OPENING HEALTH CARE CLINICS IN THE DEVELOPING WORLD

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ABSTRACT

Opening a new health care clinic in the developing world is challenging. Existing research has explored strategies and new technologies for improving health care in low- to-middle income countries, but the operational steps needed to create sustainable clinics are difficult to find. Our study explains those steps, explores the actions necessary to plant successful clinics in the developing world and confirms the success with a patient satisfaction survey. We describe one university – health care provider partnership in establishing new clinics.

Key Words: global health, opinion leadership, supply-chain, sustainability, patient satisfaction

INTRODUCTION

The developing world's inhabitants need more and better healthcare services to lead socially and economically productive lives (Bale, 2008). Everything from treatment for communicable diseases, to medicines, vaccines, and technology, is in short supply (WHO, 2018). Approximately 1.3 billion people have little or no access to health care. Low-to-medium income countries have 93% of the world´s diseases, but just 18% of world income and 11% of healthcare spending worldwide (Bale, 2008).

Research into opening clinics in low- to-medium income countries has focused on high-level vision and strategies, or on low-level implementation details. The operations work needed to start a new clinic is missing or fragmented. In addition, we know of no descriptions of collaboration between universities and healthcare organizations exploring best practices in planting clinics. Our research describes one university – health care relationship, the operational aspects of successfully starting new clinics (Baker & Orton, 2010), and patient satisfaction regarding those clinics.

The proportion of university students participating in study-abroad programs has increased significantly since the 1990s (Lewin, 2009). Some of those programs focus on health care, where the students are observers (Fennell, 2009). However, students from the University of South Dakota (USD) actively gather research data. That data makes partnering with health systems both possible and desirable. Sanford Health and USD have worked together to discover how to improve health care in Ghana. USD faculty oversee the research, provide expert analysis and explanations to Sanford's decision-makers. USD regularly offers faculty-led programs where graduate and undergraduate students travel abroad, gather data to provide market feedback. Sanford World Clinics has used that knowledge to build treatment centers. Also, USD has performed studies of health care cost, access, and quality in Ghana. Those studies provide essential information for Sanford Health to meet the needs of the communities they serve.

RELEVANT LITERATURE

Research on meeting the needs of the developing world has focused on high-level vision and strategies, or on low-level implementation details, to deliver better healthcare. Strategies include introductory resources for: expanding primary care (Mossman, Bhattacharyya, McGahan, & Mitchell, 2017), building a hospital (Nah & Osifo-Dawodu, Establishing Private Health Care Facilities in Developing Countries, 2007), starting international clinics (Collins, 2014), quality assurance (Hurst, 2012) (O'Rourke, Jeugmans, Sonin, Dashzeveg, & Batsuury, 2001), family planning (K4Health, 2018), in-country research (Csaszar & Lal, 2004), and finance (OPIC, 2013). Low-level descriptions include technological and practical advances, such as medical imaging (Kramer, 2018), medical clinics in a shipping container (Meinhold, 2009), and solar-powered medical lighting (Aronson & Stachel, 2018).

Existing research in patient satisfaction covers many aspects of health service delivery. For example, ambulatory health care services (Dansky & Miles, 1997), family doctors (Marcinowicz, Chlabicz, & Grebowski, 2009), medical imaging departments (DiGiacinto, Gildon, Keenan, & Patton, 2016), faculty practice (McNiel, Mackey, & Sherwood, 2004), and nurse practitioner managed clinics (Cole, Mackey, & Lindenberg, 2001), have all described one or more facet of satisfaction with health delivery. The motivation for surveys is to improve services. However, surveys also provide a metric for the likelihood of repeated patient use. We measured patient sentiment with a survey instrument administered by students in a study-abroad course to find out whether patients planned to continue to use the clinic. We shared our results with Sanford Health, the clinic operator.

Challenges

Several barriers make opening new clinics in the developing world difficult. Infrastructure is often inadequate or missing. Suitable facilities must be rented or constructed; resources are difficult to procure, transport, secure and distribute. Cultural understanding can be too weak to support effective collaboration (South-Winter, Dai, & Porter, 2015). Gauging success is taxing and can miss the mark. Failure to create a sustainable clinic may do more harm than good (Kargbo, 2017).

