

A narrative review of protocols for the management of respiratory illness on short-term medical missions (STMMs) in Latin America and the Caribbean

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Background Respiratory illnesses are prevalent on short-term medical missions (STMMs) in Latin America and the Caribbean, and commonly include upper respiratory infections, asthma, and allergic rhinitis. There have been no previous attempts to describe protocols that international volunteer clinicians use in managing these patients. The purpose of this study was to collect North American clinical protocols used by sending organizations in their volunteer operations in Latin America and the Caribbean, summarize the most common pharmacologic and non-pharmacologic management strategies, and compare these to published international practice recommendations.

Methods A systematic web search was used to identify North American medical service trip sending organizations. Clinical protocols were downloaded from their websites, and organizations were directed contacted to request protocols that were not published online. The protocols obtained were summarized, analyzed thematically, and compared to existing international guidelines.

Results Of 225 organizations contacted, 112 (49.8%) responded, and 31 of these (27.7%) claimed to possess protocols for their trips, of which 20 were obtained and analyzed. Four (20%) protocols discussed asthma, six (30%) discussed upper respiratory infections, and three (15%) discussed lower respiratory infections. The protocols discussed clinical assessment, pharmacologic and non-pharmacologic management with variable degrees of accuracy and thoroughness, and with important omissions when compared to international guidelines. None were the product of systematic literature searches, and most were not referenced.

Conclusions To avoid ineffective treatment and related harms, context-specific clinical guidelines are needed for volunteer clinicians practicing in remote international settings, and such guidelines should be based on best evidence and stakeholder consensus.

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Short-term medical missions (STMMs) to low and middle-income countries (LMICs) involve the provision of basic healthcare services to host communities by Western volunteer clinicians, often through mobile outreach clinics (1, 2). The proximity and accessibility of Latin American and Caribbean (LAC) countries contribute to their popularity as destinations for North American volunteers. Challenges to clinical practice on such STMMs are well-known, and include resource constraints to diagnosis and treatment, as well as the lack of familiarity of Western volunteers with both the local epidemiology and the cultural milieu (3-6).

In a recent epidemiologic study of five urban and rural STMM locations in Ecuador, Guatemala, and the Dominican Republic, respiratory ailments ranged between 8.7% and 14.4% of chief complaints (7). Three epidemiologic studies from Honduras report similarly high prevalence, ranging from 14.6% to 32% (8-10). These respiratory ailments vary in acuity and include acute upper and lower respiratory tract infections as well as chronic conditions such as asthma and chronic obstructive pulmonary disease (COPD). It is difficult, however, to establish the true prevalence of specific conditions, due to a lack of standardized reporting, highly variable diagnostic criteria, and a frequent lack of confirmatory tests or imaging. For example, the reported prevalence of asthma in the above studies ranged from 2% (10) to 4.8% (7), making it unclear whether this disparity is due to regional differences in epidemiology or reporting error.

It is essential that providers on STMMs are equipped with evidence-based knowledge of common respiratory disorders to mitigate their frequent mismanagement and misidentification (11, 12), and to ensure accurate reporting for public health planning. Clinical practice guidelines are therefore critical to ensuring that these illnesses are appropriately diagnosed and managed in non-hospital settings (13). Despite this, a recent integrative review demonstrated a lack of evidence of guideline use in STMM practice in LAC (14). Many STMMs, however, do distribute unpublished protocols (also referred to as “grey literature protocols”) to provide direction to clinicians who travel with them. To our knowledge, this is the first study to collect, summarize, and consolidate such protocols, which may contain highly variable diagnostic criteria.

The following narrative review describes the unpublished protocols used by North American STMMs in the management of respiratory illnesses, as an initial step in understanding the clinical practice of volunteers working in LAC. This study is positioned within a broader initiative to develop context-specific clinical guidelines for symptoms commonly managed by STMMs clinicians (15). Finally, we compare these grey literature protocols with published international practice recommendations.

