Int Health
doi:10.1093/inthealth/ihy005

ORIGINAL ARTICLE

A review of gastrointestinal protocols for primary care medical service trips (MSTs) in Latin America and the Caribbean

Christopher Dainton[a,b,c,*] and Charlene H. Chu[c,d]

[a]*Grand River Hospital, Kitchener, ON, Canada;* [b]*McMaster University, Hamilton, ON, Canada;* [c]*Medical Service Trip Inc., Toronto, ON, Canada;* [d]*Toronto Rehabilitation Institute-University Health Network, Toronto, ON, Canada*

*Corresponding author: Present address: 1002-8 The Esplanade, Toronto, ON, Canada M5E 0A6. Tel: +1 416 884 7231; E-mail: christopher.dainton@gmail.com

Received 12 July 2017; revised 14 December 2017; editorial decision 8 January 2018; accepted 8 January 2018

Background: Gastrointestinal disorders are among the most common conditions encountered on short-term, primary care medical service trips (MSTs) in Latin America and the Caribbean (LAC), but their optimal management remains unclear. There have been no previous attempts to describe the protocols that Western volunteer clinicians use in managing these patients.

Methods: A systematic web search was used to identify organizations operating MSTs in LAC. Clinical protocols were downloaded from organizational websites, and organizations were contacted online to obtain those that were not publicly available. Protocols were analysed qualitatively, and content compared with existing international guidelines.

Results: Two hundred and twenty-five organizations were identified and contacted to obtain their clinical protocols, and the content of each protocol was qualitatively analysed. Twenty protocols were obtained, of which 75% (15/20) discussed dyspepsia, 65% (13/20) discussed parasites and 60% (12/20) discussed diarrhoea. The protocols infrequently included literature citations.

Conclusion: Gastrointestinal disorder protocols used by MSTs in LAC sometimes neglected important aspects of clinical management that are emphasized in international guidelines. This study is a first step in context-specific clinical guideline development for MSTs operating in LAC.

Keywords: Clinical practice guidelines, Gastrointestinal disorders, Latin America, Medical missions, Medical service trips, Protocols

Introduction

Short-term, primary care medical service trips (MSTs) to developing countries in Latin America and the Caribbean (LAC) are increasingly common among healthcare providers and their trainees. Such trips involve remote outreach, with provision of primary care and health promotion services under resource constraints that make practice challenging for volunteers. Cultural and language barriers, unreliable clinical follow-up and scarce diagnostic testing make traditional diagnosis more difficult, such that clinical management is syndromic by necessity.[1,2] In tropical settings in LAC, the pathology encountered may be unfamiliar to Western practice, and even familiar conditions may have important epidemiologic differences[3,4] that alter the ideal choices for antimicrobial and symptomatic treatment.

Of the conditions encountered on such MSTs, gastrointestinal (GI) disorders are among the most important and account for 16–21% of MST complaints.[5] Diarrhoea in LAC accounts for more than 20% of childhood mortality, with incidence peaking at 13–14 mo,[6] and a reported prevalence of 0.45 cases per person-year in one Ecuadorian study.[7] Dyspepsia is also endemic in developing countries, where overcrowding, poor sanitary conditions and unclean water increase *Helicobacter pylori* transmission,[8] resulting in 90% of adults being infected and 10–15% becoming symptomatic with peptic ulcer disease (PUD).[9] Finally, soil-transmitted helminths are endemic in LAC, with mass deworming treatment commonly used in host communities by both MSTs and public health programmes to prevent anaemia, growth stunting and intellectual impairment in children.[10]

While international clinical practice guidelines (CPGs) exist, they are often lengthy or otherwise inappropriate to the specific context of MST practice, which is characterized by clinical management in remote and low resource communities. Key

considerations that may not be adequately addressed in CPGs include decisions on who requires urgent transport from remote communities to tertiary care for further diagnostic investigations, and who would be appropriate for within-community observation or a trial of treatment. Further issues exist regarding resource allocation, magnified clinician–patient power differentials and the concerns of low socioeconomic status patients over lost work time or anxiety over leaving their communities.

