IMPROVING PRE-SURGICAL PATIENT SCREENING IN RURAL GUATEMALA: EVALUATION OF A NOVEL WEB-BASED APPLICATION (THRIVE HEALTH) BY HEALTHCARE PROVIDERS

KRISTI LANGE, RN

SURG 560

MASTER OF GLOBAL SURGICAL CARE APRIL 2022

Academic Advisor: Dr. James Kim, MD, FRCPC Field Advisor: Mr. Ariel Marroquin, Director of Operations, Partner for Surgery

This project fulfills the Master of Global Surgical Care (MGSC) requirements for SURG 560 at the UBC Branch for Global Surgical Care (BGSC).

Table of Contents

Acknowledgements	2
Introduction	3
Project Background4	4
Purpose of Thrive Platform	5
Thrive Project Implementation6	6
Study Aim and Objectives	7
Methods7	7
Inclusion and Exclusion Criteria	3
Ethics	9
Limitations	9
Results1	10
Useability1	10
Quality1	10
Satisfaction1	11
Descriptive Responses	12
Discussion1	13
Conclusion1	14
References	16
Appendix A. Surgery Triage Evaluation Form on Thrive Platform	19
Appendix B. Qualtrics User Satisfaction Survey2	24
Appendix C. User Survey Responses2	25

Improving Pre-Surgical Patient Screening in Rural Guatemala: Evaluation of a Novel Web-based Application (Thrive Health) by Healthcare Providers

Acknowledgements

I would like to thank the following people for their guidance and support during all aspects of this project: Dr. James Kim, academic advisor and project lead for the 'Thrive Health' platform; Mr. Ariel Marroquin, director of operations at 'Partner for Surgery' and project field supervisor; Dr. Emilie Joos, course instructor for SURG 560 and principal investigator for this project; and Ms. Nicola Edwards, research manager at St. Paul's Hospital. As well, this project would not have been possible without the generous donation of technology and workforce by 'Thrive Health' over the past three years of project development and implementation. Lastly, I would like to thank those involved at 'Partner for Surgery' and 'Team Broken Earth' for their continued support to improve surgical care for patients in Guatemala.

Introduction

The World Health Organization (WHO) considers surgical and anesthesia care a key component to universal health coverage.¹ The vision of the Lancet Commission on Global Surgery (LCoGS) is universal access to safe, affordable, surgical and anesthesia care when needed.² Recent estimates suggest that five billion people worldwide do not have access to life-saving or disability-averting surgical care.³ This is especially true for those who are poor, marginalized, and rural, living in low-to middle-income countries (LMICs).⁴ These statistics highlight the current inequitable distribution of global surgical services between high-income and low-to middle-income countries. To improve the delivery of health and surgical care in underserved communities, the application of mobile health (mHealth) tools is being studied in many LMICs with generally positive results.⁵⁶ The WHO defines mHealth as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices".⁷ Despite obvious economic disparities between LMICs and high-income countries, the use of cellular phones continues to increase in resourcelimited areas. In recent years, the use of cellular phones has surpassed over 90% in LMICs, and the rate of mobile internet connectivity is approximately 40%.⁸ The near ubiquity of mobile phone usage in LMICs offers unique opportunities to integrate mobile technology with health systems to improve the surgical care of patients. Communication and information sharing using mobile devices and the Internet allows for patient data to be more easily collected, stored, and accessed, by all healthcare providers regardless of their location.⁴ Increasingly, mHealth tools are being used to support health services away from traditional healthcare settings, thereby supporting communities that are difficult to access. Such initiatives to decentralize healthcare can improve the accessibility of health services for patients because the time and expense of travel are reduced.⁹ More than ever, new mHealth technologies are being developed and tested in resource-constrained settings, with significant findings that support the feasibility and efficacy of these strategies.¹⁰ Overall, the use of mHealth technologies for the surgical care of patients in LMICs is an emerging field in Global Surgery which shows great potential to improve the delivery of care for surgical patients.

