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ORIGINAL SCIENTIFIC REPORT

Patient Perspectives on Barriers to Surgical Care and the Impact of Mobile Surgery in Ecuador

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Abstract

Background An estimated 5 billion people worldwide lack access to timely safe surgical care (Gawande in Lancet 386(9993):523–525, 2015). A mere 6% of all surgical procedures occur in the poorest countries where over a third of the world's population lives (Meara et al. in Surgery 158(1):3–6, 2015). Mobile surgical units like the Cinterandes Foundation endeavor to bring surgical care directly to these communities who otherwise would lack access to safe surgery. This study examines the barriers patients encounter in seeking surgical care in rural communities of Ecuador and their impressions on how mobile surgery addresses such barriers.

Methods Open interviews were conducted with Cinterandes' patients who had undergone an operation in the mobile surgical unit between 06/25/2013 and 06/25/2014 ($n = 101$). Interviews were structured to explore two main domains: (1) examining barriers patients have in accessing surgery, (2) assessing patients' opinion of how mobile surgery helped in overcoming such barriers.

Results Patient inconvenience (70%), cost (21%), and lack of trust in local hospitals (24%) were the main cited barriers to surgical access. Increased patient convenience (53%), cheaper surgical care (34%), and trust in Cinterandes (47%) were the main cited benefits to mobile surgery.

Conclusion Mobile surgery provided by Cinterandes effectively overcomes many barriers patients encounter when seeking surgical care in rural Ecuador: decreased patient wait times, limited number of referrals to multiple locations, and decreased cost. Partnering with local clinics within the communities and bringing care much closer to patients' homes may provide a better patient friendly health care delivery system for rural Ecuador.

Introduction

An estimated 5 billion people worldwide lack access to timely safe surgical care [1]. A mere 6% of all surgical procedures worldwide occur in the poorest countries where over a third of the world's population lives [2]. Responding to this most serious manifestations of social inequity in health care, a variety of mobile surgical units were established to offer improved surgical care access in some of the most underdeveloped regions of the world. Mobile surgical units endeavor to bring surgical care directly to these communities who otherwise would lack timely access to safe surgery.

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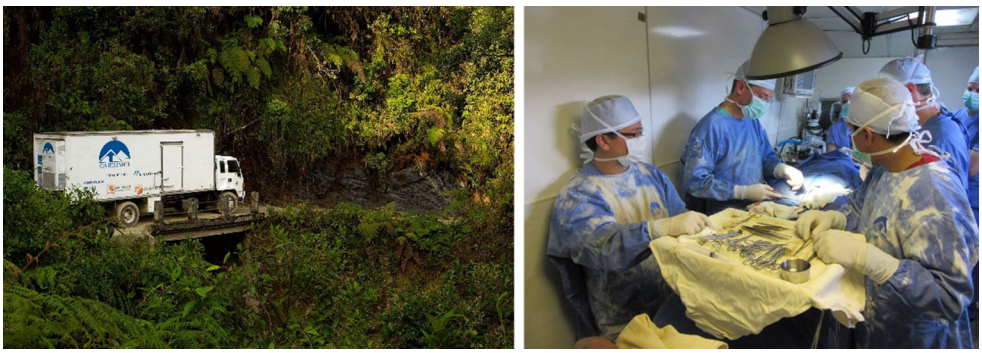

Fig. 1 Cinterandes mobile surgical unit in Ecuador and the operating room enclosed within

Mobile surgical units range from self-contained mobile surgical hospitals that are fully equipped and staffed–capable of providing a broad range of diagnostic and therapeutic interventions—to units that are much more limited in their scope and capabilities. In an effort to provide improved access of surgical care to under-resourced rural areas of Ecuador, the Cinterandes Foundation established a mobile surgical unit that has successfully provided surgical care directly to remote communities of Ecuador for over 20 years, conducting over 7600 operations with excellent outcomes [3].

The Cinterandes surgical model includes a surgical team entirely made up of native/local specialists who utilize a truck with a single operating room traveling from the highest regions of the Andes to the lowest stretches of the Amazon within Ecuador (Fig. 1). The Cinterandes missions typically take place once to several times a month and over a 4-day span. The team has seven full-time members with a president and lead surgeon, executive director and lead anesthetist, surgical coordinator, operating room nurse, driver and general assistant, general coordinator, and receptionist. The team is further completed with seven surgeons who rotate in pairs on the monthly missions, medical students, local medical personnel (nurse, midwife, family doctor, nun, or otherwise) from the rural areas, and local district contacts and leaders [4]. Follow-up is conducted with each patient 1 week, 1 month, and 1 year after surgery.