A recent integrative review demonstrated a lack of published evidence for CPG use in such MST settings.[2] Many non-government organizations (NGOs), however, do possess unpublished training protocols that are distributed to the clinicians who travel with them. To our knowledge, no attempt has been made to collect, summarize and consolidate these unpublished protocols. Examining the content of these protocols is essential to understand the level of care delivered and to draw comparisons to internationally recognized practice standards. The purpose of this study is to summarize and organize the content of unpublished gastrointestinal disorders protocols used by organizations operating primary care MSTs in LAC.

Methods

This descriptive study is part of a larger initiative aimed at locating and describing unpublished clinical protocols utilized by MSTs in LAC. Clinical protocols related to general pain and gastrointestinal, respiratory, gynaecological and urinary symptoms, dermatological conditions, hypertension and diabetes were collected. However, this paper discusses only the findings related to protocols for GI disorders.

Sampling strategy

NGOs currently operating MSTs in LAC were sampled and identified in three ways. First, several online databases were used (https://missionfinder.org/, www.medicalmissions.org, www.mmex.org, www.globalhealth.arizona.edu, www.internationalhealthvolunteers.org) to identify NGOs. Secondly, based on a similar search for short-term MSTs conducted by Lasker,[11,12] a systematic Google web search was conducted every 2 mo between 17 April, 2014 and 20 July, 2015 using the following terms: 'medical missions', 'short-term missions', 'medical mission organizations', 'international health volunteering', 'Christian health volunteering', 'religious health volunteering', 'corporate global health volunteering', 'international health fellowships', 'international health educational opportunities', 'global health director', 'international service learning', 'global health elective', 'medical school international internships', 'intercultural learning', 'global health volunteer projects university' and 'international volunteer organizations'. Thirdly, organizations were located through social media, using the Twitter hashtags 'medical mission' and 'global health'.

Organizations were contacted by the research team if they facilitated North American clinicians (physician, physician assistant, osteopath or nurse practitioner) travelling to LAC and had operated at least one short-term (i.e. <1 mo) primary care MST in the previous year. Exclusion criteria were organizations that exclusively undertook specialty or surgical trips or trips that did not involve direct patient care by North American clinicians.

Data collection

Procedures

We obtained the following data from the website of each eligible organization and entered it into an Excel spreadsheet—base of operations, countries served, frequency of MSTs to LAC, clinical setting of the MST (rural, urban), number and type of providers, diagnostic resources available during the MST and whether the organization was faith based or secular. Organizations with multiple chapters (i.e. organizations with university chapters) were treated as a single unified parent organization and only one chapter was contacted.

We searched each NGO website and downloaded any medical provider handbook, clinical protocols document or description of typical clinical management on an MST. If no such documents could be found, an attempt was made to contact the NGO directly via the email address posted on the website. NGOs were contacted using a scripted email that explained the study purpose and asked: 'Do you have any specific clinical protocols or training documents for clinicians working in low resource mission settings?' We documented the number of NGOs contacted, and any reasons provided for the absence of protocols or for declining to share protocols. All clinical protocols received were saved on a secure cloud drive.

Analysis

The data from the protocols was systematically coded into categories related to clinical assessment, non-pharmacological management and pharmacological management. An Excel spreadsheet was used to identify the most common protocol statements in each category and organize the content thematically. The protocol content was checked for the inclusion of supporting references.

Results

The search strategy generated 225 unique NGOs, and Figure 1 indicates the number of protocols retrieved and the number of NGOs who responded to the information requests. A total of 50.2% (113/225) NGOs had no protocols available on their website and did not respond to our attempts to contact them. A further 36% of NGOs (81/225) replied, but denied having clinical protocols, with 30.2% (68/225) NGOs responding that they did not use clinical protocols and 5.8% (13/225) responding that they recommended specific pre-departure readings for clinicians in lieu of providing protocols.

A total of 13.8% NGOs (31/225) claimed to use clinical protocols and 64% (20/225) of these were obtained and included in this analysis (Table 1). Of the 20 organizations from whom protocols were obtained, two served in South America, all the remaining groups serving in Central America or the Caribbean. The most common locations were Haiti (35%, 7/20), Honduras (25%, 5/20), Guatemala (25%, 5/20) and Nicaragua (20%, 4/20). Six organizations served in multiple countries.

The most common GI disorders described in the protocols were diarrhoea, dyspepsia and soil-transmitted helminths, and these will be further described later. Only three protocols (organizations 2, 7 and 8) provided citations for their management suggestions.

