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A DESCRIPTIVE CASE STUDY ON PATIENT FLOW AT A MEDICAL CENTER IN A RESOURCE-
LIMITED SETTING

BY

Salman Moti

A doctoral project submitted to the faculty of the Medical University of South Carolina
in partial fulfillment of the requirements for the degree
Doctor of Health Administration
in the College of Health Professions

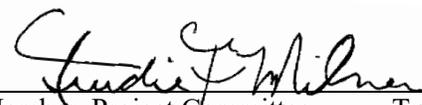
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A DESCRIPTIVE CASE STUDY ON PATIENT FLOW AT A
MEDICAL CENTER IN A RESOURCE-LIMITED SETTING

BY

Salman Moti

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Abstract of Dissertation Presented to the
Medical University of South Carolina
In Partial Fulfillment of the Requirements for the
Degree of Doctor of Health Administration

A DESCRIPTIVE CASE STUDY ON PATIENT FLOW AND DEPARTMENTAL WORKFLOWS AT
A MEDICAL CENTER IN A RESOURCE-LIMITED SETTING

by

Salman Moti

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ABSTRACT

Medical centers operating in resource-limited settings face unique challenges associated with a scarcity of resources, expertise, and infrastructure. While inefficiencies can be identified in any organization, they can be particularly problematic for health care facilities that seek to expand the scope of their operations in resource-limited areas as resources that are already in short supply are utilized to fuel non-value-added activities. In this descriptive case study of a newly built medical center in Khorog, Tajikistan, we consider a medical center's patient flow and the underlying systemic factors that contribute to the current state of affairs as well as interventions that could be employed to make more financial capital, human capital, and governmental support available to address the root causes of systemic challenges. In addition to exploring how countries like Tajikistan can thrive given decades of unrest, we explore how resource-limited areas can position themselves to capitalize on emerging trends in the global marketplace.

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CHAPTER 1 INTRODUCTION

1.1 Background and Need for Study

Tajikistan, a former Union of Soviet Socialist Republic (USSR) state, is a landlocked Central Asian country flanked by Russia, Kazakhstan, and Kyrgyzstan to the North, Afghanistan to the South, China to the East, and Uzbekistan to the West. For the better part of three decades, Tajikistan has been marked by unrest. In the early 1990s, pro-democracy protests transitioned into a conflict resulting in the country exiting the USSR and being granted independence. By 1992, internal conflict propelled Tajikistan into a civil war that lasted until 1997. As Tajikistan worked toward recovering from civil war and forming a stable government, its neighbor to the South, Afghanistan, became the target of international anti-terrorism efforts following the September 11th attacks on the United States (BBC News, 2018). These periods of instability have, among other things, left the country's health care system in dire need of support.

One area within Tajikistan that has been particularly hard hit by the lack of resources and support is the rugged and mountainous region known as Gorno-Badakhshan Autonomous Oblast (GBAO). In an assessment of the country's health care system undertaken by Tajikistan's Ministry of Health and the World Health Organization (WHO), physical access to health care facilities was generally regarded as being easy in GBAO. However, of the 16 facilities that had their physical condition assessed in the region, nine were found to be in poor condition or non-functioning. In fact, of all of the health care facilities noted as being in poor or non-functioning condition in all of Tajikistan, nearly 70% were located in GBAO. Of the 16 health care facilities in GBAO, only two were noted as functional (Tajikistan Ministry of Health and World Health Organization, 2008). In assessing the facility's level of functionality, the Tajikistan Ministry of Health and WHO studied, among other elements of the operation and infrastructure, the health care facility's physical condition, access to electricity, access to fuel, ability to produce central

heating, waste disposal, coal and wood stocks (as alternative fuels during emergencies and harsh winters), ability to maintain stocks of food, and the ability to maintain acceptable levels of essential drugs and other medical supplies.