Project Background

Guatemala is a Central American country that ranks as the fifth poorest economy in the Latin America and Caribbean (LAC) region, with sustained high poverty rates, chronic malnutrition, and inequality.¹¹ Alta Verapaz is a remote and underdeveloped region of Guatemala, with mostly indigenous Mayan inhabitants.¹² Illiteracy rates are high, and most residents do not speak Spanish (the country's national language), but rather their local dialect.¹³ The majority of the population lives in poverty or extreme poverty and has minimal access to healthcare services.¹⁴ Due to complex challenges within the current healthcare system, access to medical and surgical care for the Indigenous Mayan population is scarce. Some identified challenges include language barriers, high rates of poverty, unavailable healthcare services in the public health system, and geographical limitations.¹⁴ To address the need for surgical care in the underserved regions of Guatemala, an American non-profit organization named 'Partner for Surgery' (PFS) (http://partnerforsurgery.org/) was established in 2001. PFS collaborates with different social systems within Guatemalan society, numerous public and private sectors, and international health organizations. One such organization is PFS's Guatemalan based counterpart, Asociación Compañero Para Cirugía (ACPC) (https://companerogt.org/). ACPC manages a comprehensive network of community health workers (CHWs), also known as 'health promoters', who live and work in rural communities, speak the local dialects and work to ensure patients receive culturally sensitive care. Together these organizations provide healthcare to the mostly Indigenous populations in the remote regions of Guatemala.

Specific health services offered by PFS and the locally based CHWs include the establishment of mobile medical clinics in rural communities. In addition to primary health services offered, the focus of these clinics is to screen and assess potential surgical candidates for surgeries needed in orthopedics, gynecology, plastic/reconstructive and general surgery. Children and adults are assessed by local and international healthcare providers (CHWs, physicians and nurses) and triaged for future surgery with local or international surgical teams. One example of an international organization working with PFS is the Canadian non-profit medical organization 'Team Broken Earth' (TBE) (https://brokenearth.ca/). Once patients are selected for surgery, they are added to the

PFS waitlist and subsequently connected to a CHW based in the patient's community. The role of the CHW is to act as a liaison between PFS and the patient while waiting for surgery. At the time of surgery, the CHW travels with the patient as a support person and translator (along with a family member) and is responsible for follow-up care after discharge. Without the services offered by PFS and their local partners, patients would need to travel great distances and pay for specialist healthcare, both of which are prohibitive for most living in these regions.

Issues related to medical service trips (MST's) have been well-documented in the literature.^{15,16,17,18} Historically, global surgical interventions were "parachute missions" that raised questions about the cost-effectiveness and ethics of this type of humanitarian aid, among others.¹⁹ Similar issues related to patient screening practices and postoperative follow-up were identified following the first surgical trip by TBE Vancouver in 2018. In response, a needs-based assessment was conducted in 2019 by members of PFS and TBE. Based on the assessment findings, a proposal to develop and donate a mHealth application was presented to the Canadian health technology company 'Thrive Health' (https://welcome.thrive.health/). 'Thrive' develops and implements the use of secure, web-based platforms to manage health data in hospitals and clinics, and for the management of COVID-19 in the workplace. The infrastructure used to collect and store patients' health information meets or exceeds requirements of the Freedom of Information and Protection of Privacy Acts (FIPPA) and follows established data security and privacy conformance guidelines (<u>https://www.thrive.health/privacy-notice</u>). The creation of the mHealth tool for use in Guatemala was a collaborative effort between members of 'Thrive Health', 'PFS', 'TBE Vancouver', and select members of St. Paul's Hospital anesthesiology department. Development of the platform took approximately three years, with some disruption as the result of the COVID-19 pandemic. The platform was finalized for trial in January 2022 during a PFS rural pre-surgical screening clinic.

Purpose of Thrive Platform

The purpose of the new 'Thrive' platform is to improve the continuity of patient care and health outcomes for patients receiving surgical care by PFS and their affiliates in Guatemala. The goal is to allow all healthcare providers (health promoters, local and international clinicians) working with PFS to better connect with patients, and each other, throughout the entire surgical care pathway. The platform is unique in that it has been designed to be reciprocal between the patient, CHW, and the surgical care provider. Information collected and uploaded onto the site can be accessed by both the patient (via the CHW designate due to issues of access to technology by the patient and language/literacy considerations) and their healthcare provider (local physician, surgeon, anesthesiologist, etc.). Health data can be added and accessed during the preoperative assessment phase (in clinic or during home visits), intraoperative and postoperative phases, and after discharge. The program consists of patient preoperative and postoperative questionnaires, demographic information, test results, and photos that are uploaded directly as needed into the platform (Appendix A). Platform content was created in English based on existing PFS paper intake forms and then translated to Spanish. All platform questionnaires are available in both languages for the various users. One benefit of the web-based platform is that both local and international physicians can access patient information remotely, which was not possible in the past with paper charts. This feature will allow for better presurgical screening practices by international surgical care providers. Likewise, health promoters can contact members of PFS or international surgical care providers on behalf of their patients through the platform. This aspect of the application is especially relevant following discharge if any issues occur postoperatively. The goal of this mHealth tool is to enhance the overall care of patients living in remote communities, improve workflow in PFS's mobile clinics, and save financial and human resources for both the organization and patients.