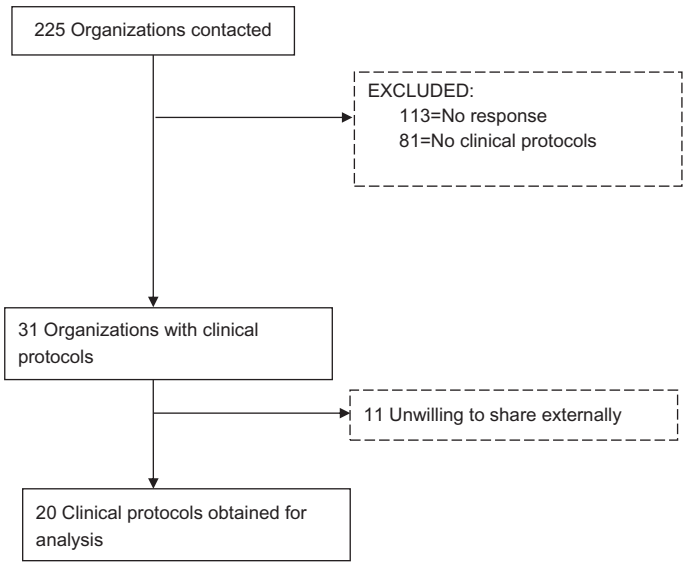

Figure 1. Flow chart of MST-sending organizations contacted to share unpublished clinical protocols used on short-term, primary care MSTs.

Deworming protocols

Thirteen protocols discussed soil-transmitted helminths or deworming (65%; organizations 1–6, 10, 11, 13–15, 17 and 19), and the most common recommendations are summarized in Table 2.

Diarrhoea protocols

Twelve protocols discussed diarrhoea or dysentery (60%; organization 3–6, 9, 10, 13–17 and 19), and the most common recommendations are summarized in Table 3.

Dyspepsia protocols

Fourteen protocols discussed dyspepsia (75%; organization 1–6, 8, 10, 12, 13, 16–19 and 20), and the most common recommendations are summarized in Table 4.

Discussion

Previous literature describes the lack of published evidence of CPG use by MSTs and the concerns related to ensuring uniform,

Table 1. Characteristics of MST-sending organizations providing unpublished clinical protocols for practice on MSTs

MST ID	Locations served	Trips per year	Format and setting	Faith based or secular
1	Dominican Republic	3	Rural clinic in Puerto Plata province	Secular
2	Ecuador	3	Rural mobile brigades in schools or clinics in health centres	Secular
3	Guatemala	Variable	Rural clinics in two villages	Secular
4	Guatemala	12	Rural hospital	Secular
5	Haiti	Variable	Urban clinic in Cité Soleil	Faith based
6	Haiti	7	Rural	Secular
7	Haiti	4	Rural clinic	Secular
8	Haiti	Variable	Urban and rural mobile brigades and clinics	Secular
9	Haiti	~40	Rural mobile clinics in 14 villages (Western operated) and standing clinic (Haitian operated)	Faith based
10	Honduras	1	Rural mobile brigades in 20 villages	Faith based
11	Honduras	Up to 50	Rural mobile brigades in community schools and churches	Faith based
12	Honduras	4	Rural mobile brigades, as well as specialty hospital services	Secular
13	Nicaragua	4	Rural mobile brigades and standing clinic	Secular
14	Nicaragua, Honduras	51	Rural mobile brigades, as well as hospital based	Faith based
15	Dominican Republic, Haiti	12–15	Rural mobile brigades in bateys	Secular
16	Guatemala, Nicaragua	3	Rural mobile clinics	Faith based
17	Honduras, Nicaragua, Panama	'Hundreds'	Rural mobile brigades in community centre or school	Secular
18	Jamaica, Haiti	4	Rural and urban mobile brigades, as well as some permanent clinics/hospital medicine	Secular
19	Ecuador, Guatemala, Dominican Republic	~100 (spread over 6 sites)	Rural and urban mobile brigades at 6 sites	Secular
20	Honduras, Ecuador, Belize, Guyana, Guatemala	5	Rural and urban mobile brigades	Faith based

Table 2. Most common recommendations for management of soil-transmitted helminths in Latin American MST settings from the protocols of MST-sending organizations (n=20)