The lack of resources extends far beyond poor infrastructure and buildings in non-functioning condition. Of the four regions that make up Tajikistan (Sughd, Districts of Republican Subordination, Khatlon, and GBAO), households in GBAO were found to be the least likely to have water and soap available for handwashing. Given that research has shown a link between socioeconomic factors, like household wealth, and handwashing practices (Seimetz et al., 2016), it is not surprising to learn 53.5% of GBAO households are grouped under the lowest wealth quartile within the country. Despite challenges such as these, GBAO leads the country in educational attainment. Of the four regions, GBAO's population is the most well educated across both sexes. Sixty-seven percent of men and 69% of women have completed at least a secondary education. Compared to the country's other regions, GBAO displays the highest primary and secondary school attendance across both sexes (Republic of Tajikistan, 2017).

Taking into account Tajikistan's health care infrastructure is lacking and economic resources are scarce, particularly in the GBAO region, non-governmental organizations (NGOs) are primed to have a meaningful and sustainable impact on the health of citizens living in the GBAO region. Aga Khan Health Services (AKHS), an agency under the Aga Khan Development Network (AKDN), is an NGO that established the Aga Khan Medical Centre, Khorog (the Medical Center) in December of 2018. Located in GBAO's capital city of Khorog, the medical center offers both inpatient and outpatient services to the local population. With the goal of expanding its operations from 48-beds to 250-beds in the next 3-years, the medical center would like to better understand its current patient flow and learn how it can improve before making additional investment in capital intensive growth projects. To that end, the primary objective of this study is to examine how patients flow through the medical center and to highlight the options

leadership has to advance positive change. More broadly, the goal of this study is to help health care facilities in resource-limited areas improve their operations and better serve the needs of the communities in which they exist. Resource limited settings or areas, as defined by the World Bank, are low-income economies where the gross national income (GNI) is \$1,025 or less per capita in 2018 USD (World Bank, 2019). As of 2018, the most recent year for which data are available, the World Bank notes Tajikistan's GNI per capita as \$1,010 USD. At this level, Tajikistan's classification as a low-income country places it in the company of mainly Sub-Saharan African countries with struggling economies. For comparison, based on GNI alone, Tajikistan, today, is where India was a decade ago (The World Bank, 2019). In 2008, India's GNP per capita was \$1,000 USD. At the time, India's lackluster performance with regard to its health care delivery systems was viewed to be a serious challenge hindering its pursuit of sustained economic growth (Canadian Medical Association, 2008). While India's reasons for improving health care services within the country differ from Tajikistan's motivations, the two countries share similar challenges associated with a shortage of available hospital beds, insufficient supply of health care professionals (Gupta, 2008), and the need for governmental policies aimed at supporting their health care delivery systems through investment in infrastructure.

1.2 Problem Statement

The medical center would like to expand its operations from operating 48-beds inpatient to 250-beds in the next 3-years. Before AKHS, the medical center's parent organization, invests in expansion, AKHS's leadership would like to learn how they can streamline existing operations in an effort to ensure they do not inadvertently scale their current problems along with their wider growth plans. As part of its due diligence, this step is critical to ensure the NGO remains a good steward of its limited capital and human resources. As noted in the 2016 review of the Tajik

health system conducted by the WHO, the count of hospital beds per 100,000 has steadily declined from a high of nearly 1,000 beds per 100,000 in 1992 to approaching an all-time low of 400 beds per 100,000 in 2013 (see Figure 1).