Thrive Project Implementation

In January 2022, PFS organized a week-long mobile medical clinic to service three under-resourced locations in the remote regions of North Quiche and Alta Verapaz, Guatemala. The focus of these clinics was to screen patients for conditions that require surgical care and to connect patients with a local health promoter for health support purposes. A small contingent of TBE volunteers, a research manager, and a representative from 'Thrive Health' were also planning to participate in this trip. However, travel restrictions related to the COVID-19 pandemic prohibited international travel and as such, support was provided remotely. Likewise, platform training sessions were provided remotely for those participating in the clinics in the weeks preceding the trip. This included two PFS administration staff, two ACPC health promoters and two Canadian physician volunteers (a radiologist and a family medicine doctor). Over the course of one week in January, PFS staff and volunteers assessed approximately 200 surgical candidates using the new platform.

Study Aim and Objectives

The objective of this research was to evaluate the newly launched 'Thrive Health' application by a small but diverse group of users during a week of rural mobile clinics in northern Guatemala. The primary goal was to assess the healthcare providers' views on the utility, useability, and user satisfaction towards the platform so that improvements to optimize the platform could be made. Feedback related to the platform was sought using an electronically administered mixed-methods questionnaire. Due to project scope and time constraints for platform development and implementation, this project focused on utilizing the platform during the pre-surgical assessment phase. However, in the future, the platform will be expanded to include all phases of the surgical care pathway and by a variety of multidisciplinary and multinational healthcare providers.

Methods

A mixed-methods survey design was selected for the purpose of this study. In keeping with mixed methods sampling practices, purposive sampling was utilized to select study participants for the survey. The aim of this project was to evaluate the impact of the Thrive platform on the work conducted by healthcare workers in Guatemala. Thus, only the healthcare providers involved in the January 2022 rural clinic were invited to participate in the study. The team consisted of six healthcare providers/support staff, including two Guatemalan health promoters, two Canadian physicians and two PFS administrative staff.

To ascertain the health providers' views on the use, quality, and user satisfaction of the 'Thrive' platform during the pre-surgical screening clinics, an anonymous selfadministered questionnaire was developed (Appendix B). This questionnaire included 16 closed-ended questions using a Likert-type scale and 1 open-ended question. Responses were assigned a value of 1-5 (strongly disagree to strongly agree) for each item. The questionnaire was designed using validated questions established by Otieno et al. to assess nurses' views on the use, quality and user satisfaction with electronic medical records.²⁰ Otieno et al.'s questions were used as a guide to create the survey, but guestions were altered to fit the context of this project. For example, guestions referring to the use of the EMR as a resource tool to support nursing practice were omitted as the 'Thrive' platform was not designed for this purpose. The length of the survey was reduced from 45 questions to 17. This was done intentionally as the survey was distributed to a variety of healthcare professionals, with varying levels of education and training. The questionnaire was developed and written in English and translated to Spanish, with both languages included in the one survey. The survey was electronically distributed to the study cohort using the survey tool platform 'Qualtrics'. The University of British Columbia (UBC) survey tool was chosen because it is endorsed by UBC, free and easy to use, and complies with FIPPA. Data analysis was conducted by abstracting data from Qualtrics and screened for any missing data and outliners. A research manager from St. Paul's Hospital, Ms. Nicola Edwards, assisted in data collection and survey response analysis.

Inclusion and Exclusion Criteria

Study inclusion involved six healthcare providers who were involved in the PFS mobile medical clinics from January 23-29, 2022. Healthcare providers that were involved in the rural mission but did not use the Thrive platform were excluded from the study. As well, team members from 'Thrive Health' and 'TBE' who were involved in the project but did not participate in the screening clinics were also excluded. This was because the purpose of the project was to obtain feedback about the performance and level of platform satisfaction by users during in-person clinic sessions. Lastly, all patients were excluded from this study due to logistical and ethical considerations. However, the inclusion of patients may be considered in future research to obtain unique insights from the perspective of the patient.

