Reliability of the Service Trip Audit Tool to assess the quality of short-term medical missions

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Background: We aimed to assess the adherence of short-term medical missions (STMMs) operating in Latin America and the Caribbean (LAC) to key best practices using the Service Trip Audit Tool (STAT) and to calculate the inter-rater reliability of the data points. This tool was based on a previously published inventory of 18 STMM best practices.

Methods: Programme administrators and recent volunteers from 335 North American organizations offering STMMs in LAC were invited to complete the STAT anonymously online. Adherence to each of 18 best practices was reported as either ‘yes’, ‘no’ or ‘not sure’. Fleiss’ $\kappa$ was used to assess inter-rater agreement of the responses.

Results: A total of 194 individuals from 102 organizations completed the STAT (response rate 30.4%; 102/335 organizations) between 12 July and 7 August 2017. Reported adherence was $>80\%$ for 9 of 18 best practices.

For 37 non-governmental organizations (NGOs) with multiple raters, inter-rater agreement was moderate to substantial ($\kappa>0.4$) for 12 of 18 best practices.

Conclusions: This is the first study to evaluate adherence to STMM best practices. Such an objective evaluation will be valuable to governments, volunteers and NGO donors who have an interest in identifying high-quality partners. Assessment and monitoring of STMMs through self-audit may be foundational steps towards quality improvement.

Keywords: global health, medical missions, primary care

Introduction

Evidence-based literature on impact and quality has struggled to keep pace with the ongoing popularity of short-term medical missions (STMMs), with one review finding quantitative methods in only 5% of 1100 publications on STMMs over the last 20 y. Based on one nationwide survey of American physicians, an estimated 16.5% of respondents had volunteered on STMMs in 2012. As such, the conduct of sending organizations has become increasingly concerning to global health advocates, who cite the real and potential harms associated with poorly conceived international aid projects. Accordingly, the trend towards increased surveillance of the activities of non-governmental organizations (NGOs) in developing countries led the World Health Organization (WHO) to recently propose minimum standards for foreign relief teams in the context of disasters.

The critical ethical issues surrounding STMMs have been explored extensively in previous literature. These include concerns with the lack of sustainability and partnerships, inadequate cultural preparation and pre-departure training, poor adherence to clinical best practices and providers practising outside of their scope. Such deficiencies can expose patients to inadequate care, negatively impact the healthcare system in fragile economies and contribute to a culture of dependency. In parallel, the number of STMMs is vast and growing, consumes substantial financial resources and involves an organizational landscape that is constantly in flux. Subsequently, well-meaning healthcare professionals may end up spending thousands of dollars for an experience that they cannot properly vet and has an unclear impact on the recipients of their efforts. A tool for organizations to objectively evaluate the quality of their work...
would serve as a useful starting point for volunteers looking for a well-planned experience that they can support in good conscience.

Given the current prevalence of STMM volunteering, common and objective standards are necessary to evaluate and compare the quality of the services delivered to patients and host communities. A recent systematic review of 92 descriptive and theoretical papers specifically describes best practice recommendations for STMMs, organizing them using the WHO Health Systems Framework.6,12 A more recent review of best practice guidelines found 27 different guidelines in the grey literature,12 although it remains uncertain how to adequately disseminate these emerging perspectives to prospective volunteers. Rather than standardized reporting measures, current practice for medical professionals and trainees selecting a global health experience with an NGO often involves anecdotal recommendations from veteran to prospective volunteers.12

While a recognized objective mechanism for the monitoring and evaluation of STMMs does not currently exist, there has been emerging academic consensus on best practices and a push for top-down legislation to enforce them.6,7,12,13 Such a proposition is challenging given the limited resources in host countries, limited jurisdiction in sending countries and the often limited political will for such an enterprise. Moreover, the basis for such enforcement is challenged by the dearth of quantitative STMM literature describing current outcomes; the heterogeneous structures of the various religious, secular, educational and nonprofit NGOs in low- and middle-income countries; and disagreement among guidelines on the relative importance of various aspects of an ideal STMM.7 As such, the translation of these policy recommendations into real improvements in the quality of STMMs remains a persistent challenge.