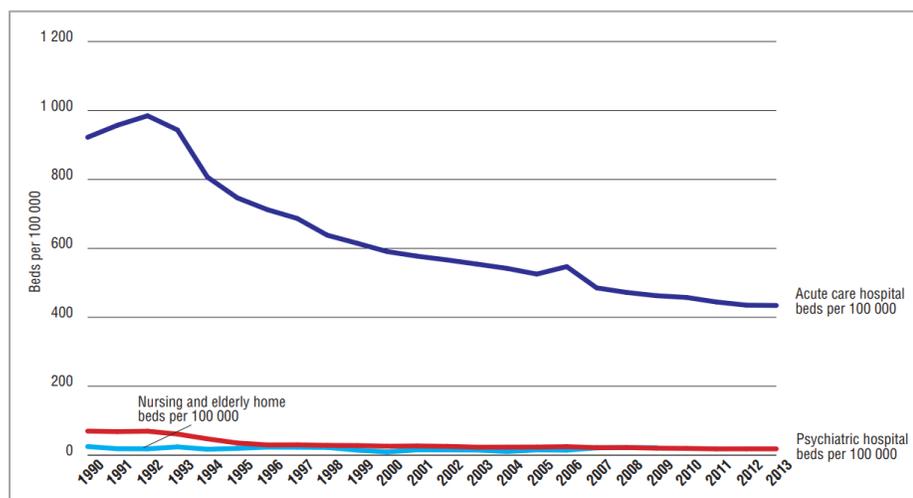


Figure 1: Number of beds per 100,000 population by type of institution in Tajikistan, 1990-2013 (World Health Organization Regional Office for Europe, 2015a)

In addition to a shortage of hospital beds, Tajikistan has also experienced a sharp decline in the availability of health workers. Between 1990 and 2005, the country lost nearly 40% of its physicians, 43% of its nurses, and 58% of its midwives (see Table 1). While these numbers have been trending up since 2005, they still remain far below where they were in 1990.

	1990	1995	2000	2005	2009	2010	2013
Physicians	255.1	213.6	167.0	157.1	162.5	168.9	169.9
Physicians working in hospitals (% total number)	n/a	n/a	73.4	66.2	62.0	n/a	n/a
General practitioners			1.5	6.1	26.6	21.1	27.6
Dentists	14.9	16.9	15.1	14.5	15.4	16.5	15.4
Pharmacists	11.8	7.8	11.0	n/a	n/a	n/a	n/a
Nurses	596.9	510.3	420.1	340.1	489.7	393.2	444.3
Midwives	128.7	84.6	62.8	54.3	51.8	53.2	53.5

Table 1: Health workers (physical persons) per 100,000 population, 1990-2013 (World Health Organization Regional Office for Europe, 2015b)

Compared to other countries that made up the former Soviet Union, between 1990 and 2011, Tajikistan consistently posted the fewest number of physicians per 100,000 population (see Figure 2). Marred by conflict, health care workers immigrated from former Soviet republics in search of more promising professional development opportunities and higher salaries. In other cases, workers who had previously worked in the health care sector, transitioned into another economic sector (Karanikolos et al., 2014).