Domain	Recommendations
Clinical assessment	Consider that faecal-oral transmission occurs in tropical, rural communities via larvae in moist soil (walking barefoot), clothes, furniture, towels and toilets[2,11] The following are consistent with infection with soil-transmitted helminths: (1) *Abdominal pain*[3,5,10,11,14,16] and nutritional problems (nausea, bloating, flatulence, poor appetite/growth)[2,4,5,10,11,14,17] (2) *Visible worms*[5,6,15] and pruritus at sites of larva penetration/migration[5,6,11,15] (3) *Poor intellectual development*[11] (4) *Respiratory distress/wheezing*[6,14] in cases of heavy infection[14] (5) *Rectal prolapse and bleeding* in cases of whipworm[11]
Non-pharmacological management	Treat[6,13,17] at triage (or send dose home for patients[15] and family[4,12]), every 3–6 months[2,11,19] if have not received dose at school[2,10,12,19] *Pinworms:* wash hands after using the toilet, and before and after eating. Launder bedding, clothing and toys to destroy eggs[11]
Pharmacological management	**Option 1:** Albendazole 400 mg once for patients over 2 y old.[1,2,5,6,10,11,13–15,19] Tablets may be crushed prior to administration.[19] Contraindicated if pregnant[2,4,10,11,17,19] or breastfeeding[10,19] *Pinworms:* repeat dose in 2 weeks[5] *Trichuris (whipworm):* 600 mg × 1[15] *Paediatric dosing:* 100 mg[2]–200 mg in age 1–2 y,[10,11,15,19] or 300 mg for trichuris[15] **Option 2:** Mebendazole 500 mg po single dose for >2 y of age (or 100 mg po bd × 3 d)[5,6,15,19] for severe cases[13] **Other options:** Ivermectin,[1] piperazine, secnidazol,[2] pyrantel **Other considerations:** Have candies/crackers available following deworming therapy[14] Consider co-treatment with multi-vitamins for iron deficiency[12] Consider treating distended/malnourished children for *Giardia* co-infection using metronidazole 250 mg tds × 5 d (10 mg/kg/dose given tds if <20 kg).[2,12] Treat only after antiparasitic treatment, due to risk of worm migration[2] Avoid anti-diarrhoeal medicines during parasite treatment[2]

bd, Twice daily; tds, three times daily; po, by mouth.

high-quality care,[2] but neglects the role and potential impact of unpublished protocols that are used to train clinicians for practice in unfamiliar settings. Most concerningly, most organizations surveyed either had no specific treatment protocols or were unwilling to share them, raising concerns regarding the quality and consistency of care delivered to patients on such MSTs. Nevertheless, our review is the first to consolidate unpublished protocols for common GI symptoms. Most protocols reviewed included recommendations for the management of GI complaints in the MST setting, which indicates that these organizations recognize the importance of a consistent clinical approach to these common symptoms.

Treatment choices on international medical projects may also be a function of medication availability, given that they are often supplied using donations to volunteers and sending organizations. The grey literature protocols reviewed in this study may best capture the practical realities of medication availability on such trips. However, ideal clinical practice guidelines should reflect a consensus of those medications that are available to both volunteers and host community providers, while remaining evidence based. Actual practice should reflect both local medication availability and any national treatment guidelines.

It is relevant that none of the protocols obtained in this review were the product of rigorous literature searches, and most were not backed by any citations. Instead, most were produced internally by sending organizations based on expert opinion of veteran clinicians who were familiar with the region, and were presumably not intended for formal appraisal or dissemination beyond a small number of medical volunteers. Consequently, the results of this review best illustrate the 'common sense approach' to patient management in austere MST practice settings. The development of an ideal protocol should both be evidence based and serve as a link between established international guidelines and local clinical realities, medication availability and cultural context. As with any formal clinical practice guideline, the authors, target audience and source of evidence should be clearly stated. They should also be endorsed by local health authorities in the host country.

The following discussion describes each GI condition within the context of international CPGs.

