mebendazole
    - Ivermectin
- **Trichinellosis**
    - Albendazole
    - Mebendazole
- **Taeniasis**
    - Praziquantel
    - Niclosamide
    - Albendazole
- **Strongyloidiasis**
    - Acute and chronic strongyloidiasis: First line therapy: Ivermectin
    - Alebndazole (Alternative)
    - Hyperinfection Syndrome/ Disseminated Strongyloidiasis: Ivermectin
- **Schistosomiasis:** Praziquantel

Section 4.0 Conclusion

This report serves as **an annex to the previous CHI Gastrointestinal Tract Protozoal and Helminthic Infections report** and aims to provide recommendations to aid in the management of Gastrointestinal Tract Protozoal and Helminthic Infections. It is important to note that these recommendations should be utilized to support clinical decision-making and not replace it in the management of individual patients with Gastrointestinal Tract Protozoal and Helminthic Infections. Health professionals are expected to consider this guidance alongside the specific needs, preferences, and values of their patients when exercising their judgment.

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Section 6.0 Appendices

Appendix A. Prescribing Edits Definition

I. Prescribing Edits (ensure consistent use of abbreviations, e.g., CU, ST)

Some covered drugs may have additional requirements, rules, or limits on coverage. These requirements and limits may include:

Prescribing Edits Tools	Description
AGE (Age):	Coverage may depend on patient age
CU (Concurrent Use):	Coverage may depend upon concurrent use of another drug
G (Gender):	Coverage may depend on patient gender
MD (Physician Specialty):	Coverage may depend on prescribing physician's specialty or board certification
PA (Prior Authorization):	Requires specific physician request process
QL (Quantity Limits):	Coverage may be limited to specific quantities per prescription and/or time period
ST (Step Therapy):	Coverage may depend on previous use of another drug
EU (Emergency Use only):	This drug status on Formulary is only for emergency use
PE (Protocol Edit):	Use of drug is dependent on protocol combination, doses and sequence of therapy

II. Adult and Pediatric Quantity Limit?

This is either the adult or pediatric maximum amount of a drug that can be administered per day based on a maximum daily dose. If there is no clinical evidence supporting the quantity limit for that relevant indication, this column will be left as Blank.

III. What information is available in the notes?

"Notes" section provides details of the prescribing edits, extra important drug information and special warning and precautions.

IV. Drug interactions

- A: No known interaction
- B: No action needed
- C: Monitor therapy

- D: Consider therapy modification
- X: Avoid combination

V. Defined Daily Dose

The Defined Daily Dose (DDD) is to be set based on the WHO recommendations https://www.whocc.no/ddd/definition_and_general_considera/

VI. REMS

A Risk Evaluation and Mitigation Strategy (REMS) is a drug safety program that the U.S. Food and Drug Administration (FDA) can require for certain medications with serious safety concerns to help ensure the benefits of the medication outweigh its risks.

Appendix B. Gastrointestinal Tract Protozoal and Helminthic Infections Scope

Comparison of the 2020 and the 2023 Report

2020	Changes Performed	2023	Rationale
Diagnosis and Management of Amebiasis			
Diagnosis and Management of Amebiasis 1999 IDSA[31]	**NA**	**NA**	**NA**
CDC Amebiasis Treatment Information 2013[4]	**Updated**	**2024**	**<u>Not SFDA-registered</u>:** **Iodoquinol**
Giardia lamblia (Giardiasis) Treatment			
CDC Diagnosis and Treatment Giardia Lamblia	**Updated**	**2021**[5]	**<u>Not SFDA-registered</u>:** • **Nitazoxanide** • **Paromomycin** • **Quinacrine** • **Furazolidone**
Pinworm (ENTEROBIASIS, OXYURIASIS, THREADWORM) Treatment Guidelines			
Enterobiasis / Pinworm CDC	**Updated 2023**	**CDC Yellow Book 2024**[6]	**<u>Not SFDA-registered</u>:** • **Pyrantel pamoate**
ASCARIASIS			
CDC Ascariasis Health Professionals 2020	**Missing**	**CDC Ascariasis 2020**[7]	• **Ivermectin** 150-200 mcg/kg orally once