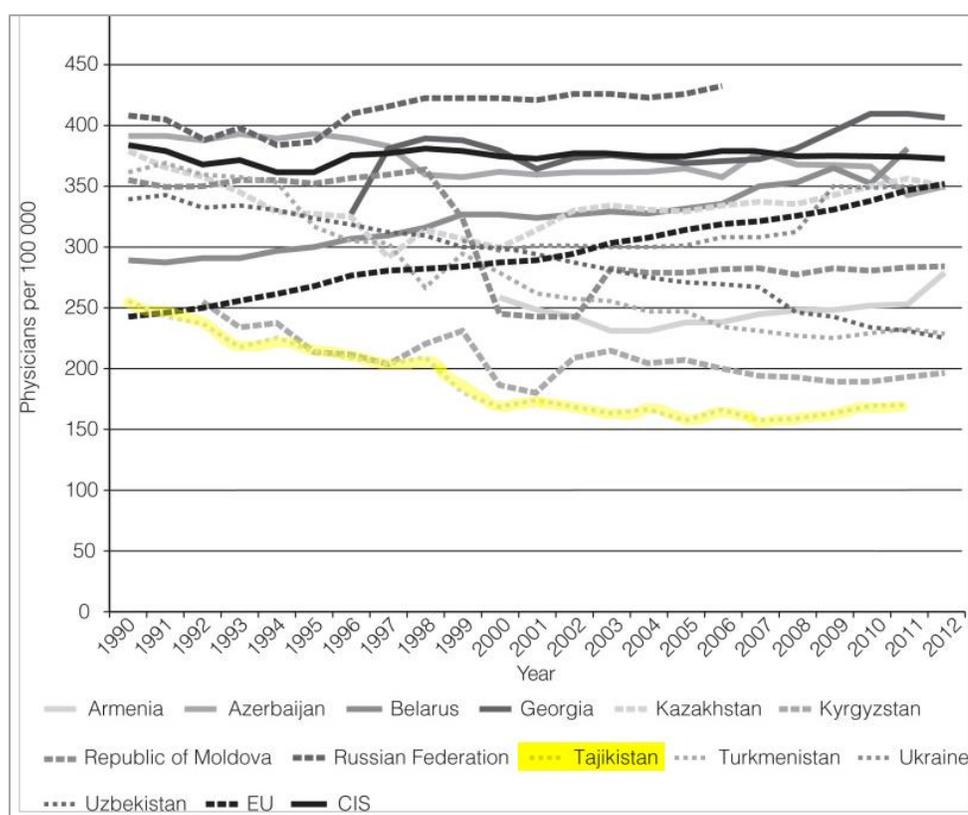


Figure 2: Physicians per 100,000 population in the former Soviet countries and the EU, 1990–2012 (Karanikolos et al., 2014)

Between the decline in hospital beds and limited availability of health care workers, the medical center must remain mindful of its human and capital resources to ensure it can remain

viable in the long run. By having a thorough understanding of how patients flow through their health system, inefficiencies in established workflows, and opportunities to eliminate non-value added activities, the medical center can position itself to become an integral part of the health care delivery system in Khorog, Tajikistan.

1.3 Objective of the Study

The objective of this observational descriptive case study will be to describe the medical center's current patient flow through the use of patient flow mapping, rounding, and unstructured key informant interviews.

1.4 Description of Region and Population

To fully appreciate the factors influencing the health of citizens living in Khorog, it is critical to have context about the area and the people. Situated in the southwest corner of the GBAO region of Tajikistan, Khorog's population is estimated to be between 28,000 and 30,000 (Encyclopaedia Britannica, 2019). Resting at an elevation of 7,200 feet above sea level, Khorog is part of the Pamiri mountain range and is only meters away from the Afghanistan border. Tajik is the official language of the country and is closely related to Farsi and Dari. While vital statistics for the City of Khorog have been sparsely recorded, the country's statistics can be considered to establish a foundation. By in large, expenditures on health care services as a percentage of GDP have grown consistently between 2000 and 2016. As of 2016, 66% of health care services were paid for out-of-pocket, 29% were paid for through domestic public assistance, and 5% were paid for by aid agencies (World Health Organization, 2016a). It is estimated 69% of all deaths in the country are attributable to non-communicable diseases, with 42% being attributable to cardiovascular diseases alone (World Health Organization, 2016b). Gainful employment is

difficult to find in Tajikistan. Consequently, over one million of the country's citizens work outside the country with 90% of them working in Russia. In 2017, remittances from abroad accounted for almost 35% of Tajikistan's GDP (United States Central Intelligence Agency, 2017). Looking forward, the country is facing a mounting debt crisis. To build its infrastructure after the end of the civil war in 1997, Tajikistan borrowed heavily to finance its rebuilding projects. As of 2017, China owns roughly 50% of the country's debt.

1.5 Critical Questions the Study Will Address

- I. How do patients flow through the medical center?
- II. What options does the leadership have to advance positive change?
- III. How can health care facilities in resource-limited settings improve to serve the needs of the communities in which they exist?

CHAPTER 2 REVIEW OF THE LITERATURE

2.1 Introduction

Published scholarly works focusing on the study of patient flow in resource-limited parts of the world are rare. Given that resource-limited areas are generally characterized by scarce financial resources, inadequate infrastructure, and insufficient availability of qualified professionals, the need for non-governmental organizations operating in these areas to maximize their impact while strategically eliminating non-value added steps is essential to the long-term viability of the operation. Of the handful of scholarly works found on the study of patient flow in resource-limited settings, the vast majority seek to understand patient flow as a means to an end (Hussein et al., 2017; Safdar et al., 2016). First, these studies identify an operational problem that needs to be addressed (i.e. poor payment collection in private practices, overcrowding in public hospitals and clinics), then they undertake an effort to understand and reengineer the patient flow to solve the predefined problem (Sastry et al., 2015). This focused investigative approach, while effective at addressing predefined problems, is unable to explore patient flow from a holistic perspective. By concentrating the analysis of patient flow on projects of limited scope rather than studying patient flow from a broader perspective, organizations can overlook previously unknown and critical satellite factors influencing outcomes. In examples of data-driven studies where patient flow analysis has been considered for its own sake and the results used to highlight improvement opportunities, researchers have been able to uncover previously unidentified issues (Bean et al., 2017).