Research-based Recommendations

Research shows that though there are challenges, some can be mitigated, and others avoided, by following a few simple steps. First, the benefits of primary care (Starfield, Shi, & Macinko, 2005) mean that the greatest return on investment will occur at a location where basic health services are not met (Mossman, Bhattacharyya, McGahan, & Mitchell, 2017). Second, work with an indigenous liaison familiar with the local culture and government (South-Winter, Dai, & Porter, 2015). Third, gain the support of government officials and opinion leaders (South-Winter, Dai, & Porter, 2015). Fourth, hire and train residents to staff the clinic (Hongoro & Normand, 2006). Fifth, establish the complete supply chain before opening the clinic (Ivanov, 2010). Sixth, use management controls to keep operating costs low (Wild, 2017). Seventh, use telemedicine where possible (Wootton, 2001). Eight, focus on quality to ensure patient satisfaction (Peabody, Taguiwalo, Robalino, & Frenk, 2006). There are introductions on to how to begin (Collins, 2014), but caution must be exercised to ensure long-term sustainability (Kargbo, 2017).

EXPERIENCE IN OPENING CLINICS

In 2011, Sanford Health Systems announced that it would fund construction and operation of a ten-clinic network in Ghana to be complete in three years. In January 2012, Sanford opened its first clinic in Cape Coast, Ghana. The Cape Coast clinic sees over 900 patients per week. By May 2014, Sanford World Clinics had four clinics providing general health care services (e.g., treatment for malaria, diarrhea, and respiratory issues). In July 2014, Sanford Health announced they would build 300 clinics in Ghana over a six-year period. The Ghana clinics will be a linked telehealth network and be able to reach rural areas with modern care for the first time. Investors include the government of Ghana, with locals serving as medical staff. The mission, vision, and values are a part of the organically-grown staff in the clinics where research is conducted. Sanford plans to invest $30 million over ten years; each clinic is expected to break even within two years.

Location should be selected based on demographics, resource availability, security, government stability, and support. However, the most important criterion is to find a location where the unmet medical needs of the community can be met with basic health services. Regional facilities are best equipped to treat complex conditions. For Sanford Health, with its focus on children's health, basic services fit their mission well. Sanford Health has used those factors to open clinics in Ghana. Sanford knew some factors beforehand and discovered others during the construction and operation process. Training can best ensure cultural understanding and hiring indigenous professionals. Ideally, indigenous personnel will have spent significant time within your organization, as close as possible to where you make initiative-related decisions. That experience bridges both worlds in ways that are difficult to match with other arrangements. Sanford Health partnered with Kojo Benjamin Taylor to facilitate their interactions with Ghanaians. Skilled managers are needed at each stage from clinic construction to clinic operation. American members of Sanford Health's new-clinic team play an important role, but to be sustainable, Ghanaians are integral to staff and manage the clinics. Training medical personnel takes time, and developing countries are unlikely to have personnel possessing the required skills without being trained by the sponsor. Plan to train the staff both in skills and mission.

Cultural sensitivity necessitates the successful recruitment of local formal and informal opinion leaders (South-Winter, Dai, & Porter, 2015). Without the support of opinion leaders, the new clinic will be unused. Kojo Benjamin Taylor is an essential conduit for accurate information transfer between Ghanaians and Sanford Health's new-clinic team. Sanford Health's global focus is on children's health, and in Ghana, mothers are the principal players in children's health. Providers must reach mothers first to reach the children.

Even successful completion of the tasks above can be insufficient. Patients must come to the clinic. Early results for Sanford Health showed that a clinic's presence, without the support of opinion leaders, was an empty clinic. However, once Sanford gained opinion leader support, patients came. The next step is to ensure that patients have a satisfactory experience.

Survey

We evaluated satisfaction with a survey of Ghanaian patients in three clinics using fifteen Likert items (see Table 1).

Table 1
Independent variable statistical significance and Spearman's ρ correlation coefficient

Clinic Features	Spearman's ρ	*p* -value
Waiting Area	0.135	0.128
Registry	0.076	0.393
Vitals	0.301	< 0.001
Consulting Rooms	0.157	0.076
Treatment Room	0.060	0.499
Pharmacy	0.111	0.211
Laboratory	0.179	0.043
Ante-Natal	0.042	0.636

Clinic Characteristics	Spearman's ρ	*p* -value
Value for Price	-0.001	0.990
Quality	0.505	< 0.001
Usage Experience	0.266	0.002
Ability to Meet Needs	0.212	0.016
Design and Appearance	0.295	< 0.001
Overall Satisfaction	0.313	< 0.001

We chose those items to record patient perceptions of their experience with the clinic, and to identify the important factors in patients' decisions to use the clinic. We also wanted to predict which patients were likely to return. We used Spearman's Rank Correlation Coefficient (Spearman's ρ (rho)) (Spearman, 1904) to identify the independent variable or variables most likely to predict patient satisfaction. We chose ρ because we measured a monotone ordinal association between each independent variable and the response "Will you use any of the services at this facility in the future?" The close correspondence between ρ and the Pearson Product-Moment Correlation Coefficient also make ρ attractive (Hauke & Kossowski, 2011). Values closer to 1 indicate a positive or direct relationship between independent variable rank and response rank. Conversely, values closer to -1 are indicative of a negative or inverse relationship. ρ is a nonparametric measure that does not make normality, linearity or interval-scale assumptions about the data.