An alternative approach to local enforcement involves bottom-up, self-auditing of STMM projects abroad. One seminal study6 describes a self-assessment tool designed to measure and promote improvements in quality of care on STMMs, but there has been little to no adoption of this framework in actual practice, despite its growing recognition in the academic literature.1,7,12 The original six major quality domains (preparedness, sustainability, cost-effectiveness, efficiency, impact and education) provide a context-specific frame for comparing subsequent attempts to address quality of care on STMMs, but the authors acknowledge the inherent limitations of this type of subjective self-assessment.8

Given these challenges, and with the goal of maximizing utility for prospective volunteers, an ideal assessment tool must be simple to use, easily understood, objective and reproducible.14 Furthermore, the acceptability of any quality assessment tool depends not only on its foundation in the existing literature, but also on the integration of relevant stakeholder perspectives.15 This has been a recognized limitation of previously created tools.3,4,16 In 2017, Dainton et al.13 sought to integrate the views of clinicians, academics, NGO administrators and student volunteers through an eDelphi process designed to approve a framework of universally acceptable best practices for STMMs. The current study builds on this framework by adapting its elements to create the Service Trip Audit Tool (STAT), which consists of 18 binary questions intended for STMM self-auditing.

The aims of this pilot study were to describe current STMM practices in Latin America and the Caribbean (LAC) based on responses to the STAT survey and assess the objectivity of the elements of the STAT by calculating the inter-rater reliability of respondents. Compiling a quantitative data set describing current STMM practices in terms of these elements will facilitate more specific hypotheses regarding the quality of STMMs as well as outcome evaluations of interventions, partnerships, policies and quality assessment projects.

Methods

A multiphase methodology was used to pilot and determine inter-rater reliability for the previously developed quality assessment tool. Ethics approval was sought from and waived by Markham Stouffville Hospital.

Development of the STAT

The STAT is an audit tool consisting of 18 STMM best practice elements (Table 1) that was previously content validated by an eDelphi panel of international stakeholders.13 The candidates for inclusion were selected using a theory synthesis methodology that relied on key literature sources and a recent systematic review of STMM best practices.6 Each of the 18 elements that reached consensus was rephrased into a forced-choice, theoretically falsifiable binary item (yes, no, not sure) that was then edited for clarity and structure to encourage objectivity of the tool, avoid decision fatigue of respondents and allow calculation of a frequency distribution of the items. Respondents were also given an open-ended opportunity for comments on each question, as well as global comments on their STMM at the end of the survey.

The goal was to enable a previous volunteer or STMM programme administrator to anonymously complete a STAT survey in <5 min. For convenience, the items were classified into six major domains (sustainability, education, efficiency, impact and safety, preparedness and cost-effectiveness) that were based on a previous seminal article,8 to allow respondents to cognitively organize the items.

Sampling and data collection

The sample consisted of NGOs listed in the medicalservicetrip.com database, which is the largest online database of primary care STMMs operating in LAC and which, at the time of the study, consisted of 335 organizations currently operating primary care STMMs (<1 month duration) in LAC. We extracted the following information from each organizational website: the location of their headquarters in North America, the location(s) served in LAC, the frequency of STMMs to LAC, the setting(s) of their mobile clinics, the number and types of providers and whether the organization was faith-based.

A SurveyMonkey online survey was created using the elements of the STAT, and a hyperlink to the survey was incorporated into the individual organization descriptions found on medicalservicetrip.com. Anonymous respondents were asked to categorize themselves as either programme administrators, medical professional volunteers (including medical trainees) or non-medical
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Table 1. Overview of the STAT, an audit tool constructed based on a literature-based, eDelphi, stakeholder-validated framework for best practices on STMMs