Ethics

In September 2021, a Human Ethics application titled "Improving perioperative care with informatics: Evaluation of a novel web-based application (Thrive Health) in rural Guatemala" was submitted to the UBC Research Ethics Board (REB) by Principle Investigator, Dr. Emilie Joos. This project (#H21-02265) was deemed a quality improvement study by REB and as such, did not require ethics approval in Canada or Guatemala.

Limitations

This study has several limitations. The survey developed for this project was formatted using Otieno et al.'s questionnaire designed to assess 'nurses' views on the use, quality, and user satisfaction with electronic medical records. This instrument was chosen because the tool has been shown to have positive validity and reliability when used to evaluate electronic medical records in hospitals. Although in the future, nurses will be primary users of the platform, nurses were not available to participate in the initial platform trial. Instead, CHWs, physicians and administrative staff with PFS participated in the trial and study. Likewise, the Thrive platform is not a traditionally designed EMR, and the setting was in a community clinic, rather than a hospital. However, despite these differences, Otieno et al.'s tool seemed to be an appropriate survey tool available to use for this project. Because not all the components of Otieno et al.'s survey applied to the project in Guatemala, many questions were changed or omitted. As such, the validity of the tool is likely impacted, and certain biases may exist as the result of altering the original survey to fit the context in Guatemala. Finally, the original plan was to conduct direct observation and in-depth interviews in the field, while participating in the launch of the 'Thrive' platform. Unfortunately, due to travel restrictions, the project had to pivot from inperson to remotely administered research techniques. Although pertinent information was gathered using the survey, a deeper understanding of user satisfaction and project impact may have been obtained in person rather than by remote assessment.

Results

A total of six end-users of the 'Thrive' platform responded to the survey for a response rate of 100% (6/6). Each respondent answered all 16 of the Likert-scale questions and five out of six answered the final open-ended descriptive question. All responses were included in the analysis, and none were excluded. The graph below shows the responses to the survey questions (Figure 1). For more detailed survey replies, refer to Appendix C.

Useability

Four questions in the survey were related to platform useability and responses to this category were generally positive. Sixty-six percent (4/6) of respondents agreed that the platform is presented in a useful format, sixteen percent (1/6) strongly agreed and sixteen percent (1/6) neither agreed/disagreed. Half of the respondents (3/6) found the platform to be user-friendly, while thirty-three percent (2/6) neither agreed/disagreed and sixteen percent (1/6) strongly agreed. Likewise, fifty percent (3/6) reported that information retrieved from the platform is obtained in sufficient time and is easy to access and available when needed. There were no negative responses of disagree or strongly disagree to questions related to the useability of the platform. However, several suggestions related to aspects of useability were provided in the open-ended question.

Quality

Generally, responses to the five questions of platform quality were also positive, but there was greater variance among responses in this category. Two questions in the survey were negatively worded where a response of "disagree" or "strongly disagree" correlated to a positive response. In response to the question "the platform is subject to frequent system problems and crashes", thirty-three percent (2/6) disagreed, and thirty-three percent strongly disagreed, while sixteen percent (1/6) respectively neither agreed/disagreed and agreed. Fifty percent (3/6) of users found the input of patient information to be efficient, and no responses were negative in terms of efficiency. Likewise, using the platform to upload photos and chart using the body diagram were positive, with zero responses disagreeing or strongly disagreeing to these questions.

Sixty-six percent (4/6) agreed that uploading photos is easy to do, and sixty-six percent (4/6) strongly agreed that the body diagram is simple to use. The second negatively worded question "the platform is missing important data collection fields" elicited the greatest variation of responses where thirty-three percent (2/6) respectively disagreed and neither agreed/disagreed, and sixteen percent (1/6) respectively agreed and strongly agreed. The two questions that sought a negative response for a positive answer had the most diverse responses in the survey. This variance may speak more to the wording of the question or understanding of the question by the respondent, rather than to the intended response.

Satisfaction

Overall, responses to the seven questions related to user satisfaction ranked most positive in the survey. Zero responses of disagree or strongly disagree were recorded for all user satisfaction questions. Fifty percent (3/6) of users agreed that the platform is useful, while the other fifty percent strongly agreed. Fifty percent (3/6) of users strongly agreed that the platform is worth the time and effort required to use it, while thirty-three percent (2/6) agreed, and sixteen percent (1/6) neither agreed/disagreed. Similarly, the same percentages were reported by respondents when asked if they felt the platform has been successful in the clinic. The most positive response regarding user satisfaction is the majority of users (4/6) strongly agree the platform is an important tool for the clinic. Conversely, sixty-six percent (4/6) neither agreed/disagreed that patient safety has been improved as the result of the platform. One of the main goals of the platform was to improve the continuity of patient care between all healthcare providers during each phase of the surgical care pathway. Based on survey responses, all users agreed (3/6) or strongly agreed (3/6) that continuity of patient care will be improved with the platform. Lastly, the majority of users (4/6) agreed to feeling satisfied with the platform overall, while one respondent was indifferent and neither agreed/disagreed, and one respondent strongly agreed.