Table 3. Most common recommendations for management of diarrhoea in Latin American settings from the protocols of MST-sending organizations (n=20)

Domain	Recommendations
Clinical assessment	Consider hospital referral or early follow-up for the following signs of severe diarrhoea or dysentery (suspect *Salmonella*, *Shigella*, *Campylobacter*, cholera, amoebiasis): (1) *Very young, elderly, or sick patients*[5] (2) *Fever*[5,6,13,16,19] (3) *Bloody/mucoid stools*[5,6,13,16,19] (4) *Dehydration*[5,6] *or >5 stools/d*[6] (5) *Rectal pain*[13,16,19] (6) *Suspected cholera*: dehydration, tachycardia, electrolyte imbalances/acidosis, abdominal cramps, vomiting, acute secretory rice water diarrhoea with fishy smell[9] (7) *Suspected Entamoeba*: persistent bloody diarrhoea[4,13,16] (8) *Suspected amoebic liver abscess*[4]
Non-pharmacological management	Provide education on food handling, hand sanitation, bleach cleaning of surfaces,[9,19] and ask about recent antibiotic use[19] *For infants:* continue breastfeeding, and ensure next day clinical follow-up.[5]
Pharmacologic management	**Oral rehydration solutions (ORS)** Oral rehydration packets (using a clean potable water source) or Pedialyte.[3,5,9,13,17,19] Use ORS for 12 h, followed by solid food (i.e. rice) to supply potassium and calories for repair[10,17] *Homemade rehydration solutions:* mix 6–8 tsp sugar with 1 tsp salt in 1 L boiled water (ensure parent tastes first, and that solution tastes sweet). Avoid fructose or artificial sweeteners. Add half-cup of orange juice or half a mashed banana to each litre to add potassium and improve taste) Salt–sugar–lemon juice–water solution[14] The above are all preferable to sports drinks (excess sugar, few electrolytes and may cause osmotic diarrhoea). Use IV Ringer's lactate or normal saline for severe dehydration[6,9,13] and consider hospitalization if toxic[6] **Options for dysentery** *Adults:* ciprofloxacin 500 mg bd × 10 d[6,13,17,19] (may add metronidazole[6,17]) *Pediatrics:* ciprofloxacin or trimethoprim-sulfamethoxazole[6,13,19] acceptable **Options for cholera** *Adults:* doxycycline 300 mg once *Pregnancy:* cipro 1 g once or azithromycin 1 g once *Pediatrics:* doxycycline 100–200 mg once (8–12 y), azithromycin 20 mg/kg once (<8 y) **Persistent diarrhoea (1 w[6] or >48 h[5] duration)** *Adults:* metronidazole 250 mg po tds for 5–7 d[2,10,19] *Pediatrics:* metronidazole 15 mg/kg/d for 5–7 d[2,10,19] or albendazole 400 mg once daily for 5 d[2] *Suspected amoebic diarrhoea:* metronidazole 500–750 mg tds (15 mg/kg/dose tds in children)[4,13,15–17,19] for 7–10 d[19] **Additional considerations** *Pediatrics:* multi-vitamin, vitamin A supplement[9] Zinc 20 mg/d if >6 mo old, or 10 mg/d if <6 mo old for 10–14 d[9] to decrease the length and severity of episode and prevent recurrence[19] Consider symptomatic treatment with Kaopectate,[14] Pepto-Bismol or Imodium[5]

tds, Three times daily; po, by mouth.

Deworming

Deworming was recommended by most MST protocols to treat abdominal and nutritional complaints, although there is inconsistent evidence to support positive outcomes. One meta-analysis examining periodic single-dose deworming showed no difference in children's growth, while another showed an average weight increase of 0.24–0.38 kg[13] and inconclusive benefits of deworming on cognitive performance.[13] Finally, a third meta-analysis of 14 randomized trials examining the effect of deworming on anaemia showed a small haemoglobin increase of 1.71 in the treatment group,[14] which may not be clinically significant. Despite this, periodic deworming on MSTs continues to be ubiquitous, and is promoted as a safe and cost-effective intervention for school-age children in developing countries by WHO.[10]

Diarrhoea and dysentery

Many protocols included CPG-supported criteria for severe forms of diarrhoea, including four episodes or more per day,[15,16] signs of sepsis, age <1 y, presence of measles within 6 wk,[17] or signs of dehydration.[16–19] None, however, discussed the use of a WHO growth chart or mid-arm circumference in children 1–5 y old,[16,17] which is a quick, low-cost assessment that may be

Table 4. Most common recommendations for management of dyspepsia in LAC from the protocols of MST-sending organizations (n=20)