Over the last decade, incorporating patient perspectives into care delivery processes has become increasingly important in many high-income countries; however, very little research on this subject exists in low- and middle-income countries (LMICs). This study examines the patient perceptions of barriers to accessing surgical care in rural Ecuador, the care received through the Cinterandes mobile surgical unit, and the impact of the mobile surgical care provided by the Cinterandes Foundation.

Materials and methods

A retrospective cohort study was conducted using patients who had undergone an operation in the Cinterandes mobile surgical unit between 06/25/2013 and 06/25/2014. Open interviews were held individually with each patient and were structured to explore two domains: (1) patient's perceived barriers to accessing surgery, (2) patient's perception of how mobile surgery overcame such barriers.

Two-hundred and fifteen patients were identified. A total of 181 patients had been operated on by the Cinterandes Surgical team. Thirty-four patients were operated on by a separate local surgical group unrelated to Cinterandes, who borrowed the Cinterandes surgical truck and facilities for 1 week. Contact by telephone was attempted with all patients on two occasions. Interviews were conducted in Spanish. Responses were tabulated word for word and

Table 1 Outline of baseline interview questions

How did you find your experience with mobile surgery compared with care received from a hospital?
Why did you choose to be operated on in the mobile unit and not in the hospital?
Is it difficult for you to get surgical care from the hospital?
If yes to question 3, what are the main barriers?
How far would you have to travel to receive surgical care from a hospital?
How far did you travel for your surgery with Cinterandes?

subsequently analyzed for common themes. The interviews were conducted similar to the format used by Bruwer, Futter, and Ramesar consisting of both open-ended and closed-ended questions [5]. Open-ended questions explored the participants' thoughts and experiences. Closed-ended questions collected 'yes/no' answers to questions or pre-categorized scales of various items (Table 1).

The Cinterandes Foundation provided ethical approval for this study.

Results

Demographics

Forty-five percent (101/215) of patients responded and were interviewed (85 Cinterandes patients and 16 from the other local surgical group). Respondents came from eight geographical regions, spanning six provinces of Ecuador (Fig. 2). Mean patient age was 36 years (1–77). Mean patient travel time to the nearest hospital where surgical care could be received was 48 min (10–210 min). Mean patient travel time to Cinterandes' mobile surgical unit was 25 min (2–180 min). A variety of surgical procedures were performed on these patients in the mobile surgical unit (Table 2).

Fig. 2 Provinces of Ecuador where interview respondents received surgical care from Cinterandes (Santa Elena, El Oro, Azuay, Zamora Chinchipe, Morona Santiago, and Sucumbíos)

Table 2 Operations that interviewed patients underwent with Cinterandes

Operations	#
Hernia repair	14
Small tumors	22
Cholecystectomy	19
Urologic	9
Gynecologic	7
Ophthalmologic	17
Other[a]	5
Undesignated	8
Total	101

[a] Liver resection 1, endoscopy 1, scar revision 1, frenuloplasty of tongue 2

Perceived barriers to surgical access (Table 3)

Of the 101 respondents, 81 stated "yes" to the question "is it difficult for you to get surgical care from a hospital?" The most cited perceived barrier to accessing hospital surgical care was patient inconvenience (70%). Patient inconvenience includes long wait times required to see the physician and receive surgical care (42%), proximity to surgical care (29%), and having multiple referrals to multiple locations for appointments, tests, and surgery (21%).

Cost of receiving surgical care (21%) and lack of trust in the care provided in the hospitals (24%) were also commonly cited barriers.

Perceived benefits (Table 3)

Patients reported mobile surgery helped them by: increasing patient convenience (53%), increasing patient perception of general quality and trust (47%), and decreasing costs incurred by the patient (34%). Regarding patient convenience, 36% reported mobile surgery decreased the time required to see the physician and receive surgical care compared to care received at a hospital, 17% said mobile surgery brought the surgery closer to their home (Fig. 3), and 14% mentioned mobile surgery reduced the general inconvenience of being passed between multiple locations for appointments, tests, and surgery.