Descriptive Responses

To capture any additional feedback not obtained in the guestionnaire, one openended question requesting additional thoughts or feedback was included at the end of the survey. Five out of six respondents provided a descriptive response to this question. The general theme of the responses were technical suggestions for improving the flow and efficiency of data entry into the platform. For example, one respondent requested a larger box to free type the patient's medical history and minor changes to the COVID immunization field were suggested. As well, one respondent wanted "fewer clicks" and certain information condensed to one page rather than multiple ones. An issue that was identified early in the trial was difficulty uploading multiple photos onto the platform using the tablet camera. This problem was addressed on the first clinic day by 'Thrive' who recommended reducing the number of pixels in the photograph. Although the team reported this action solved the issue, one survey comment expressed the need to upload more than one photo onto the platform. As such, further investigation into the photo settings on all tablets is required to ensure this issue is resolved. Other technical suggestions included adding a birthdate to the schedule page and to relabel certain sections of the intake questionnaire to a more standard format. Although sixty-six percent of users strongly agreed the body diagram is simple to use (and one person agreed and one person neither agreed/disagreed), one respondent described that it is "hard to be precise marking body diagram...frequently have to erase and remark". Overall, the comments were generally positive with several responses describing the platform as "an amazing tool" and one that "worked better than we expected". Although several respondents agreed the platform will be a great addition to patient care in Guatemala, the platform "needs some tweaking" to best optimize its functionality.





Discussion

The successful implementation of any new health information system depends on the acceptance of the system by the direct user.²¹ Therefore, understanding healthcare professionals' attitudes toward the use of these systems is important to ensure successful project implementation. The term "usability" is most used to describe the design of electronic medical systems in the information science field.²² Poor usability will likely result in poor acceptance, inaccurate data collection, ineffective implementation, and adoption/evaluation of future health systems.²¹ The successful adoption of any new electronic health system requires the active participation and involvement of medical professionals who would regularly use the technology. However, many mHealth projects fail due to the lack of pre-implementation preparation and understanding of medical professionals' attitudes toward the use of such platforms in practice.²³ As such, the main purpose of this research project was to obtain feedback from the end-users on the usability, quality, and level of satisfaction with the platform during actual patient care evaluations.

Although a small number of healthcare providers were involved in implementation of the 'Thrive' platform in Guatemala, valuable information was gathered using the described survey tool. It is notable that all individuals involved in the platform trial participated in the follow-up survey with a 100% response rate. This is important to note as research demonstrates that involvement of end-users during project implementation and evaluation of new systems can positively impact the acceptance and integration of novel mHealth systems.²⁴ As well, the high response rate may reflect the time and energy committed to the project by end-users, as several people had been involved in program development from the start. Overall, the platform tested positively and generally ranked high responses in the three categories of usability, quality, and user satisfaction. However, as expected, certain aspects of the platform were identified during the trial and follow-up survey that require fine-tuning. The survey provided insight into the user impressions of the platform, as well as offered concrete suggestions for how to optimize the tool for future use. A trip debriefing was conducted for development team members and the end-users to discuss trip outcomes and survey findings, as well to plan the next phase of platform expansion. Studies show that the ongoing evaluation of mHealth initiatives is likely to be more impactful to end-users over the long term.²⁵ As such, recommendations include the continued engagement of all stakeholders in platform development, and regular evaluation of the project across all phases of development and implementation.

Conclusion

Continuity of care for the surgical patient remains a challenge for nongovernmental organizations working to provide surgical care in LMICs. The inability of physicians to review the medical history of surgical candidates prior to travel causes inefficiencies, wastes resources, and can impact patient care. Postoperative follow-up is similarly affected and can result in difficulties gathering outcome data and optimizing subsequent involvement. In response, a mHealth tool was collaboratively developed by 'Thrive Health', 'PFS' and members of 'TBE'. The aim of the multilingual application is to ultimately improve perioperative care and increase efficiency and health outcomes for patients treated by PFS. A survey project was conducted following a rural medical trip in northern Guatemala to assess the utility and impact of the new platform. Overall, survey findings were positive and support the adoption of the new mHealth technology by the various end-users. Future plans include expansion of the platform to include all phases of the surgical care pathway to promote quality surgical care for the Indigenous populations of Guatemala. Based on project findings, the continued involvement and evaluation of end-users during all aspects of platform expansion and implementation are recommended. Outcomes of the new 'Thrive' platform in Guatemala have the potential for far-reaching impacts on patient care, with future possibilities to expand this technology to other global surgery initiatives.