Domain	Recommendations
Clinical assessment	Intermittent burning chest/epigastric pain[6,8,13,16,20] affected by eating[8] *Peptic ulcer disease (PUD)*:[5,8,19] daily pain, gastrointestinal (GI) bleeding, weight loss,[6] or pain refractory to 4 weeks treatment with proton pump inhibitor (PPI)[3] Consider possible contributing factors: diet,[19] obesity,[12] *H. pylori*[2,5] *Giardia*,[17] and soil-transmitted helminths[17] Consider hospital referral for the following symptoms: (1) *Large volume haematemesis*[5] (2) *Typical cardiac chest pain/pressure* radiating to shoulders, neck, jaw or arms[5] (3) *Dyspnoea or dizziness*[5]
Non-pharmacological management	(1) *Weight loss*[2,13] (2) *Avoid culprit foods/medications:* NSAIDs[13] alcohol,[2,3,13] chocolate, citrus juice, tomato-based products,[2,13] spicy foods,[2,3] consommé, large/fatty meals[2,13] and acidic instant coffee[2,3,10] (3) *Avoid factors that increase abdominal pressure and relax the lower oesophageal sphincter:* smoking, mint, anticholinergics, calcium channel blockers, smooth muscle relaxants[2] (4) *Wait 3 h after a meal before lying down*,[2,13] and elevate the head of the bed 8 in[2,13] (5) *Traditional approaches:* women may loosen their faja/belt (which may push up on the oesophageal sphincter);[3] some may try ginger[6]
Pharmacologic management	Calcium/magnesium antacid prn[1,2,5,13] or H2 blocker[1–4,6,8,10,12,13,16,19,20] (i.e. ranitidine 150 mg po bd prn) Reserve PPI treatment[1,3,6,8,13,16,19,20] (i.e., omeprazole 20 mg po qds) for suspected PUD or upper GI bleeding[13] ***H. pylori* eradication** While expensive,[4] consider *H. pylori* eradication if refractory to treatment,[19] positive *H. pylori* test[3] or convincing symptoms suggestive of PUD.[10] Avoid antibiotics to which there has been prior exposure[2] *Option 1:* amoxicillin 1 g po bd and clarithromycin 500 mg po bd plus omeprazole for 10–14 d[3,10,19,20] *Option 2 (1-d protocol due to concerns of compliance and follow-up):* lansoprazole 60 mg po qds × 1 d, bismuth subsalicylate 524 mg po qds × 1 d, amoxicillin 2 g po qds × 1 d, metronidazole 500 mg po qds × 1 d[2] **Other options** In refractory cases, may consider albendazole[17] to eradicate soil-transmitted helminths or long-term oral vitamin B12 for chronic gastritis caused by pernicious anaemia[2]

bd, Twice daily; qds, four times daily; po, by mouth; prn, as needed.

valuable in identifying children with malnutrition who require more aggressive treatment.

Oral rehydration solutions were considered a mainstay of treatment, which is in line with international CPGs, but only one protocol suggested zinc for children under 5 y old.[16–18] Protocols also did not specifically mention the provision of multivitamins for increased folate, zinc, vitamin A, magnesium and copper needs,[17] although MSTs do commonly provide such vitamins in practice. No protocols suggested antimotility agents, antiemetics or antibiotics in the case of simple acute diarrhoea, which was in line with published literature that also discourages the practice.[16–18]

Four protocols suggested the reasonable practice of empiric ciprofloxacin treatment of *Shigella*-related dysentery,[16,17] although additional considerations could include switching the antibiotic if there is no improvement in 2 d, or empirically treating for amoebiasis with metronidazole if there was no improvement in an additional 2 d.[16,17] Although most MSTs lack timely access to stool culture results, international guidelines nonetheless recommend treatment for *Giardia* with metronidazole only if positive cultures are obtained.[16,17] In contrast, the MST protocols commonly suggested presumptive treatment for giardiasis and amoebiasis in cases defined by persistent diarrhoea.