| Domain         | Best practice                                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Sustainability | The organization has a formal partnership with local health services in the host community.                                                   |
|                | The organization has a clear referral process for patients who need higher levels of care.                                                    |
|                | In addition to the visiting volunteers, the organization ensures that there is always a local clinician involved in clinical care.              |
|                | The organization has a permanent staff member or partner organization in the host community.                                                  |
| Education      | The organization builds capacity by helping train host providers, local health workers or community health workers.                             |
| Efficiency     | The organization promotes the visiting clinics to locals by word of mouth or advertisement or uses a clinic location that is already well known to locals. |
|                | The organization has a formal staffing plan describing future needs and a recruitment strategy.                                               |
|                | The organization has a formal triage, priority, appointment or ticketing system in place for patients visiting the clinic.                     |
| Impact and safety | The organization solicits written feedback/debriefing from volunteers after the trip is over.                                             |
|                | The organization keeps medical records that are easily accessible to future clinicians.                                                      |
|                | The organization provides evidence-based clinical guidelines to volunteers, describing an approach to common diseases in the host community.    |
| Preparedness   | Volunteers are pre-screened before being accepted by the organization.                                                                         |
|                | The organization provides pre-departure training for volunteers (i.e. in-person or online).                                                  |
|                | Urine dipsticks, pregnancy tests and glucometers are all available and there is a clear pathway for volunteers to obtain more advanced tests.   |
|                | The organization provides written clinical protocols to volunteers (i.e. limiting their practice scope to the care they are licensed to provide at home). |
| Cost-effectiveness | The financial reports for this organization are transparent and easily available (i.e. via website, annual report, etc.).                  |
|                | The organization considers and describes any host community costs that are associated with hosting volunteers (i.e. on their website).            |

Sample size calculation
A sample size calculation was completed using Stata 15 (StataCorp, College Station, TX, USA). Assuming a true reliability of 0.8, the sample size required to detect an excellent reliability of at least R−0.1 with 95% confidence would be 70 NGOs, with at least two raters (κ=2) completing the survey for each NGO. We planned to contact all 340 NGOs contained in the database to complete the online survey and expected a response rate of 25–40% (n=85–136) based on previous similar studies using the same database and typical response rates for external online surveys.

Statistical analysis
Statistics were calculated using an online statistical tool. Characteristics of the organizations with one or more responses were compared with those with no responses using Fisher’s exact test (p<0.05) to determine predictors of NGO engagement with the quality assessment study. Adherence to each of the 18 best practices was reported as ‘yes’, ‘no’ or ‘not sure’, and conflicting data were resolved by investigator consensus. Adherence was calculated as the percentage of organizations with a ‘yes’
335 emails sent to NGOs operating STMMs in Latin America and the Caribbean

38 emails bounced

297 emails received by NGOs

191 NGOs with no response after multiple attempts at contact
4 NGOs requested no further contact

102 NGOs with at least one response
(194 total survey responses)

37 organizations with multiple responses (range 2-22)
65 organizations with one response

Figure 1. Flow diagram for NGOs operating in LAC who were solicited to complete the STAT for STMMs.

response, with the result being a percentage of organizations claiming compliance with each element of the STAT.

The inter-rater reliability for each STAT question was calculated as a free marginal Fleiss’ $\kappa$. This measure specifically allows that different organizations may be rated by different individuals in which raters are not forced to assign a certain number of cases to each category.23,24 Benchmarks of $\kappa>0.6$ for substantial correlation, $\kappa>0.4$–0.6 for moderate to good correlation, $\kappa>0.2$–0.4 for fair correlation and $\leq0.2$ for slight correlation were used.25 Global comments and comments specific to each element were analysed qualitatively using thematic analysis but are not presented in this study.

Results

Figure 1 describes the flow of e-mail contact with the organizations identified by the study. A total of 335 e-mails were sent out in three rounds beginning 12 July 2017, 7 August 2017 and 21 August 2017. Thirty-eight e-mails bounced back (302 were received). Four organizations requested no further contact.

By 1 March 2018, 194 responses from 97 programme administrators (50%), 57 medical professionals (29.4%) and 40 non-medical volunteers (20.6%) had been received. Responses were submitted from 102 organizations, for an organizational response rate of 30.4%. The characteristics of the 102 responding organizations are described in Table 2 compared with non-responders. Non-responders operated fewer trips per year on average and were more likely to be faith-based, but were similar with regards to type of clinic, length of trip and trip setting.