References

1. World Health Organization. Surgical care systems strengthening: developing national surgical, obstetric and anaesthesia plans. 2017.

2. Meara JG, Leather AJM, Hagander L, et al. Global Surgery 2030: Evidence and solutions for achieving health, welfare, and economic development. *Surgery*. 2015;158(1):3. <u>https://www.ncbi.nlm.nih.gov/pubmed/25987187</u>.

3. Alkire BC, MD, Raykar NP, Dr, Shrime MG, MD, et al. Global access to surgical care: a modelling study. *The Lancet global health.* 2015;3(6):e316-e323.

4. Meara, John G., MD,DMD, MBA, Greenberg, Sarah L.M.,MD, MPH. The Lancet Commission on Global Surgery Global surgery 2030: Evidence and solutions for achieving health, welfare and economic development. *Surgery*. 2015;157(5):834-835.

5. Hall CS, Fottrell E, Wilkinson S, Byass P. Assessing the impact of mHealth interventions in low- and middle-income countries--what has been shown to work? *Glob Health Action.* 2014;7:25606. doi:10.3402/gha.v7.25606.

6. De La Cruz Monroy, Martha F. I., Mosahebi A. The Use of Smartphone Applications (Apps) for Enhancing Communication With Surgical Patients: A Systematic Review of the Literature. *Surgical Innovation.* 2019;26(2):244-259.

7. World Health Organization. Frequently asked questions on Global Task Force on digital health for TB and its work. *World Health Organization Tuberculosis (TB).World Health Organization.* 2017.

8. Bergström A, Fottrell E, Hopkins H, Lloyd D, Stevenson O, Willats P. mHealth: can mobile technology improve health in low-and middle-income countries. *UCL public policy briefing.* 2015.

9. Mahmud N, Rodriguez J, Nesbit J. A text message-based intervention to bridge the healthcare communication gap in the rural developing world. *Technology and Health Care.* 2010;18(2):137-144.

10. Agarwal S, Perry HB, Long L, Labrique AB. Evidence on feasibility and effective use of mHealth strategies by frontline health workers in developing countries: systematic review. *Tropical medicine & international health.* 2015;20(8):1003-1014.

11. The World Bank. The World Bank in Guatemala Overview. October 06, 2021. Accessed November 12, 2021.

https://www.worldbank.org/en/country/guatemala/overview.

12. Matute J, Lydick EA, Torres OR, Owen KK, Jacobsen KH. Prevalence of Cleft Lip and Cleft Palate in Rural North-Central Guatemala. *The Cleft Palate-Craniofacial Journal*. 2015;52(3):377-380. doi:10.1597/13-347.

13. Jacobsen KH, Bankoski AJ. Predictors of compliance with scheduled surgery in rural Guatemala. *International Health.* 2010;2(3):206-211. doi:10.1016/j.inhe.2010.07.007.

14. Nguyen K, Bhattacharya SD, Maloney MJ, et al. Self-reported barriers to pediatric surgical care in Guatemala. *Am Surg.* 2013;79(9):885-888.

15. Broecker J, Liu W, Rappaport J, et al. Long-term follow-up is possible for short-term surgical trips. *Global Surgery.* 2017;3. doi:10.15761/GOS.1000170.

16. Sykes KJ. Short term medical service trips: a systematic review of the evidence. *American journal of public health (1971).* 2014;104(7):e38-e48. doi:10.2105/AJPH.2014.301983.

17. Luan A, Mghase AE, Meyers N, Chang J. Are we curing by cutting? A call for longterm follow up and outcomes research in global surgery interventions - perspective. *International Journal of Surgery.* 2021;87:105885.

doi:<u>https://doi.org/10.1016/j.ijsu.2021.01.011</u>.

18. Bae JY, Groen RS, Kushner AL. Surgery as a public health intervention: common misconceptions versus the truth. *Bull World Health Organ.* 2011;89(6):394.