METHODS

This descriptive study is part of a larger initiative aimed at locating and describing unpublished clinical protocols utilized by STMMs in LAC. Clinical protocols related to general pain, gastrointestinal symptoms, respiratory symptoms, gynecologic symptoms, urinary symptoms, dermatologic conditions, hypertension, and diabetes were collected; however, this paper presents only the findings related to protocols for respiratory disorders.

Sampling strategy

Our sampling frame included all STMMs with a web presence, and the details of our web search strategy are described in Appendix S1 of the **Online Supplementary Document**. Organizations were included if they: facilitated North American clinicians (physician, physician assistant, osteopath, or nurse practitioner) traveling to LAC, and had operated at least one STMM in the previous 12 months. In keeping with the primary care focus of the study, exclusion criteria were organizations that exclusively performed specialty or surgical trips, as well as trips that did not involve direct patient care by clinicians.

Data collection

We obtained the following information from each STMM website between June 2015 to December 2016: location of base of operations in North America, countries served in LAC, frequency of trips to LAC each year, clinical setting (e.g., rural or urban), diagnostic resources available during the STMM (e.g. point of care tests, imaging tests). We searched each website and downloaded any medical provider handbook, clinical protocols document, or description of clinical management on a STMM.

If no clinical protocols were found, one attempt was made to contact the organization by either email or telephone if no email address was available. A prepared email asked: “Do you have any specific training documents for clinicians working in low resource settings?” We documented the number of organizations contacted, and reasons provided for lacking clinical protocols, or for declining to share protocols. Protocols for respiratory illnesses were extracted to an Excel document by a research assistant. With the goal of maximizing response rates and minimizing barriers to sharing private protocols, the anonymity of the NGOs that shared clinical protocols was maintained.

Analysis

The data from the received protocols was systematically coded into categories related to clinical assessment, non-pharmacologic management suggestions, and pharmacologic management suggestions. An Excel spreadsheet was used by CD to identify the most common protocol statements in each category and arrive at consensus on their thematic organization. The protocol content was checked for the inclusion of supporting references. Flow charts were constructed, giving priority to the most common recommendations, and the recommendations were compared to the most recent World Health Organization (WHO) guidelines for common respiratory conditions.

RESULTS

The search strategy generated 225 unique organizations operating STMMs. Of these organizations, 113 (50.2%) had no protocols available on their websites and did not respond to our attempts to contact them. Sixty-eight (30.2%) organizations responded that they did not use any clinical protocols and 13 (5.8%) responded that they had no specific protocols but recommended pre-departure readings for clinicians.

Thirty-one organizations (13.8%) used clinical protocols. Twenty (64%) of these were obtained and included in this analysis (Table 1), while 11 either declined to share or did not respond to a request for further information. Of the 20 organizations included in the analysis, two conducted STMMs in South America, and all remaining groups operated in Central America and the Caribbean. The most common locations were Haiti (35%, n=7), Honduras (25%, n=5), Guatemala (25%, n=5), and Nicaragua (20%, n=4). The number of STMMs that each organization operated annually was highly variable, ranging from 1 to hundreds.

Table 1. Summary of STMM organizations providing clinical protocols for review

MST ID	LOCATIONS SERVED	TRIPS PER YEAR	TYPE OF NGO	PRIMARY SITE TYPE
A	Nicaragua	4	Secular	Rural
B	Guatemala	Variable	Secular	Rural
C	Haiti	Variable	Faith-based	Urban
D	Dominican Republic	3	Secular	Rural
E	Haiti	7	Secular	Rural
F	Honduras, Ecuador, Belize, Guyana, Guatemala	5	Faith-based	Rural and urban
G	Ecuador, Guatemala, Dominican Republic	~100 (spread over 6 sites)	Secular	Rural and urban
H	Ecuador	3	Secular	Rural
I	Honduras	1	Faith-based	Rural
J	Jamaica, Haiti	4	Secular	Rural and urban
K	Haiti	4	Secular	Rural
L	Guatemala, Nicaragua	3	Faith-based	Rural
M	Nicaragua, Honduras	51	Faith-based	Rural (some urban hospital based)
N	Guatemala	12	Secular	Rural
O	Honduras	Up to 50	Faith-based	Rural
P	Haiti	Variable	Secular	Urban and rural
Q	Dominican Republic, Haiti	12 to 15	Secular	Rural
R	Honduras, Nicaragua, Panama	Over 100	Secular	Rural
S	Honduras	4	Secular	Rural (some hospital-based services)
T	Haiti	~40	Faith-based	Rural