To strengthen the results, we divided patients into two groups. The first group included only those who answered the question "Will you use any of the services at this facility in the future?" with "Definitely." The second group comprised those who answered "Probably" or "Probably Not" or "Definitely Not" or "Not Sure."

The survey's null hypothesis was that half or fewer of clinic patients definitely will use the clinic again. The alternative hypothesis was that more than half definitely will use the clinic again. We chose a one-tailed sign test for a proportion, with effect size 0.15, confidence level 0.95, and power 0.9. Based on an apriori analysis, our sample size required at least $N = 93$; it was $N = 128$. Given the number of students administering the questionnaire and the number of translators

available, we estimated that students could complete approximately one hundred interviews during the time the students had for interviews.

The sample comprised 128 subjects, and 2,560 sample points, with 202 missing. We imputed values for the missing data using observation similarity, breaking ties by randomly choosing one of the candidate values. We used a two-step analysis. In the first step, we identified and verified the significance of the independent variable correlation. *Satisfaction with Quality of Service Provided* (Quality) had the greatest positive correlation, with $\rho = .51$, $p < .001$. The sample proportion estimate that clinic patients definitely will use the clinic again was 0.93, 95% CI [0.88, 0.97]; see Figure 1.

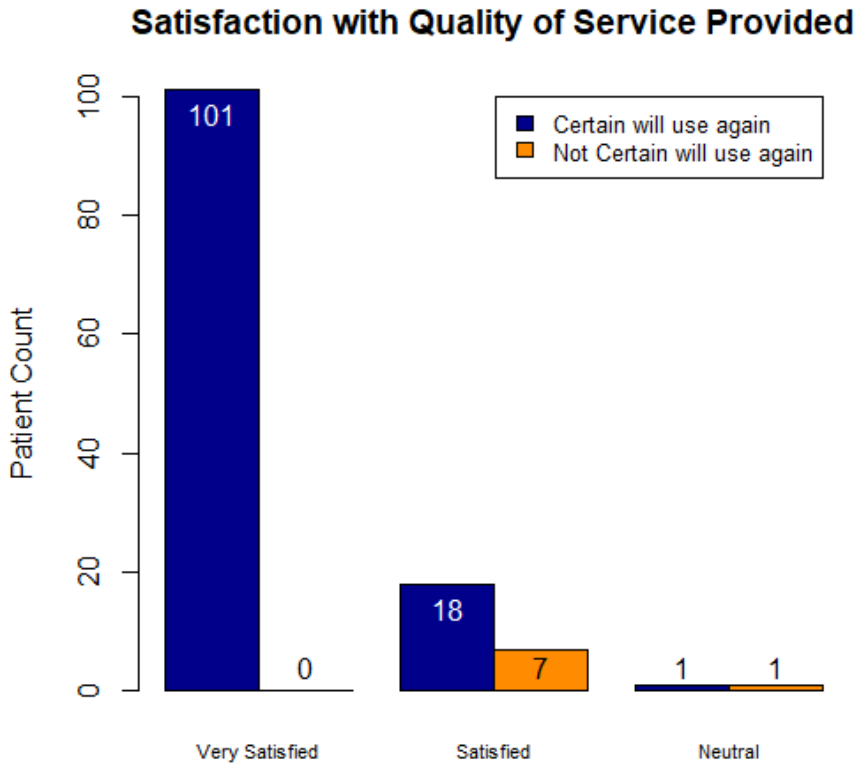

Figure 1

The second step used the first step's results to construct a predictive model using logistic regression (Cox, 1958). We compared the predictive model to a null hypothesis model to evaluate accuracy.

We constructed logistic regression models using a 70/30 training/validation split and 1,000 bootstrap iterations for each (Efron & Tibshirani, 1993). We used Forward Stepwise Selection (James, Witten, Hastie, & Tibshirani, 2013) beginning with each statistically significant independent variable (IV) (*Vitals, Laboratory, Quality, Usage Experience, Ability to Meet Needs, Design and Appearance, Overall Satisfaction*) and building until the models by adding one IV at a time. We choose the best model based on *Akaike's Information Criterion* (AIC) (Akaike, 1974). Quality had the lowest AIC of all the models.