The claimed adherence of responding organizations to the 18 best practices described by the STAT tool was high (Table 3), with at least 80% of the organizations claiming to comply with 9 of the items in the inventory. The lowest performing inventory items were the presence of minimum diagnostic tests (61.8% of organizations claiming adherence), formal referral processes (65.7%), clinical scope of practice protocols (65.7%), clinical guidelines (58.8%), accessible medical records (65.7%) and community cost–benefit analysis (52.0%).

There were 37 organizations with multiple raters that were included in the reliability analysis. Table 4 indicates the Cohen’s $\kappa$ for each of the 18 items in the STAT inventory. For the organizations with multiple raters, inter-rater agreement was substantial ($\kappa>0.6$) for 6/18 best practices, moderate ($\kappa>0.4$–0.6) for 6/18 best practices, fair ($\kappa>0.2$–0.4) for 4/18 best practices and slight for 2/18 best practices ($<0.20$).
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### Table 2. Participants and characteristics of 102 STMMs responding to the STAT versus non-responders

| Characteristics               | Respondents (N=102), n (%) | Non-respondents (N=233), n (%) | p-Values |
|------------------------------|----------------------------|--------------------------------|----------|
| Type of organization         |                            |                                |          |
| Secular                      | 52 (51.0)                  | 90 (38.6)                      | 0.028    |
| Faith-based                   | 41 (40.2)                  | 133 (57.1)                     |          |
| Educational                   | 6 (5.9)                    | 9 (3.8)                        |          |
| Unclear                      | 3 (2.9)                    | 1 (1.0)                        |          |
| Type of clinic\(^a\)          |                            |                                |          |
| Mobile                       | 72 (70.6)                  | 135 (57.5)                     | 0.968    |
| Standing clinic               | 50 (49.0)                  | 100 (41.9)                     |          |
| Hospital                      | 19 (18.6)                  | 35 (15.0)                      |          |
| Unclear                      | 7 (6.9)                    | 31 (13.3)                      |          |
| Minimum trip duration         |                            |                                |          |
| <2 weeks                      | 67 (65.7)                  | 154 (66.1)                     | 0.726    |
| 2-4 weeks                     | 19 (18.6)                  | 34 (14.6)                      |          |
| >4 weeks                      | 8 (7.8)                    | 19 (8.2)                       |          |
| Unclear                      | 8 (7.8)                    | 26 (11.2)                      |          |
| Average number of trips per year |                         |                                |          |
| Rural                        | 92 (90.2)                  | 186 (79.8)                     | 0.106    |
| Urban                        | 30 (29.4)                  | 39 (16.7)                      |          |
| Unclear                      | 9 (8.8)                    | 37 (15.9)                      |          |

\(^a\)Percentages add to >100% because some organizations operated more than one type of clinic.

**Discussion**

In this pilot study, NGO representatives and volunteers claimed adherence to the majority of the best practices included in the STAT tool, with moderate to substantial interrater reliability for most data points. To our knowledge, this is the first description of a bottom-up, objective approach to quality assessment of STMMs. It represents a novel approach to knowledge translation by encouraging discussion between programme administrators, volunteers and local partners.
The STAT comprises one stage of a clinical audit cycle for organizations delivering STMMs. While problem identification and standard setting are comprehensively addressed in the previous content validation paper, the present study addresses one mechanism for rapid, binary data collection and comparison of performance with stakeholder-validated criteria. It remains to be seen whether the tool will have utility in the final stage of the cycle, which involves implementing change. In sum, the STAT may be useful in the context of an internal review of STMM policies.

Assessment of the inter-rater reliability of the STAT is essential, since a key challenge to such projects is the tendency for bias among assessors who are intimately involved with an organization. Nonetheless, in the absence of a supervening governing body to independently certify such organizations, self-assessment remains the most feasible mechanism for quality improvement for the immediate future. Self-regulation of healthcare professionals with government oversight is already a common and well-defined approach in professions such as medicine and nursing across high-income countries. This quality assurance often involves intentional self-reflection as an integral part of a process of identifying strengths, areas for improvement and learning needs.