STMM – short-term medical missions, NGO – non-governmental organizations

The clinical protocols collected most commonly described asthma, COPD, lower respiratory tract infections, upper respiratory tract infections, and allergic rhinitis, and these conditions are further described below. Other respiratory conditions mentioned less commonly included tuberculosis, pertussis, bronchiolitis, and measles.

Table 2. Most common recommendations for management of asthma in LAC from the protocols of STMM organizations (N=20), and comparison with WHO recommendations

DOMAIN	RECOMMENDATIONS IN PROTOCOLS	WHO RECOMMENDATIONS
Clinical assessment or case definition	Presence of intermittent and reversible wheezing upon respiratory assessment ^{E,F}	Age 2–5 with wheezing
Severe clinical signs (consider hospital referral)	SOB/difficulty breathing, vomiting, blue lips or weakness ^E	Respiratory distress
Pharmacological recommendations	Albuterol 4mg pills or elixir (0.1–0.2mg/kg TID, not >12mg/24h), inhaler ^{F,I,N} or jet nebulizer treatment if active wheezing ^E	Give rapid acting inhaled or oral bronchodilator
	Prednisone for acute exacerbations ^{F,J}	
	Hydration and reassessment in 3 days ^F Subcutaneous epinephrine if severe ^F	

WHO – World Health Organization, LAC – Latin America and the Caribbean, STMM – short-term medical missions, SOB – shortness of breath, TID – three times daily

*Source: anonymized NGOs operating STMMs in Latin America and the Caribbean, data not in the public domain. Letters in superscript indicate NGOs from Table 1.

Only 2 of 20 protocols discussed the diagnosis of specific related conditions, including sinusitis and pharyngitis. All six protocols discussed various symptomatic management options, including nasal saline, cough syrup, and acetaminophen for fever. Three discussed antibiotic choices for sinusitis and pharyngitis.

Protocols for asthma and COPD

Four (20%) of 20 protocols mentioned asthma, and their recommendations are summarized in Table 2. With respect to diagnosis, only 2 of the 20 protocols discussed how to diagnose asthma, although the reported diagnostic criteria were similar. All four protocols discussed pharmacological options, which included various routes of administration for albuterol. Only one protocol discussed indications for urgent referral to a higher level of care.

Protocols for upper respiratory infections

Six (30%) of 20 protocols mentioned upper respiratory infections (URI), and their recommendations are summarized in Table 3.

Table 3. Most common recommendations for management of upper respiratory infections in LAC from the protocols of STMM organizations (N=20), and comparison with WHO recommendations*