2.2 Best Practices

Guides and educational material on best practices as they pertain to the analysis of patient flow, tend to address specific functional problems and/or be department specific. For instance,

while the Agency for Healthcare Research and Quality (AHRQ) provides guidance on improving patient flow, the agency does so through the lens of reducing crowding in the emergency departments of hospitals (Agency for Healthcare Research and Quality, 2011). Guides that focus on improving patient flow from a broader systems perspective are not the norm. Guides that adopt a holistic viewpoint on patient flow justify the approach by noting the interconnectedness of operations in health care and how inefficiencies early in the process can compound downstream (Showell et al., 2012). Best practices for understanding and optimizing patient flow from a holistic perspective include:

- i. Acknowledging and engaging every clinical and non-clinical department within the organization to assess the experience of the patient
- ii. Enable and empower leadership to view live data on patient flow to identify bottlenecks
- iii. Assess demand based on data and adjust for the acuity of patients transitioning from the ED
- iv. Establish data-driven escalation processes that can enable the workflow to flex when placed under significant stress (British National Health Service, 2017)

2.3 Literature Review

The PubMed database was used to conduct a literature review on patient flow analysis and relevant use cases in resource-limited settings. Unsurprisingly, case studies on patient flow in resource-limited settings are few and far between. Despite leaving the publication date field unrestricted, a search using the terms, “resource-limited patient flow case study” returned only seven items. Repeating the same search in PubMed without the term, “resource-limited” returned nearly eighteen thousand items. These results highlight the position that while the study of patient

flow is fairly common in research aimed at driving performance improvement, patient flow analysis is far less likely to be performed in resource-limited settings.

Through this literature review, four recurring themes emerged. The first theme was the use of patient flow analysis in resource-limited settings as a means of addressing pre-identified operational problems (Burmen et al., 2017; McCormack et al., 2013; Siapka et al., 2017). In one such example, researchers noted the amplification of operational challenges associated with providing health care services to a high volume of patients in middle- and low-income countries, where resources and availability of medically trained staff are limited. In this case, researchers sought to address inefficient patient flow as a means of reducing overcrowding in a hospital in central Ghana. As part of the patient flow analysis, upon arrival to the facility, patients were presented with a watch and a worksheet and asked to record their wait times throughout their visit. Subsequently, the time logs were analyzed to identify bottlenecks in the patient's journey (Dixon et al., 2015).

The second theme found as the result of this literature review was the use of patient flow analysis for purposes of planning and improving clinical outcomes. While examples of such use cases are largely found to be conducted in developed countries, they illustrate additional ways in which resource-limited areas of the world can further leverage patient flow analysis. In one example, patient flow analysis was used by a regional long-term care facility in the United States to develop a robust projection model for purposes of understanding the relationship between the facility's capacity limitations and demand for long-term care. Through this model, researchers were able to show that as the population of citizens aged 65 and over continues to grow over the next decade, demand for beds in long-term care facilities will increase. With the supply of available beds unable to grow at the same rate, researchers predict patient flow will suffer from increases in wait times for beds. Furthermore, the authors of the study postulate service quality will also decline over this time period and examine the possible implications of policy-makers

taking a reactive versus proactive approach to the problem (Bae et al., 2019). In another example, as part of a larger study, researchers worked to quantify the impact on poor patient flow resulting from adverse events. In this article, the authors noted the link between bed management and patient flow. In essence, a patient's length of stay (LOS) is influenced by many factors and a degree of uncertainty resulting from the inability to know how each individual patient will respond to prescribed medical treatments and interventions. When patients experience preventable adverse events during their time at the health care facility, the uncertainty around the patient's prognosis goes up, LOS and costs increase, and patient flow suffers (Almashrafi & Vanderbloemen, 2016).