Hookworm			
Resources for Health Professionals Hookworm		**2019**[8]	**<u>Not SFDA-registered</u>:** • **Pyrantel pamoate**
Trichuriasis (also known as Whipworm Infection) Treatment Guidelines			
Parasites - Trichuriasis (also known as Whipworm Infection)		**2019 CDC**[9]	• **Ivermectin**: 200 mcg/kg/day orally for 3 days
Treatment Guidelines for Trichinellosis (also known as Trichinosis)			
Parasites - Trichinellosis (also known as Trichinosis) Resources for Health Professionals		**CDC 2019**[10]	NA
Treatment Guidelines for Taeniasis			
Resources for Health Professionals Taeniasis Parasites		**CDC 2020**[11]	NA
Treatment Guidelines for Schistosomiasis			
Resources for Health Professionals Schistosomiasis		**CDC 2020**[12]	NA
Missing			
	Missing	**CDC Anisakiasis**[13]	NA
	Missing	**CDC Balantidiasis**[14]	**Tetracycline** adults, 500 mg orally four times daily for 10 days; children ≥ 8 years old, 40 mg/kg/day (max. 2 grams) orally in four doses for 10 days. (Note:

			Tetracyclines are contraindicated in pregnancy and in children < 8 years old. Tetracycline should be taken 1 hour before or 2 hours after meals or ingestion of dairy products.) **<u>Not SFDA-registered</u>:** • **Nitazoxanide** • **Iodoquinol**
	Missing	**Blastocystis spp.** [15]	Treatment with **trimethoprim (TMP)*/sulfamethoxazole (SMX)*** at various doses has been reported, for example (adults): 6 mg/kg TMP*, 30 mg/kg SMX* once daily for 7 days 320mg TMP*, 1600 mg SMX* once daily for 7 days 160 mg TMP*, 800 mg SMX* twice daily for 7 days **Ketoconazole** **<u>Not SFDA-registered</u>:** • **Nitazoxanide** • **Iodoquinol** • **Paromomycin**
	Missing	**CDC Capillariasis**[16]	NA
	Missing	**CDC Nonpathogenic intestinal protozoa**[29]	NA
	Missing	**CDC Clonorchis**[17]	NA

	Missing	**CDC Cryptosporidium** [18]	**<u>Not SFDA-registered</u>:** • **Nitazoxanide**
	Missing	**CDC Cyclosporiasis (Cyclospora Infection)** [19]	**Trimethoprim-sulfamethoxazole (TMP-SMX),** TMP 160 mg plus SMX 800 mg (one double-strength tablet), orally, twice a day, for 7–10 days
	Missing	**Cystoisosporiasis (formerly known as isosporiasis)** [20]	**Trimethoprim-sulfamethoxazole (TMP-SMX),** TMP 160 mg plus SMX 800 mg (one double-strength tablet), orally, twice a day, for 7 to 10 days. Ciprofloxacin 500 mg, orally, twice a day, for 7 days. **<u>Not SFDA-registered</u>:** • **Pyrimethamine**
	Missing	**Dientamoeba fragilis CDC** [21]	**<u>Not SFDA-registered</u>:** • **Iodoquinol** • **Paromomycin**
	Missing	**Diphyllobothrium latum** [22]	**<u>Not SFDA-registered</u>:** • **Niclosamide**
	Missing	**CDC Dipylidium Infection (also known as Dog and Cat Flea Tapeworm)** [23]	**<u>Not SFDA-registered</u>:** • **Niclosamide**
	Missing	**Fasciolopsis buski** [24]	**NA**
	Missing	**Hymenolepiasis (also known as**	**<u>Not SFDA-registered</u>:**

		Hymenolepis nana infection)[25]	• **Niclosamide** • **Nitazoxanide**
	Missing	**Strongyloidiasis**[26]	**Ivermectin** 200 µg/kg orally for 1—2 days

Appendix C. MeSH Terms PubMed

The following is the result of the PubMed search conducted for guideline search:

Query	Filters	Search Details	Results
(((((Helminthiasis[MeSH Terms]) OR (Helminthiases[Title/Abstract])) OR (Infections, Nematomorpha[Title/Abstract])) OR (Infection, Nematomorpha[Title/Abstract])) OR (Nematomorpha Infection[Title/Abstract])) OR (Nematomorpha Infections[Title/Abstract])	Guideline, in the last 5 years, English	("helminthiasis"[MeSH Terms] OR "Helminthiases"[Title/Abstract] OR (("infect"[All Fields] OR "infectability"[All Fields] OR "infectable"[All Fields] OR "infectant"[All Fields] OR "infectants"[All Fields] OR "infected"[All Fields] OR "infecteds"[All Fields] OR "infectibility"[All Fields] OR "infectible"[All Fields] OR "infecting"[All Fields] OR "infections"[All Fields] OR "Infections"[MeSH Terms] OR "Infections"[All Fields] OR "Infection"[All Fields] OR "infective"[All Fields] OR "infectiveness"[All Fields] OR "infectives"[All Fields] OR "infectivities"[All Fields] OR "infects"[All Fields] OR "pathogenicity"[MeSH Subheading] OR "pathogenicity"[All Fields] OR "infectivity"[All Fields]) AND "Nematomorpha"[Title/Abstract]) OR (("infect"[All Fields] OR "infectability"[All Fields] OR "infectable"[All Fields] OR "infectant"[All Fields] OR "infectants"[All Fields] OR "infected"[All Fields] OR "infecteds"[All Fields] OR "infectibility"[All Fields] OR "infectible"[All Fields] OR "infecting"[All Fields] OR "infections"[All Fields] OR "Infections"[MeSH Terms] OR "Infections"[All Fields] OR	3