19. Eyob B, Boeck MA, FaSiOen P, Cawich S, Kluger MD. Ensuring safe surgical care across resource settings via surgical outcomes data & quality improvement initiatives. *International Journal of Surgery.* 2019;72:27-32. doi:10.1016/j.ijsu.2019.07.036.

20. Otieno OG, Toyama H, Asonuma M, Kanai-Pak M, Naitoh K. Nurses' views on the use, quality and user satisfaction with electronic medical records: questionnaire development. *Journal of Advanced Nursing.* 2007;60(2):209-219. doi:10.1111/j.1365-2648.2007.04384.x.

21. Mijin N, Jang H, Choi B, Khongorzul G. Attitude toward the use of electronic medical record systems: Exploring moderating effects of self-image. *Information development*. 2019;35(1):67-79.

22. Ratwani RM, Fairbanks RJ, Hettinger AZ, Benda NC. Electronic health record usability: analysis of the user-centered design processes of eleven electronic health record vendors. *Journal of the American Medical Informatics Association : JAMIA.* 2015;22(6):1179-1182.

23. Biruk S, Yilma T, Andualem M, Tilahun B. Health Professionals' readiness to implement electronic medical record system at three hospitals in Ethiopia: a cross sectional study. *BMC medical informatics and decision making*. 2014;14(1):115.

24. D'Costa S, Sinha RK. Usability Assessment of Hospital Information System Integrated Electronic Medical Record. *Online journal of health & allied sciences : OJHAS*. 2018;17(3).

25. Bossen C, Jensen LG, Udsen FW. Evaluation of a comprehensive EHR based on the DeLone and McLean model for IS success: Approach, results, and success factors. *International journal of medical informatics (Shannon, Ireland).* 2013;82(10):940-953.

Appendix A: Surgery Triage Evaluation Form on Thrive Platform (English - Abbreviated Version)

Site Information		
Triage Site Required		
Date Required	2021/12/15	Ċ
Translator/Nurse/Promotor Required		
		Next >
General Information		
Name and Surname Required	Legal first name(s) 😮	
	Last name 😧	
	Legal middle name	
Age Required		
Date of Birth Required	YYYY/MM/DD	
Address (Municipality, Village) Required		li li
dentification Card Number Required		
Phone Number Required	•••	Mobile -
How do you get to your house? Required		<i>b</i>
Name of person in charge Required		

Identification card number of the person in charge Required	
Language Spoken Required	
Promotor Required	

Medical History

Allergies Required	
Family Required	
Surgeon Required	
Medical History	Cleft Lip
	Cleft Palate
	Burns (Electric Shock) Durns (Electric Shock)
	Burns (Fire)
	Polydactylia (Foot)
	 Polydactylia (Hand)
	Sindactilia (Foot)
	Sindactilia (Hand)
	□ Fibromas
	□ Cyst
	Uterine Prolapse
	Rectocele
	Cystocele
	Gallbladder stones
Hypertension Required	O No O Yes
Diabetes Required	O No O Yes

COPD Required	O No O Yes
Obstetric History (G/P/AB/C) Required	
Date of Last Menstrual Period Required	YYYY/MM/DD
Menarche Required	years
Last PAP smear Required	
Contraceptives Required	O No O Yes
HIV Required	O No O Yes
STD Required	O No O Yes
Smoke Required	O No O Yes
Alcohol Required	O No O Yes
Trauma Required	
Important Medical Notes	

< Back

Next >

Medications

Drugs Required	This field is required		
Important Medical Notes Required	This field is required		
< Back	Next >		

Physical Exam

BP Required	Top Pressure (systolic)	Bottom Pressure (diastolic)
	e.g. 120	e.g. 80
HR Required		BPM
RR Required		BPM
Temp Required	celsius °C	×
SpO2 Required		%
Height Required	feet incl	hes ft/in →
Weight Required	pounds Ibs	•
< Back		Next >