Dyspepsia

Descriptions of dyspepsia in the protocols agreed with international CPGs that describe episodic or persistent burning epigastric pain, bloating, gas or nausea.[16,20] Several protocols distinguished PUD from dyspepsia based on refractory or daily pain, and noted appropriate red flags for more severe disease, such as GI bleeding and weight loss.[16] Lifestyle and dietary recommendations were aligned with those found in CPGs.[16] The MST protocols generally recommended an antacid or H2 blocker, with a proton pump inhibitor (PPI) reserved for refractory cases, which is reasonable given disagreement in the literature on the selection of ideal short-term treatment.[16,20]

With limited laboratory testing available on MSTs, the approach and ethics of the management of *H. pylori*-related PUD is controversial. Up to 95% of PUD is *H. pylori* positive, and 15–30% of dyspepsia in *H. pylori* positive patients is caused by PUD. In contrast, treatment is no more effective than placebo in *H. pylori* negative patients,[20] suggesting that a 'test and treat' strategy is ideal. It remains unclear, however, how to balance the benefits of a strict 'test and treat' strategy on reducing drug adverse effects and antibiotic resistance with the possible need to relax such standards to allow for empiric treatment in cases with high clinical suspicion and limited access to testing. MSTs with

resource limitations might consider CPGs that propose *H. pylori* treatment only for frequent symptomatic recurrences requiring retreatment with antiulcer drugs,[16] vs a strategy of simply incorporating *H. pylori* treatment into standard PUD treatment.[9]

The protocols suggested 10–14 d of antibiotic therapy, considered prudent in developing countries with >20 and 40% rates of clarithromycin and metronidazole resistance respectively.[9,21–23] While international CPGs suggested metronidazole plus azithromycin,[16] the protocols differed somewhat in suggesting amoxicillin plus a macrolide antibiotic. One protocol suggested a 1-d quadruple therapy protocol to maximize medication adherence,[24] at the price of diminished efficacy.[25] The above recommendations may be appropriate in most circumstances or when local resistance patterns are unknown. When regional data exist, however, such local guidance regarding resistance patterns, antibiotic choice and treatment duration should be prioritized over general guidelines. MSTs might additionally consider deworming treatment for hookworm-associated dyspepsia in cases refractory to the above *H. pylori* therapies.[16]

Strengths and weaknesses

This study involved an extensive search using multiple channels, including internet and social media. It is worth noting, however, the probable selection bias in favour of larger, better organized NGOs that maintain websites with high search engine optimization. It is also likely that these better equipped organizations are more likely to possess clinical protocols than their smaller peers. One might, therefore, speculate that if informal groups that may only undertake occasional MSTs or that have a limited online presence were included, the proportion of groups with explicit clinical protocols would be smaller than that recorded in this study.

Conclusions

Clinical protocols and CPGs are mechanisms by which healthcare NGOs can demonstrate their commitment to high-quality care to all stakeholders, including funders and benefactors, volunteer clinicians, host communities and local government. For patients themselves, predictable and consistent treatment is valuable, and maintains confidence in health professionals. While outside the scope of this study, it remains unanswered whether short-term volunteer groups should be providing direct clinical service at all. Many sources discuss overall best practices and, placed within a larger context, there is an urgent need for MSTs to function within the local healthcare system, and to liaise effectively with local practitioners. Specifically, clinicians should ensure that any pharmacological treatments are available locally and that care is well documented, to avoid dangerous medication interactions or duplication of treatment.

This study can be considered an entry point for the creation of context-appropriate CPGs for MSTs that are acceptable to clinicians, NGOs and host communities. This review of unpublished protocols describes current clinical practices on MSTs that often align with international recommendations, although opportunities remain to tailor the management of GI conditions to this unique setting.

Authors' contributions: CD conceived the study and wrote the Introduction, Results, and Discussion sections. CHC wrote the Methods section. Both authors were involved in data analysis, editing and revisions to the final manuscript.

Acknowledgements: Raji Harish, Camille Kwan, Kate Samuelson.

Funding: None.

Conflicts of interest: None declared.

Ethical approval: Not required.

References

1 Niska W, Sloand E. Ambulatory medical care in rural Haiti. J Health Care Poor Underserved 2010;21(1):70–80.

2 Dainton C, Chu CH, Lin H et al. Clinical guidelines for Western clinicians engaged in primary care medical service trips in Latin America and the Caribbean: an integrative literature review. Trop Med Int Health 2016;21(4):470–8.