		"Infection"[All Fields] OR "infective"[All Fields] OR "infectiveness"[All Fields] OR "infectives"[All Fields] OR "infectivities"[All Fields] OR "infects"[All Fields] OR "pathogenicity"[MeSH Subheading] OR "pathogenicity"[All Fields] OR "infectivity"[All Fields]) AND "Nematomorpha"[Title/Abstract]) OR "nematomorpha infection"[Title/Abstract] OR "nematomorpha infections"[Title/Abstract]) AND ((y_5[Filter]) AND (guideline[Filter]) AND (english[Filter]))	
(((((Protozoan Infections[MeSH Terms]) OR (Infections, Protozoan[Title/Abstract])) OR (Infection, Protozoan[Title/Abstract])) OR (Protozoan Infection[Title/Abstract])) OR (Histomoniasis[Title/Abstract])) OR (Histomoniases[Title/Abstract])	Guideline, in the last 5 years, English	("protozoan infections"[MeSH Terms] OR "infections protozoan"[Title/Abstract] OR "infection protozoan"[Title/Abstract] OR "protozoan infection"[Title/Abstract] OR "Histomoniasis"[Title/Abstract]) AND ((y_5[Filter]) AND (guideline[Filter]) AND (english[Filter]))	4

Appendix D. Treatment Algorithm

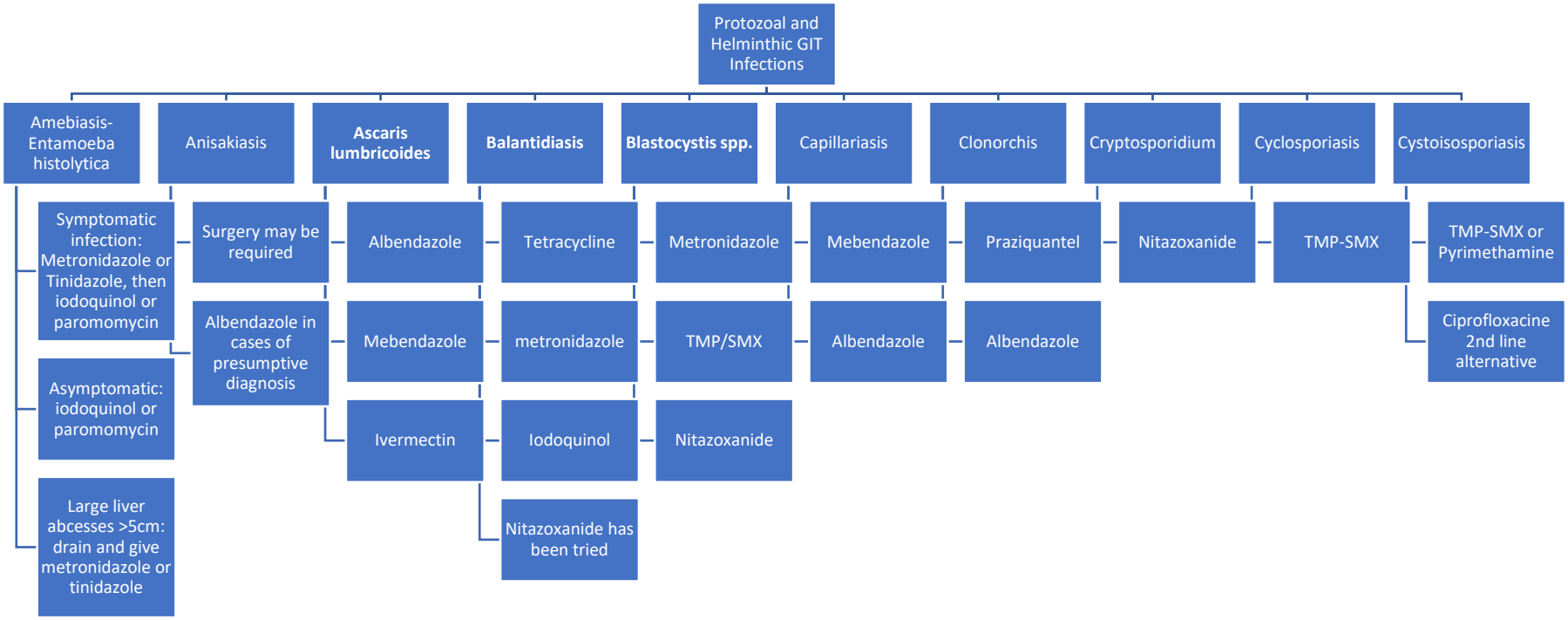

***Figure 1**. Treatment Algorithm for Protozoal and Helminthic GIT Infections, adapted from CDC - Parasites. https://www.cdc.gov/parasites/. For the level of evidence, please refer to the full report.*

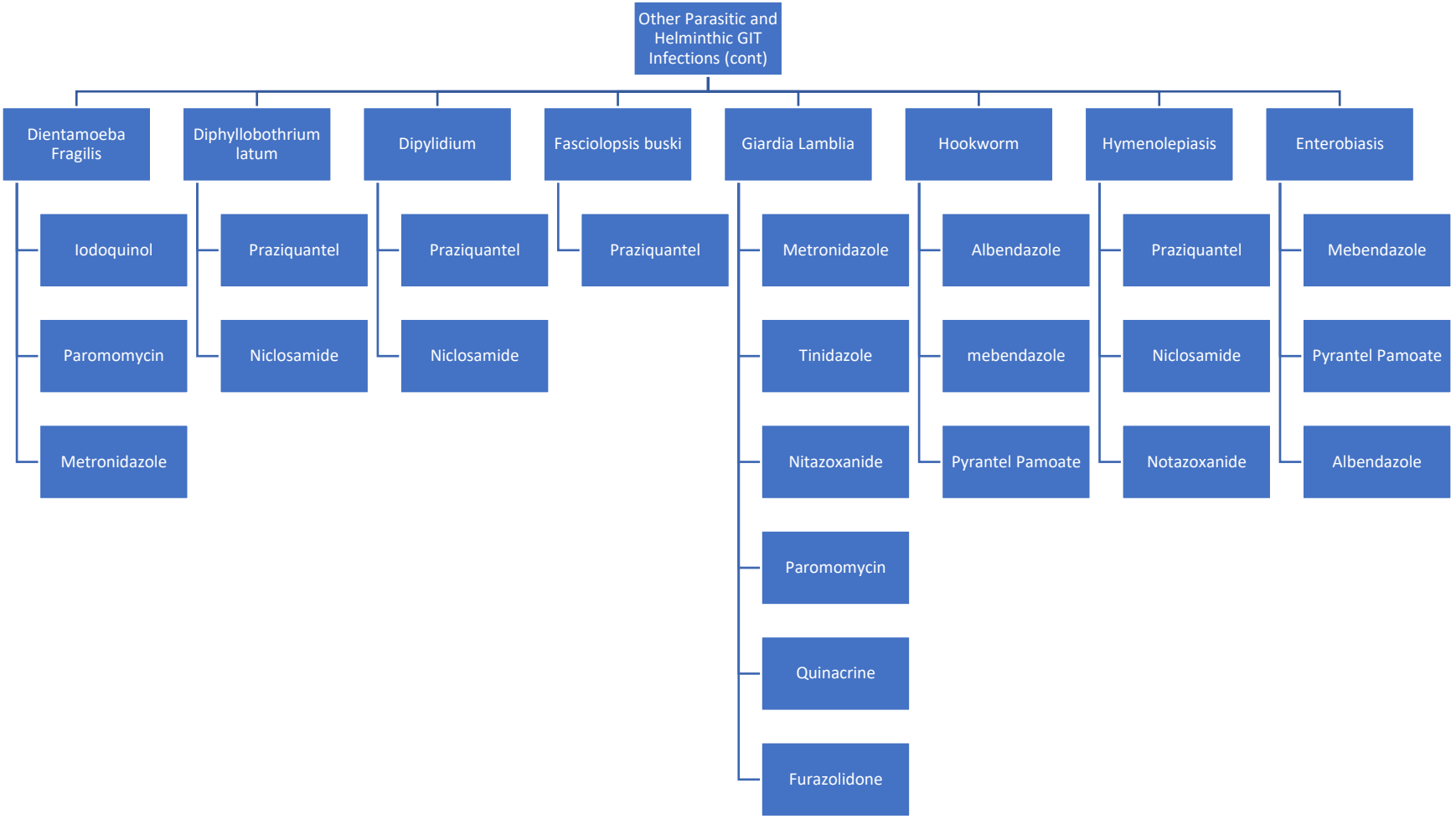

Figure 2. *Treatment Algorithm for Protozoal and Helminthic GIT Infections part 2, adapted from CDC - Parasites. https://www.cdc.gov/parasites/. For the level of evidence, please refer to the full report.*