The third theme prominently highlighted in the literature was the innovative use of computer simulations to understand and influence patient flow (Al Owad et al., 2018; Ceresoli & Kuhl, 2018). In one instance, administrators in Taiwan were troubled by the level of overcrowding in the outpatient area of a local hospital. Additionally, administrators were concerned about physicians being overworked. The authors of the study attributed both of these issues to Taiwan's rapid economic growth and increased availability of education causing the citizens to demand a more affordable and efficient health care system. The outpatient service in which overcrowding and wait times were determined to be the worst was in dermatology. To study the issue, researchers programmed a computer-based patient flow simulation to mimic the dermatology clinic's patient flow and observed changes in the outcome variables (patient throughput and wait times) as they made adjustments to the model. The analysis of patient flow through computerized simulations informed the researchers' recommendation to shorten the duration of individual appointments and to offer an additional session on Monday afternoons. By implementing these recommendations, administrators were able to realize meaningful reductions in wait times and improved patient throughput (Huarng & Hou Lee, 1996). In another case, when a hospital was unable to increase capacity to address increasing demand because of cost

constraints, researchers used the Hospital Event Simulation Model: Arrivals to Discharge (HESMAD) approach to simulate patient flow through the Emergency Department (ED). By experimenting with varied discharge strategies and seeing their impact on the patient flow simulation, researchers were able to develop the optimal strategy for the department. Ultimately, noteworthy reductions in LOS, overcrowding, and improvements in hospital occupancy rates were achieved through fine-tuning of the patient flow (Qin et al., 2017).

The fourth and final theme to emerge from the literature review was the lack of quality data in resource-limited settings. This theme is of particular importance as it predictably precludes health care facilities in resource-limited settings from adopting data-driven best practices. In a pilot project titled, the Data for Decision Making (DDM) project, researchers set out to address the need for high quality and timely information for use by ministries of health in developing countries to help health care leaders identify and prioritize health problems in their respective communities (Wilkins et al., 2008). Researchers on this project found the most common barriers impeding availability of high-quality data in resource-limited settings to be systems and processes that were not designed to capture data, the burden of training staff on an ongoing basis to record data discretely, and the lack of health care systems to disseminate data in a timely and meaningful way. Lacking robust processes and infrastructure to facilitate data capture in real-time, for health care firms to leverage data-driven best practices in resource-limited areas, they would have to devote resources to transcribing data from paper charts and records into a tabular form or database. When this type of large scale and ongoing data entry has been employed to facilitate data capture in developing countries, it has been found to be overly burdensome (Garrib et al., 2008). Researchers studying district health information systems in ten rural South African clinics found the perceived work burden of collecting and collating data to be high and some data collation tools not being used. Furthermore, while there seemed to be a good understanding of the data collection and collation process, the data were rarely analyzed or

utilized. Lastly, of the data collected, 25% of the values were inexplicably found to be out of the expected range and could not be used. For the aforementioned reasons, health care facilities that would benefit the most from employing best practices in improving patient flow in resource-limited settings are also the least well equip to marshal the resources and expertise required to successfully undertake such projects.

2.4 Conclusion

Studying patient flow in resource-limited settings enables organizations operating in some of the most challenging geopolitical situations in the world to gain a holistic perspective on their operations. Through a thorough and strategically open-ended exploration of patient flow, these organizations stand to extract valuable insights that can highlight previously unknown deficiencies as well as opportunities to reinforce parts of the operation that work well. Despite the promise of patient flow analysis, they are seldom undertaken in resource-limited areas leading to a gap in the scholarly literature on how best to undertake such projects. Further complicating the problem of limited scholarly works in this area is the issue of resource-limited areas being unable to adopt best practices to improve outcomes. This observational descriptive case study will go beyond the limited body of work that currently exists to show how such an undertaking can be designed, executed, and leveraged to extract tangible gains in performance improvement.