We tested the Quality model by comparing it to a model based on the survey's null hypothesis. We created an evenly balanced response by replicating the eight "Not Definite"

observations fourteen times for a total of 120. Using 120 "Definite" responses and 120 The null model used an evenly balanced response, and randomized predictor data for each observation. See Table 2.

Table 2
Patient Use Expectations

	Actual			
	Quality		Null	
Predicted	Not Definite	Definite	Not Definite	Definite
Not Definite	0.01	0.04	0.35	0.14
Definite	0.01	0.94	0.15	0.36

Quality is 95% accurate, while the null model is 71% accurate. The results demonstrate that Quality is a good predictor of patient intent to continue to use clinic services. Our results are consistent with other research conducted in the developing world. E.g., Hanefeld et al., Andaleeb, Haddad & Fournier, Reerink & Sauerborn all found that perceptions of quality drive health service utilization (Hanefeld, Powell-Jackson, & Balabanova, 2017) (Andaleeb, 2001) (Haddad & Fournier, 1995) (Reerink & Sauerborn, 1996). *Disease control priorities in developing countries* is a helpful description of quality improvement in developing countries (Peabody, Taguiwalo, Robalino, & Frenk, 2006).

DISCUSSION AND FUTURE RESEARCH

After initial setbacks in the first Sanford Health clinic, Sanford opened three clinics in Ghana using the research-based recommendation steps above. Hiring and training indigenous professionals ensured cultural understanding. Ideally, indigenous personnel will have spent significant time within your organization. That experience bridges both worlds in ways that are difficult to match with other arrangements. Sanford Health partnered with Kojo Benjamin Taylor, a native of Ghana, to facilitate Sanford's interactions with Ghanaians.

Cultural sensitivity is a requirement for the successful recruitment of local opinion leaders, both formal and informal (South-Winter, Dai, & Porter, 2015). Without the support of opinion leaders, the new clinic will be unused. Taylor was, and is, an essential conduit for accurate information transfer between Sanford Health and Ghanaians. In Ghanaian society, women have the primary responsibility for child care. If all other stakeholders endorse the clinic, and mothers have access to the clinic, so will children.

Logistics planning requires identifying how resources will be procured in a developing country, including the transportation and storage of everything from medicine and bandages to office supplies and light bulbs. Sanford uses local sourcing where possible, as long as it is not cost prohibitive, which builds local goodwill. Vendors must be scrutinized and chosen on a case-by-case basis. Careful supply chain management is essential, requiring managerial skill throughout the process.

Skilled managers are needed at each stage from clinic construction to clinic operation. American members of Sanford Health's new-clinic team played an important role, but to be sustainable, clinic staff and management has to be Ghanaian. Training medical personnel takes time, and developing countries are unlikely to have personnel possessing the required skills

without being trained by the sponsor. Plan to train the staff both in skills and mission. Without training, quality will suffer, resulting in clinic failure.

There are several technological advances that warrant further research. Perhaps the most attractive development is the potential of smartphones to improve healthcare outcomes (Kahn, Yang, & Kahn, 2010). Though telemedicine (Wootton, 2001) has existed for at least twenty years, its cost-effectiveness has been difficult to quantify (Håkansson & Gavelin, 2000). However, its efficacy in developing countries may be greater than in the developed world (Edworthy, 2001). For example, tele-electroencephalography (tele-EEG) has worked well when a resident clinical neurophysiologist is not available (Coates, Clarke, Davison, & Patterson, 2012) (Lasierra, et al., 2009). Monitoring the effectiveness of telemedicine can be included in the ongoing tasks of cost, access and quality assessments.

CONCLUSION

To open a successful clinic, find a location where basic medicine is unavailable. Create relationships with stakeholders from national government officials to informal community leaders. Staff the clinic with trained indigenous people. Recruit women, because as caregivers for children, they are the means through which children access health care services. Maximize your resources by leveraging the benefit-to-cost ratio through low-risk, high-return, health care services; leave complex or expensive treatments to regional centers. Partner with university study-abroad programs because they are a resource multiplier. Students benefit from this of type research and the industry partnership. It allows university students to develop a greater knowledge of global healthcare, cultural competencies, and the importance of opinion in healthcare. Focus on quality; it is the most important predictor of repeated use.

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