A validated online tool would allow prospective volunteers and donors to make decisions based on the positive and negative reviews of previous volunteers, thus shifting demand toward high quality projects. Likewise, when provided with a validated framework for responsible STMM projects, organizations themselves may be encouraged to adapt their practices to meet the evolving expectations of volunteers, hosts and the global health community at large. As such, the STAT may be deployed by NGOs as a self-reflection exercise in order to examine strengths and weaknesses, by host organizations to hold their partners accountable and highlight gaps, or by governments in order to allow cross-comparisons of the organizations operating within their borders.

**Strengths**

The STAT builds on the existing literature, including the most recent systematic review on the topic of STMM best practices, our initial eDelphi discussion-based framework for best practices, and is structured based on the only other published quantitative assessment tool for STMMs. To our knowledge, this is the largest existing quantitative study of STMM best practices and the first to attempt a data-driven assessment of practice quality. This pilot study includes a broad sample of STMMs, compiled through the integration of multiple databases, and involved multiple attempts to contact each NGO through multiple channels, including social media. Furthermore, each element included in the STAT tool is theoretically falsifiable, making this tool more objective than previously developed assessment tools.

**Limitations**

This pilot study has several limitations. First, despite multiple attempts at contact, 70% of STMM organizations were non-responders. While this response rate exceeds that of typical external e-mail surveys, it nonetheless suggests an important response bias. One might speculate that certain organizational characteristics make an NGO more likely to participate in quality improvement initiatives, such as its size and resources, funding sources, overall philosophical mission or other factors yet to be determined. However, while the views and characteristics...
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of these non-responders may not be represented at present, the evolving, public and online nature of the tool makes it possible for such groups to become involved during the external validation phase. Second, this pilot was administered in English only, which limits participation from predominantly Spanish-speaking host country administrators in LAC.

Third, it is important to note that the 18 items in the STAT inventory represent only those items that achieved consensus in an eDelphi process. While these items were agreed to be essential to a high quality STMM, the list is not exhaustive and does not negate the potential importance of items that did not achieve consensus. In theory, the absence of a fulsome assessment of these missing elements could impart a false sense of confidence and reassurance to volunteers in their selection of an STMM experience. Therefore it is more accurate to suggest that while it is problematic if an organization does not incorporate the STAT elements, volunteers should continue to perform their due diligence even in cases where the STMM appears to perform well. Volunteers should carry out conscientious vetting, even for organizations that fulfill all 18 criteria, to ensure that all legal and ethical requirements are being met.

Finally, the STAT also makes no comment on the relative importance of the elements in the inventory. It is conceivable that for many volunteers, the presence of a local clinician, a permanent presence in the community and an adequate system of referral would be more convincing indicators of quality than transparency of finances or the presence of a system of scheduling and triage. However, until a rational, quantitative mechanism can be elucidated to weigh the individual components of the STAT, their relative importance must continue to be dictated by the values and preferences of those evaluating each opportunity. It is therefore an ordinal scale; as such, a higher score suggests a higher quality medical mission but does not necessarily correlate with any given degree of improvement.

**Future directions**

Additional improvements to the tool are necessary to ensure that it accurately reflects the quality of STMMs. Most critically, current work aims to integrate host community voices to expand the framework. Refinement of the phrasing of STAT questions that performed poorly in this pilot, as well as broader external validation with larger sample sizes and in diverse settings, are also necessary to support further refinement of the tool. Since this study reports only the claimed adherence of NGO administrators and volunteers to best practices, further validation by fully independent and standardized assessors would be valuable to correlate these reports to verifiable indicators.

While we can speculate that volunteers and charitable organizations themselves are predominantly motivated by a desire to do good, other competing motivations may be less altruistic. As such, any quality improvement exercise must consider whether enforcement is necessary for those STMMs that cannot be engaged through traditional means. While we believe the data produced by the STAT project would be helpful in this regard, the legal implications of enforcement are outside the scope of this study, although this topic is discussed in depth in a recent publication. It is also reasonable to believe that a similar tool could be useful for other, non-medical cadres, although such a tool would need to be separately validated.