CHAPTER 3 METHODOLOGY

3.1 Study Design

For this project, we used a descriptive case study approach to examine the flow of patients through a medical center in Khorog, Tajikistan. The descriptive case study approach should be employed when examining activities, like operational dynamics, wherein taking a random sampling of facilities is not possible and the activities being examined cannot be fully controlled or repeated on-demand (Süt, 2014). In support of this approach, we sourced relevant data from key informant interviews, documents review, and direct observation as they have been found to be a common sources of high-quality data (Mills et al., 2010). By contrast, studies classified as analytic in nature, including but not limited to experimental, retrospective cohort, and case-control, were not selected for this project because such methods seek to establish or understand the link between exposure to a specific event and a specific outcome or they seek to compare defined groups (Centers for Medicare and Medicaid Services, 2013). Because this study was performed at a single facility, does not have a direct comparison group, and does not seek to test a measurable hypothesis, analytic study methods were not appropriate.

3.2 Sample Selection

For this project, a purposeful sample was selected within a single health care facility located in Khorog, Tajikistan in July of 2019. These selection criteria were necessitated by the limited availability of functional health care facilities in the city, availability of health care workers able to converse in English in a predominantly Russian speaking locale, and a restricted window within which travel was permitted within the region. This method of sample selection is consistent with established practices and is widely employed in qualitative research wherein the environment is information-rich, resources are limited, and key informants are knowledgeable

about the topic of interest, able to communicate effectively, and willing and able to participate (Palinkas et al., 2015).

3.3 Specific Steps Undertaken

Ahead of our onsite visit, we started by diagramming the way in which we expected patients to flow through the medical center's established process. Drawing inspiration from a similar approach outlined in the literature (Dixon et al., 2015), we defined the medical center's preferred patient flow as a process map starting from pre-admission activities and concluding with post discharge activities (Appendix A, p.54). Using the preferred patient flow process map, we identified 35 discrete elements we wished to understand in formulating our impressions of the medical center's patient flow and organized the elements into a checklist (Appendix B, p. 55). This checklist was distributed to the medical center's leadership for their feedback. Specifically, for each item on the checklist, we wanted to learn:

- i. Does the medical center have a documented workflow?
- ii. Are standard operating procedures in place?
- iii. Is the activity available for observation?
- iv. Are the staff available for Q&A?
- v. Is the leadership available for Q&A?

From this exercise, we determined the medical center did not have any documented workflows or standard operating procedures in place. With approval from the CEO of Aga Khan Health Services, Tajikistan and Aga Khan Medical Centre, Khorog's Hospital Manager, we were granted permission to observe any activities we deemed relevant and were granted access to appropriate staff and leadership to learn about the medical center's operations. Upon securing the necessary travel documents, insurance, visas, and a letter of invitation from the NGO allowing us to travel

into the GBAO region, we embarked on a 7-day research focused visit to Tajikistan in early July 2019.

3.4 Data Description and Collection

To learn about the medical center's patient flow and to facilitate data capture for this observational descriptive case study, we coordinated onsite in-person key informant interviews, process observations, and document reviews. The key informant interviews were semi-structured and participants were purposefully selected to include subject matter experts and medical center leadership. These interviews gave us an insider's perspective on systemic issues and enabled us to assess broader organizational challenges as described by the most experienced and knowledgeable members of the medical center. Furthermore, and as highlighted in the literature around research methodologies, interviewing key informants can be a proxy for the views of the associates of the informants (Lavrakas, 2008). Initial key informant interviews lasted between two- and three-hours and were followed by a guided demonstration of their standard workflow. The key informants were made available to address follow-up questions and points and clarification on an as-needed basis. Interviews consisted of largely open-ended questions crafted to solicit highly contextualized and thoughtful responses. Interview questions and prompts included, but were not limited to:

- i. Tell me about your role at the medical center.
- ii. Explain how workflows into you/your team and from whom does it originate.
- iii. Explain how workflows out from you/your team and where does it go next.
- iv. Describe the challenges you perceive around your work and that of your customers and stakeholders.
- v. How should these challenges be addressed?
- vi. What prevents you from acting on these recommendations?