Perceived differences between surgical teams

Within the cohort of patients called, 34 patients were operated on within the Cinterandes mobile surgical truck when the truck was on loan to another local surgical team, but were not operated on by the Cinterandes Surgical team. Sixteen of these patients (47%) responded and were included in the study. Of the 16 patients who responded, 43% had a negative experience and 62% stated their

Table 3 Results of barriers to accessing surgical care and the benefits of surgery provided by Cinterandes ($n = 101$)

Perceived barriers to accessing local surgical care	*%*
1. Patient inconvenience	**70**
a. Long wait times to see physician and receive surgical care	42
b. Proximity to surgical care	29
c. Multiple referrals/locations for appointments, tests, and surgery	21
2. Increased cost of receiving surgical care	**21**
3. Lack of trust in care provided at local hospitals	**24**
Perceived benefits of surgery provided by Cinterandes' mobile surgical unit	*%*
1. Patient convenience	**53**
a. Decreased wait times to see physician and receive surgical care	36
b. Proximity to surgical care	17
c. Decreased referrals/locations for appointments, tests and surgery	14
2. Decreased cost of surgical care	**34**
3. Increased trust in surgical care provided	**47**

Several patients stated multiple barriers or benefits to surgical care, and thus percentages add up to be greater than 100%. Each percentage is given as the percentage of patients in the total cohort who stated that specific barrier

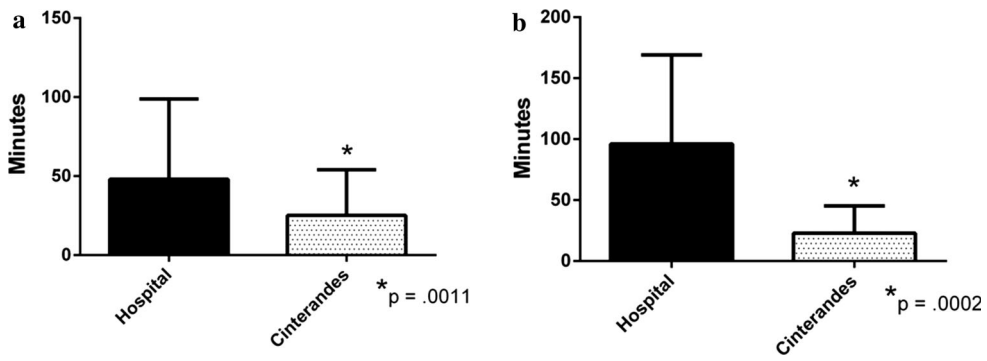

Fig. 3 Proximity of interviewed patients to a hospital and to Cinterandes where surgical care could be received. **a** Proximity of all interviewed patients, **b** proximity of those who specified lack of proximity as a barrier

experience would have been better if the physicians had done some sort of follow-up following the surgery. As a comparison, only 5% ($n = 4$) of the 85 interviewed patients operated on by the Cinterandes team had a negative experience. These patients' complaints ranged from having a minor reaction to the anesthesia ($n = 2$) to having more pain after the surgery than they anticipated ($n = 2$).

Discussion

The Cinterandes Foundation organized their mobile surgical unit after learning from years of experience leading teams to small towns to do surgeries at local hospitals, but would find the local equipment old or in disrepair. The mobile surgical unit was developed to overcome many barriers patients face in accessing surgical care in rural Ecuador [6]. Cinterandes' patients find the mobile surgical unit to be more convenient, less expensive, and tend to have greater trust in surgery provided through Cinterandes than in their local hospitals.

Patients reported significant inconvenience when attempting to access surgical care at local hospitals. Patients perceived that the Cinterandes mobile surgical unit helped alleviate many of the barriers to accessing surgical care at the local hospital by decreasing long wait times to see the physician, decreasing the multiple referrals at multiple locations, and bringing care much closer to their homes.

Inconvenience as a barrier to surgical access is not unique to Ecuador. Mongolia, Pakistan, Ghana, and the USA all document poor surgical system organization acts as a barrier to accessing surgical care [7–10].

Patients in this study describe when seeking hospital care, they spend full days in long lines waiting to setup an appointment that is scheduled for several weeks to months down the road. A similar process and period of time is then required to see the surgeon. Multiple patients stated that they were the sole breadwinner for their family and were already struggling financially; taking time away from their work would be crippling not only to themselves, but to their whole family. As such, the weeks to months

inconvenience waiting for hospital-based surgery was often incompatible and out of the question, unless life-threatening.

Fifty-three percent of Cinterandes patients interviewed state that mobile surgery has increased the convenience they encounter when seeking surgical care. The Cinterandes mobile surgical model, partnering with local clinics within the communities where services are provided, could create a more patient friendly model for delivering health care. Through these clinics, potential patients are able to receive the required pre and postoperative care and instructions from a single location by local physicians, which is then communicated to the Cinterandes team via telecommunications [11].