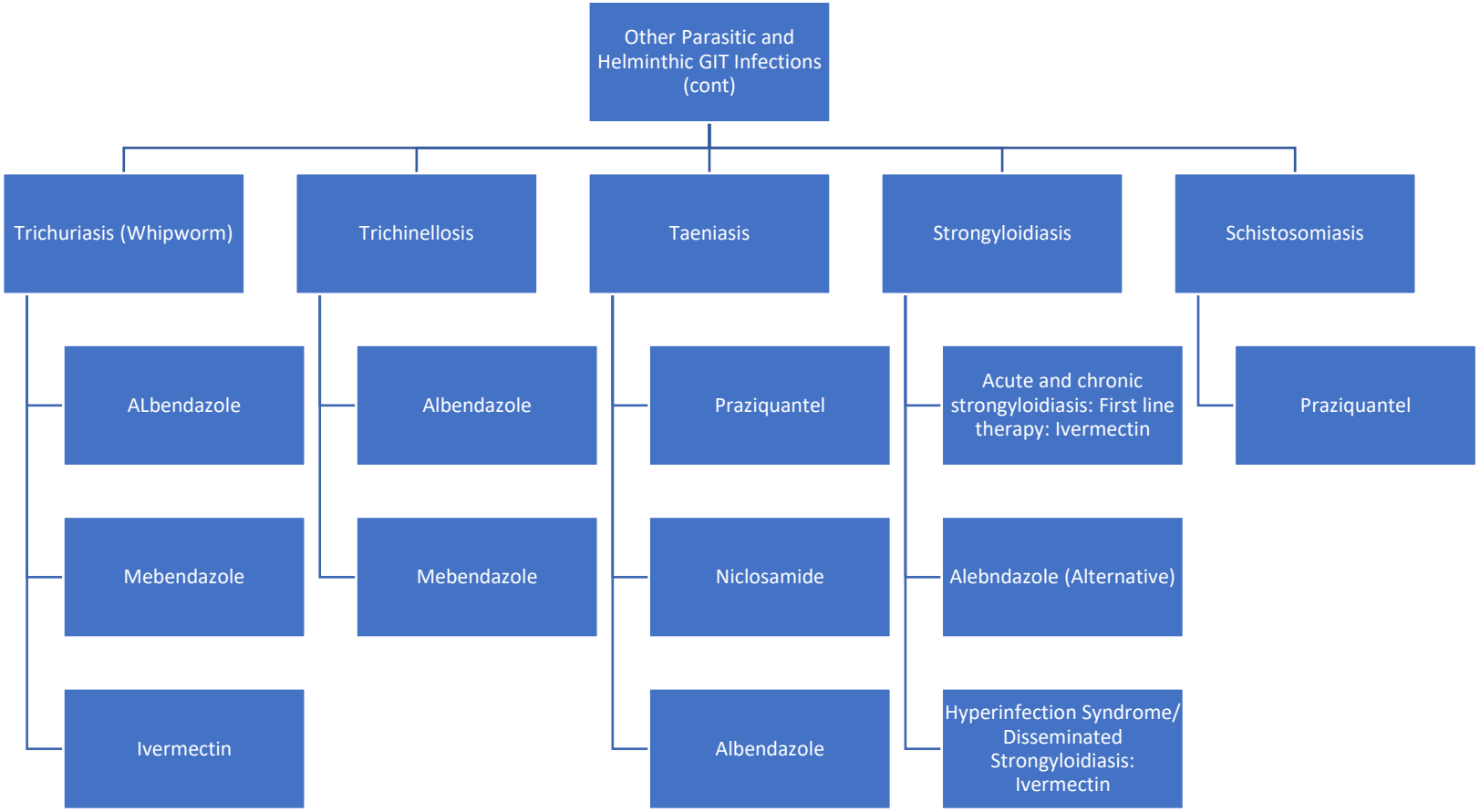

***Figure 3**. Treatment Algorithm for Protozoal and Helminthic GIT Infections, part 3, adapted from CDC - Parasites. https://www.cdc.gov/parasites/. For the level of evidence, please refer to the full report.*