DOMAIN	RECOMMENDATIONS IN PROTOCOLS	WHO RECOMMENDATIONS
Clinical assessment or case definition	Consider in-house smoke and close confinement	Absence of rapid breathing or respiratory distress (see pneumonia case definition)
	Rhinorrhea, sneezing, coughing, low grade fever ^F	
	Sinusitis: Facial pain, headache/head congestion, 14-day duration ^F , purulent nasal discharge	
	Head congestion and facial pain that progresses to productive cough, suspect bacterial infection if worsening after 7 days ^T	Pharyngitis:
	Pharyngitis: Sore throat, exudate, tonsil enlargement, fever ^F	Sore throat with tender, enlarged lymph nodes (streptococcal pharyngitis)
Severe clinical signs	Cough, high fever, difficulty swallowing, severe malaise, stomach upset ^T	Child cannot drink at all (throat abscess)
Non-pharmacological recommendations	Saline nasal drops for infants (1/4 tsp salt, 1/4 tsp baking soda, 1 cup boiled and cooled water) and provide bulb syringes ^d	If child is not feeding well because of a blocked nose, clear it using a soft cloth. If the nose is blocked by dry or thick, sticky mucus, salted water can be put in the nose (using a moistened wick) to soften the mucus. Do not use nose drops in young infants.
	Self limited ^d , limit antibiotics to those who appear to have active bacterial infection ^j	Increased fluids, including breast milk, water, formula or cow's milk, rice water or water in which other cereals have been cooked, home-made soups, yoghurt-based drinks, and fresh fruit juices
	Encourage fluids ^{F,Q} , tea or hot water with honey (not for children <12 months) ^P	If the child is exclusively breast-fed, advise mother to breast-feed more frequently
	Symptomatic management ^{E,T} and hygiene practices to reduce transmission ^B	Soothe the throat and relieve the cough with tea sweetened with sugar or honey

Table 3. Continued

DOMAIN	RECOMMENDATIONS IN PROTOCOLS	WHO RECOMMENDATIONS
Pharmacological recommendations	Acetaminophen or NSAID if fever present ^{F,N,Q}	Paracetamol every 6 hours until the child's temperature drops below 39°C
	Decongestants ^J	Pharyngitis:
	Antihistamine cough syrup ^{F,J,L,N}	Single dose benzathine penicillin (many mothers will not complete oral course of antibiotics)
	Super Mentol (dextromethorphan 10mg, guaifenesin 100mg, menthol 6.25mg/5cc): 2–6 years: ½ tsp qid prn, 6–12 years: 1 tsp qid prn and >12 years: 2tsp qidprn ^J	Amoxicillin, ampicillin, or penicillin × 10 days
	Sinusitis:	
	Amoxicillin ^{FT} , augmentin, cefdinir, cefprozil, cefdinir, ciprofloxacin, levaquin ^T	
	Pharyngitis:	
	Antibiotics if strep test positive or signs of bacterial infection ^B	
	–First line: Amoxicillin or penicillin VK ^{FTB}	
	–Second line: Macrolide ^{B,FT}	
	–Others: Cephalexin, cefadroxil ^B	

LAC – Latin America and the Caribbean, STMM – short-term medical missions, tsp – teaspoon, qid – four times daily, prn – as required
 *Source: anonymized NGOs operating STMMs in Latin America and the Caribbean, data not in the public domain. Letters in superscript indicate NGOs from [Table 1](#).

Protocols for lower respiratory infections

Three protocols (15%) discussed the diagnosis and management of lower respiratory infections, including pneumonia and viral bronchitis, and their recommendations are summarized in [Table 4](#). All three discussed clinical signs and symptoms in variable degrees of detail and included recommendations for antibiotic therapy.

Table 4. Most common recommendations for management of lower respiratory infections in LAC from the protocols of STMM organizations (N=20), and comparison with WHO recommendations