**Conclusions**

The STAT tool presents a novel quantitative approach for assessing STMMs in developing countries and may be a viable resource for volunteers who are considering participation, NGOs seeking to improve their practices, donors looking to make financial or in-kind contributions to support charitable work and governments tasked with the regulation of their healthcare workforce.

**Authors’ contributions**: CD conceived the study and designed the study protocol, conducted statistical analysis and drafted the manuscript. CG contacted and conducted follow-up with STMM sending organizations. All the authors critically revised the manuscript for intellectual content and read and approved the final manuscript. CD is guarantor of the paper.

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### APPENDIX A

**Service Trip Audit Tool (STAT)**

The STAT tool is designed to assess the quality of short-term medical missions.

| Domain                  | Minor elements                                                                                                                                                                                                 | YES | NO | NOT SURE |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|----------|
| **Sustainability**      | 1. The organization has a formal partnership with local health services in the host community.                                                                                                               | □   | □  | □        |
|                         | 2. The organization has a clear referral process for patients who need higher levels of care.                                                                                                                 | □   | □  | □        |
|                         | 3. In addition to the visiting volunteers, the organization ensures that there is always a local clinician involved in clinical care                                                                               | □   | □  | □        |
|                         | 4. The organization has a permanent staff member or partner organization in the host community                                                                                                               | □   | □  | □        |
| **Comments:**           |                                                                                                                                                                                                            |     |    |          |
| **Education**           | 1. The organization builds capacity by helping train host providers, local health workers, or community health workers.                                                                                         | □   | □  | □        |
|                         | 2. The organization engages in public health work or health promotion in the community.                                                                                                                     | □   | □  | □        |
| **Comments:**           |                                                                                                                                                                                                            |     |    |          |
| **Efficiency**          | 1. The organization promotes the visiting clinics to locals by word of mouth or advertisement, or uses a clinic location that is already well known to locals.                                               | □   | □  | □        |
|                         | 2. The organization has a formal staffing plan describing future needs and a recruitment strategy.                                                                                                      | □   | □  | □        |
|                         | 3. The organization has a formal triage, priority, appointment, or ticketing system in place for patients visiting the clinic.                                                                                  | □   | □  | □        |
| **Comments:**           |                                                                                                                                                                                                            |     |    |          |
| **Impact and safety**   | 1. The organization solicits written feedback/debriefing from volunteers after the trip is over.                                                                                                             | □   | □  | □        |
|                         | 2. The organization keeps medical records that are easily accessible to future clinicians.                                                                                                                   | □   | □  | □        |
|                         | 3. The organization provides evidence-based clinical guidelines to volunteers, describing an approach to common diseases in the host community.                                                            | □   | □  | □        |
| **Comments:**           |                                                                                                                                                                                                            |     |    |          |
| **Preparedness**        | 1. Volunteers are pre-screened before being accepted by the organization.                                                                                                                                   | □   | □  | □        |
|                         | 2. The organization provides pre-departure training for volunteers (i.e. in-person or online).                                                                                                             | □   | □  | □        |
|                         | 3. Urine dipsticks, pregnancy tests, and glucometers are all available, and there is a clear pathway for volunteers to obtain more advanced tests.                                                            | □   | □  | □        |
|                         | 4. The organization provides written clinical protocols to volunteers (i.e. limiting their practice scope to the care they are licensed to provide at home)                                                     | □   | □  | □        |
| **Comments:**           |                                                                                                                                                                                                            |     |    |          |
| **Cost effectiveness**  | 1. The financial reports for this organization are transparent and easily available (i.e. via website, annual report, etc.)                                                                              | □   | □  | □        |
|                         | 2. The organization considers and describes any host community costs that are associated with hosting volunteers (i.e. on their website).                                                                   | □   | □  | □        |
| **Comments:**           |                                                                                                                                                                                                            |     |    |          |