3 Wall A. The context of ethical problems in medical volunteer work. HEC Forum 2011;23(2):79–90.

4 Hawkins J. Potential pitfalls of short-term medical missions. J Christ Nurs 2013;30(4):E1–6.

5 Dainton C, Chu C. Symptom clusters on primary care medical service trips in five regions in Latin America. J Epidemiol Glob Health 2015;5(3):259–64.

6 Orlandi PP, Magalhães GF, Matos NB et al. Etiology of diarrheal infections in children of Porto Velho (Rondônia, Western Amazon region, Brazil). Braz J Med Biol Res 2006;39:507–17.

7 Bates SJ, Trostle J, Cevallos WT et al. Relating diarrheal disease to social networks and the geographic configuration of communities in rural Ecuador. Am J Epidemiol 2007;166(9):1088–95.

8 Aziz RK, Khalifa MM, Sharaf RR. Contaminated water as a source of *Helicobacter pylori* infection: a review. J Adv Res 2015;6(4):539–47.

9 Frenck RW Jr, Clemens J. *Helicobacter* in the developing world. Microbes Infect 2003;5(8):705–13.

10 WHO. Eliminating soil-transmitted helminthiases as a public health problem in children: Progress Report 2001–2010 and Strategic Plan 2011–2020. Geneva: World Health Organization; 2012.

11 Haddaway NL, Collins AM, Coughlin D et al. The role of Google Scholar in evidence reviews and its applicability to grey literature searching. PLoS One 2015;10(9):e0138237.

12 Lasker NJ. Hoping to help; the promises and pitfalls of global health volunteering. New York: Cornell University Press; 2016.

13 Dickson R, Awasthi S, Williamson P et al. Effects of treatment for intestinal helminth infection on growth and cognitive performance in children: systematic review of randomised trials. Br Med J 2000;320(7251):1697–701.

14 Gulani A, Nagpal J, Osmond C et al. Effect of administration of intestinal anthelmintic drugs on haemoglobin: systematic review of randomised controlled trials. Br Med J 2007;334(7603):1095.

15 Farag TH, Nasrin D, Wu Y. Some epidemiologic, clinical, microbiologic, and organizational assumptions that influenced the design and performance of the Global Enteric Multicenter Study (GEMS). Clin Infect Dis 2012;55:225–31.

16 Médecins Sans Frontières. Clinical guidelines—diagnosis and treatment manual. 2016. http://refbooks.msf.org/msf_docs/en/clinical_guide/cg_en.pdf [accessed 12 January 2018].

17 World Health Organization. The treatment of diarrhoea: a manual for physicians and other senior health workers. 4th edn. Geneva: WHO; 2005. http://apps.who.int/iris/bitstream/10665/43209/1/9241593180.pdf [accessed 12 January 2018].

18 World Gastroenterology Organisation (WGO). World Gastroenterology Organisation global guidelines: acute diarrhea in adults and children: a global perspective. Milwaukee, WI: World Gastroenterology Organisation (WGO); 2012.

19 Levine MM, Kotloff KL, Nataro JP et al. The Global Enteric Multicenter Study (GEMS): impetus, rationale, and genesis. Clin Infect Dis. 2012; 55 (Suppl. 4):S215–24.

20 Schwartz MD. Dyspepsia, peptic ulcer disease, and esophageal reflux disease. West J Med 2002;176(2):98–103.

21 Malfertheiner P, Megraud F, O'Morain C et al. Current concepts in the management of *Helicobacter pylori* infection: the Maastricht III Consensus Report. Gut 2007;56(6):772–81.

22 Trespalacios AA, Regino WO, Reyes MM. Resistencia de *Helicobacter pylori* a metronidazol, claritromicina y amoxicilina en pacientes colombianos. Rev Col Gastroenterol 2010;25(1):31–8.

23 Alvarez A, Moncayo JI, Santacruz JJ et al. Antimicrobial susceptibility and mutations involved in clarithromycin resistance in *Helicobacter pylori* isolates from patients in the Western Central Region of Colombia. Antimicrob Agents Chemother 2009;53(9):4022–4.

24 Tucci A, Corinaldesi R, Stanghellini V et al. One-day therapy for treatment of *Helicobacter pylori* infection. Dig Dis Sci 1993;38: 1132–6.

25 Zhou N, Chen WX, Zhang W et al. Is short-term therapy really sufficient to eradicate *Helicobacter pylori* infection? J Zhejiang Univ Sci B 2010;11(9):690–701.