DOMAIN	RECOMMENDATIONS IN PROTOCOLS	WHO RECOMMENDATIONS
Clinical assessment	Viral bronchitis:	Assessment for children <5 years based on respiratory rate and presence of respiratory distress
	Productive cough, fever, rhonchi that clears with coughing ^F , can persist up to 14 days ^T	
	Pneumonia:	
Severe clinical signs	Fever, cough, tachypnea, chest pain ^F	
	Decreased air entry, wheezes, crackles, rhonchi, tactile fremitus ^T	
	Refer neonates to hospital ^F	Respiratory distress: Nasal flaring, grunting, cyanosis
		Unable to drink, or severe malnutrition
Pharmacological and non-pharmacological recommendations		If under 2 months: any pneumonia, stridor when calm, wheezing, poor feeding (less than half of usual milk), fever
	Viral bronchitis:	TMP/SMX, amoxicillin, or ampicillin x 5 days, or IM procaine penicillin
	Decongestants, mucolytics, increased fluid intake, albuterol inhaler PRN ^T	
	For cough with sputum: Azithromycin or amoxicillin x 7–10 days ^B	
	Erythromycin/doxycycline (Pediatrics: TMP/SMX) ^F	Reassessment in 48 hours
	Pneumonia:	
	Adults: Macrolide or doxycycline ^{FT} , amoxicillin/clavulanic acid, respiratory fluoroquinolone ^J , amoxicillin ^F	
	Pediatrics: TMP/SMX ^F	Nutrient and energy rich foods, including cereals, vegetables, meat or fish, and dairy products or eggs if available. Increase energy content of the food by adding vegetable oil. If child is less than 4 months old or has not started taking soft foods, encourage mother to breast-feed frequently
	Nebulizer treatment ^T	
	Ceftriaxone if severe (both adults and peds) ^F	

WHO – World Health Organization, STMM – short-term medical missions, LAC – Latin America and Caribbean, TMP/SMX – trimethoprim-sulfamexazole, PRN – as required
 *Source: anonymized NGOs operating STMMs in Latin America and the Caribbean, data not in the public domain. Letters in superscript indicate NGOs from [Table 1](#).

Protocols for allergic rhinoconjunctivitis

Three protocols (15%) discussed the diagnosis and management of allergic rhinoconjunctivitis, and their recommendations are summarized in [Table 5](#). All three suggested a role for antihistamines in the management of symptoms.

Table 5. Most common recommendations for management of allergic rhinoconjunctivitis in LAC from the protocols of STMM organizations (N=20), and comparison with ARIA-WHO recommendations for low resource settings

DOMAIN	RECOMMENDATIONS IN PROTOCOLS	WHO RECOMMENDATIONS
Clinical assessment	Clear rhinorrhea, sneezing, conjunctival edema, itching, and tearing ^{E,F} , seasonal ^F , sniffing and congestion	2 of rhinorrhea, sneezing, nasal obstruction, nasal pruritis
	Can also be accompanied by: fever, pain in front of head and upper face, thick mucus ^E	Persistent if >4 days/week or >4 weeks, functional impairment or impaired sleep
Pharmacological and non-pharmacological recommendations	Diphenhydramine or antihistamine ^{A,E,F}	Allergen avoidance
	Loratadine ^{A,F} , cetirizine ^A	Evaluation for asthma
	Liquid tears, over the counter cough and cold meds (not for <2 years old) ^E	Mild intermittent: oral antihistamine
	Anti-allergics or decongestants ^A	Moderate/persistent: add nasal corticosteroid Severe: high dose nasal corticosteroid, add oral steroid Conjunctivitis: saline, oral/ocular antihistamine, ocular chromones

LAC – Latin America and the Caribbean, STMM – short-term medical missions, ARIA-WHO – Allergic Rhinitis and its Impact on Asthma-World Health Organization

*Source: anonymized NGOs operating STMMs in Latin America and the Caribbean, data not in the public domain. Letters in superscript indicate NGOs from [Table 1](#).

Others

Two organizations mentioned antibiotic recommendations for the treatment of pertussis. Three protocols mentioned suspected tuberculosis, and all included the recommendation that patients be referred to a local tuberculosis program. One protocol mentioned bronchiolitis as a separate entity from asthma and suggested oral hydration and albuterol syrup. One additional organization discussed symptoms and supportive management for measles.

DISCUSSION

This review is the first to collect and consolidate unpublished clinical protocols for common respiratory illnesses seen on STMMs. Of note, nearly three-quarters of the sampled MSTs (72%, 81/112) reported that they did not use any clinical protocols. Our analysis of 20 MST protocols for respiratory conditions revealed that exceedingly few organizations discussed common respiratory conditions at all, and those that did focused on upper respiratory infections. The protocols were of variable quality, with important implications for practice by international volunteers. Their similarities and differences with international guidelines are discussed below.