Body Diagram

Mark where the issue is



< Back

Next >

Appendix B: Qualtrics User Satisfaction Survey

	Strongly disagree/ Muy en desacuerdo	Disagree/ En desacuerdo	Neither agree nor disagree/ Ni de acuerdo ni en desacuerdo	Agree/ De acuerdo	Strongly agree/ Muy de acuerdo
The platform is presented in a useful format/ La plataforma es presentada en un formato útil.	0	0	0	0	0
The platform is user-friendly/ La plataforma es fácil de usar.	0	0	0	0	0
Information retrieved from the platform is obtained in sufficient time/ La información recibida de la plataforma se obtiene en tiempo y forma.	0	0	0	0	0
The platform is easy to access and available when needed/ La plataform as de faicil acceso y está disponible cuando se necesita.	0	0	0	0	0
The platform is subject to frequent system problems and crashes' La plataforma está sujeta a frecuentes problemas y bloqueos del sistema.	0	0	0	0	0
The input of patient information is efficient/ La información proporcionada por el paciente es eficiente.	0	0	0	0	0
Uploading photos is easy to do/ Es fácil subir fotos.	0	0	0	0	0
Using the body diagram is simple to use/ Es fácil usar el diagrama del cuerpo.	0	0	0	0	0
The platform is missing important data collection fields/ A la plataforma le hacen faltan campos importantes sobre la colección de datos.	0	0	0	0	0
I feel the platform is useful/ Siento que la plataforma es útil.	0	0	0	0	0
I feel the platform is worth the time and effort required to use it/ Siento que la plataforma vale la pena el tiempo y el esfuerzo para usarla.	0	0	0	0	0
I feel the platform has been successful in the clinic/ Siento que la plataforma ha tenido éxito en la clinica.	0	0	0	0	0
I feel the platform is an important tool for the clinic/ Siento que la plataforma es una horramienta importante para la clinica.	0	0	0	0	0
I feel the safety of patients has improved due to the platform/ Siento que la seguridad de los pacientes ha mejorado debido al uso de la plataforma.	0	0	0	0	0
I feel the continuity of patient care (pre-surgical screening, surgery improved web the plate to the more screen and the plate to the screen que la continuidad de la atención al paciente (evaluaciones pre- quirórpicas, cirugías y seguimiento del alta) mejorará con la plataforma.	0	0	0	0	0
Overall, I am satisfied with the platform/ En general, estoy satisfecho (a) con la plataforma.	0	0	0	0	0

Please provide any additional thoughts or feedback below/ Por favor, a continuación

proporcione sugerencias o comentarios adicionales:



Appendix C: User Survey Responses

Question	Stronaly	Disagree	Neither agree	Aaree	Strongly
	disagree	J	or disagree	5	agree
The platform is	0.00%	0.00%	16.66%	66.66%	16.66%
presented in a	0	0	1	4	1
useful format					
The platform is	0.00%	0.00%	33.33%	50.00%	16.66%
user-friendly	0	0	2	3	1
Information	0.00%	0.00%	16.66%	50.00%	33.33%
retreived from the	0	0	1	3	2
platform is					
obtained in					
The plotform is	0.00%	0.00%	16 66%	50.00%	22.220/
	0.00%	0.00%	10.00%	30.00%	33.33%
and available	0	0	1	5	2
when needed					
The platform is	33 33%	33 33%	16 66%	16 66%	0.00%
subject to frequent	2	2	1	1	0
system problems					-
and crashes					
The input of	0.00%	0.00%	16.66%	50.00%	16.66%
patient information	0	0	1	3	1
is efficient					
Uploading photos	0.00%	0.00%	16.66%	66.66%	16.66%
is easy to do	0	0	1	4	1
Using the body	0.00%	0.00%	16.66%	16.66%	66.66%
diagram is simple	0	0	1	1	4
The platform is	0.00%	33 330/	22.220/	16 66%	16 66%
missing important	0.00 /0	2	2	10.00 //	10.00 %
data collection	0	2	2	I	
fields					
I feel the platform	0.00%	0.00%	0.00%	50.00%	50%
is useful	0	0	0	3	3
I feel the platform	0.00%	0.00%	16.66%	33.33%	50.00%
is worth the time	0	0	1	2	3
and effort required					
to use it	0.000/	0.000/	40.000/	00.000/	50 000/
I feel the platform	0.00%	0.00%	16.66%	33.33%	50.00%
has been	0	0	1	2	3
clinic					
I feel the platform	0.00%	0.00%	0.00%	33 33%	66 66%
is an important	0.00%	0.00 /0	0.0070	2	4
tool for the clinic	Ŭ	Ŭ	ů	-	
I feel the safety of	0.00%	0.00%	66.66%	0.00%	33.33%
patients has	0	0	4	0	2
improved due to					
the platform					
I feel the continuity	0.00%	0.00%	0.00%	50.00%	50.00%
of patient care will	0	0	0	3	3
be improved with					
the platform	0.000/	0.000/	40.000/	00.000	40.000
Overall, I am	0.00%	0.00%	16.66%	66.66%	16.66%
saustied with the	U	U	1	4	
plation					