Long distances and poor roads remain significant challenges to accessing surgical care in many LMICs. Surprisingly, despite patients identifying "distance to travel for surgical care" as a significant barrier, the overall mean travel time to a hospital compared to the Cinterandes Surgical Unit only showed a 23-minute difference. With the Cinterandes truck coming directly to the communities, this time difference would have been expected to be much greater. However, the difference increased to 72 min (96 min to a hospital, 24 min to Cinterandes) when examining only those who specified "distance" as a barrier (Fig. 3). While patients perceived 72 min travel time to the local hospital as a barrier, the organization of the local healthcare systems seemed to be a greater impediment to timely access for quality surgical care than distance to the closest hospital. Many patients commented that in order to access surgical care at a hospital they would have to take multiple forms of transportation (bus, taxi, on foot) which would amount to a significant financial loss, both missing a day at work and the cost of the transportation. This parameter, however, was not assessed with each patient.

Cost was cited as a barrier by 21% of the patients interviewed. With Ecuador functioning under a socialized healthcare system, this was an interesting finding, as the care the patients receive in a hospital should technically be free. Indeed, care patients receive at the hospital at the beginning of the year is free until the hospitals run out of money. When this happens, the patients or their family members are provided "surgical shopping lists" that instruct them where to buy the needed supplies such as sutures and gloves, thus requiring families to use their private resources for the surgery. Many of the preliminary tests leading up to the surgery were also reported as not being covered by the healthcare system.

Conversely, Cinterandes does inform their patients about the cost of surgery, but patients are not obliged to pay. The care Cinterandes provides is free to the patient, though payment is requested if the patient has the means to pay for their surgery. Hence 34% of those interviewed mentioned cost as a determining factor to why they chose to come to Cinterandes rather than a hospital. While patients operated on by Cinterandes certainly perceive the free care model as a benefit, arguably, offering free care has the potential to undermine sustainable development of surgical care within the larger catchment area.

Lack of trust in local hospitals was only cited as a barrier to surgery by 24% of patients. Conversely, 47% of patients stated trust in Cinterandes as a reason for choosing their services. Cinterandes' reputation of positive outcomes, high quality care, and a simpler process has taken root in the communities they have served over the past 20 years. Future studies should examine the perception local physicians, and hospitals have of Cinterandes. Additional studies might explore potential unexpected consequences when patients perceive they receive better service from mobile surgical units than from their established healthcare system.

Interestingly, there were significant differences in patients' perceptions of the quality of care delivered when Cinterandes provided the primary services compared to the surgical team that borrowed the Cinterandes Surgical Unit for short-term mission work. The other local team of surgeons that borrowed the truck deviated from Cinterandes' protocol and had not provided thorough postsurgery follow-up with their patients. Patients perceived they were left with no instructions on what to do if a problem occurred postsurgery. Forty-three percent of the patients operated on by the temporary team that borrowed the Cinterandes Surgical Unit reported a negative experience (citing the lack of follow-up) compared to only 5% of patients operated on by the Cinterandes team (citing varying reasons). Appropriate follow-up and post-op instructions were perceived as a critical component to quality care.

Upon reviewing the results of this study, Cinterandes suspended the lending of their surgical truck out to other groups until establishing a means of ensuring adherence to their protocols. Cinterandes' protocols include having at the very least follow-up within 1 week of surgery by local medical personnel with real-time audio or visual communication with the core Cinterandes team. Further follow-up is conducted in a similar manner 1 month, and 1 year after surgery [4]. Follow-up is made possible via improved telecommunications across Ecuador that enable Cinterandes to leave an IPad with the patient's local clinic or a telephone if internet is not locally available. In addition to scheduled postoperative follow-up, routes of communication are left for patients to actively contact the surgical team personally, if they so wish. Most postoperative complications are managed by the patient's local clinic. In the rare occurrence when complications extend beyond the care local medical personnel can provide arrangements are made for the patient's transportation to a facility where

adequate care is obtained. This is all done with coordination and communication with the Cinterandes surgical team.

Limitations of this study include: small sample size, a single mobile surgical unit, and contacting patients by cell phone in rural areas. Selection biases may exist as all patients included in this study chose to have their surgery in the mobile surgical unit rather than through their local healthcare system. Analysis of the responses was performed by a member of the research team rather than an independent evaluator could pose additional biases.

Conclusion

Mobile surgery provided by Cinterandes effectively overcomes many perceived barriers patients encounter when seeking surgical care in rural Ecuador, through decreased wait times, limiting the multiple referrals to multiple locations, and lowering costs. Partnering with local clinics within the communities and bringing care much closer to patients' homes may provide a better patient friendly healthcare delivery system for rural Ecuador. Mobile surgery should include appropriate and dedicated preoperative evaluation and follow-up. Further studies should be conducted to determine the effect Cinterandes has on the established local hospitals in the communities where Cinterandes operates.

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Compliance with ethical standards

Conflicts of interest All authors declare that they have no conflict of interest.

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