Asthma

Recommendations for asthma management in the clinical protocols were brief, but otherwise paralleled existing WHO recommendations (16). Notably, COPD was not mentioned by any clinical protocol. In considering risk factors for COPD, while the prevalence of smoking is often low in rural communities served by STMMs (17), many sources have linked the combustion of biofuels in close quarters with the development of chronic lung disease in these populations (18–20). While epidemiological studies of STMMs have suggested a low prevalence of COPD on such brigades (10), it is unclear whether this represents true low prevalence, or simply low recognition of this entity by clinicians.

Upper respiratory infections

Upper respiratory infections were the most commonly mentioned condition in the protocols, yet most limited their discussion to superficial aspects of symptomatic management rather than clinical decision making. Several protocols did discourage the use of unnecessary anti-

biotics, but without noting specific signs and symptoms that would indicate a legitimate need for such treatment, such as bacterial pharyngitis, sinusitis, or suspected pneumonia. In contrast, WHO guidelines more clearly delineate signs and symptoms of pharyngitis or a throat abscess, both diagnoses which would indicate that more aggressive treatment is required.

Lower respiratory infections

Lower respiratory infection protocols were limited and were of similarly poor quality. While antibiotic selections were reasonable, the optimal method to clinically diagnose pneumonia in a resource-limited setting was left unclear. Protocols did not discuss nutritional and hydration status, and other than one protocol that suggested referring neonates to a hospital, clinical red flags were absent. While multiple clinical pneumonia scores exist in the literature (21-23), it is currently unclear which should be used. The current WHO and Integrated Management of Childhood Illness (IMCI) guidelines use respiratory rate in addition to oxygen saturation to support the diagnosis of pneumonia (24, 25), although this approach has not yet been validated. Finally, given the importance of tuberculosis as a public health concern, the absence of mention of this particular condition in all but three protocols is an important omission.

Allergic rhinoconjunctivitis

Several organizations discussed allergic rhinoconjunctivitis, which may be a manifestation of its prevalence as a diagnosis on primary care STMMs (7). The symptoms mentioned in the clinical protocols were similar to those discussed in World Health Organization-Allergic Rhinitis Asthma international guidelines (25), although they were not formally divided into categories. Treatment in the STMM protocols were also similar, although nasal corticosteroids were not specifically mentioned for severe symptoms. The important relationship between allergic rhinitis and asthma was also not mentioned in any protocol.

Strengths and weaknesses

A major strength of this study is its capture of grey literature using a multipronged search strategy. Our findings provide a baseline understanding of STMM practices and how they compare to international guidelines. Weaknesses include the limited response rate (48%) among invited STMM organizations and restriction of our sample to those STMM organizations with a web presence, suggesting the possibility of selection bias. Additional research is needed on the broader population of STMM organizations both within and outside of LAC, as well as on the extent to which clinical protocols are implemented. Although caution should be exercised in generalizing the findings of this study to STMMs operating outside LAC, it is possible that the lack of clinical protocol use is a persistent problem in LMICs (11).

CONCLUSIONS

Inconsistent care and departure from established guidelines can place patients at risk of ineffective treatment, promote antibiotic resistance through use of ineffective antimicrobials, and erode the confidence of patients and communities in the expertise of their clinicians. Visiting volunteer groups can improve their practices by establishing formal pathways for communication and partnerships with local health authorities, and by ensuring proper awareness of current international guidelines when available. Practice guidelines for clinicians treating common respiratory disorders are a key step in the consistent, effective treatment of these conditions. This study can be considered an entry point for the creation of consensus guidelines for STMMs that are acceptable to both clinicians, patients, and organizations. Ideally, consensus guidelines would suggest management options for the medical conditions most frequently seen by STMMs, and these guidelines could be modified to suit a variety of STMM settings and needs. Any guidelines development initiative should carefully consider and integrate input from local healthcare workers, which will optimize chances for sustainable and meaningful changes in clinical practice.

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