Following the interviews, we conducted independent and guided observations through each department to understand interdepartmental dynamics, intradepartmental dynamics, and their interaction with patients. Through these observations, we collected field notes and took high resolution digital photographs of patients and staff as they navigated the facility. Careful attention was paid to ensure established processes were not interrupted and objectivity was maintained throughout the data collection process.

Lastly, we reviewed relevant business and process-specific documents to learn how the medical center records, retains, and leverages data-driven decision making. This method of data collection was employed because, as described in the CDC's data collection methods brief, document review is an inexpensive and unobtrusive source of high quality background information that can give researchers a "behind-the-scenes" view of programs while also highlighting issues not identified by other data collection methods (Centers for Disease Control and Prevention, 2009).

With feedback from the manager of the medical center, three key informants were identified based on their level of experience with the inner workings of the medical center, its challenges, opportunities, and ability to communicate complex business processes in English. The key informants were:

- i. Medical Center Logistician
- ii. Chief Pharmacist
- iii. Medical Center Financial Services Coordinator

As part of the interview, each key informant was asked to describe the workflow within their own department and how operational challenges in their work may be contributing to patient flow problems downstream.

To learn how patients experienced flowing through the medical center, observations of key processes were conducted. Through these observations, our aim was to identify processes that worked well and added value as well as processes that required reengineering to clear bottlenecks and improve flow. Observations were conducted at patient registration, outpatient clinic, inpatient admissions, and emergency department. As necessary and through the help of a Russian to English translator, staff were asked to explain elements of their work that could not be outwardly observed (i.e. components of computerized data entry). These conversations were used to further refine our understanding of established processes and patient flow.

In parallel with key informant interviews and process observations, we examined documents that were either directly or indirectly linked with the operations of the medical center. These documents included:

- i. Paper medical records without patient identifying information
- ii. Outpatient patient assessment form
- iii. Pharmacy records
- iv. Quality control charts for refrigerated medications
- v. Supplies and medication requisition requests

Documents containing protected health information were beyond the scope of this project and were not reviewed.

3.5 Data Analysis

With the combination of key informant interviews, process observations, and documents review, a thorough patient flow analysis (PFA) was conducted. The PFA included a detailed account of the medical center's standard workflow. Careful attention was paid to understanding how the hospital's three key areas (inpatient, outpatient, and ED) flowed into one another. The

workflow was presented to the medical center's manager and consensus was reached with regard to its validity. Upon validating the workflow, we critically evaluated the defined process to understand how the challenges we identified through key informant interviews and our own observations could be further contextualized. Lastly, we considered the effect of societal norms and region-specific patient expectations as a contributing factor in how patients flow through the medical center. The need to evaluate societal norms and region-specific patient expectations was not initially anticipated, but became necessary as we learned about the unique way in which patients in the high mountain regions of Tajikistan engage with health care institutions and care providers. We also found sufficient evidence in the literature supporting the need to account for regional variations in patient expectations in understanding how and when patients engage with health care organizations (Grafe, 2016; Pittet et al., 2018; Shahid & Singh, 2016).

3.6 Data Storage

Appropriate security measures were employed to ensure notes and data collected were only accessible by the primary investigator (PI). These security measures were specific to the method of data collection and included:

- i. Handwritten notes were safely stored in a locked cabinet accessible only by the PI.
- ii. Personal notes, data, and digital images stored on a computer were secured by a biometric fingerprint scanner and typed password. This computer was safely stored in a locked cabinet accessible only by the PI.

CHAPTER 4 RESULTS

4.1 Results: Inpatient, Outpatient, Emergency Departments

Synthesized through key informant interviews, observations, and documents review, we constructed a diagram depicting how patients flow through the medical center depending on their point of entry into the facility (Appendix C, p.56). Patients could make entry into the medical center through the emergency department (ED), inpatient admission department, or outpatient department (OPD). Over the course of multiple observations, no patients were seen entering through the ED, inpatient admissions maintained a steady flow of patients with prearranged stays, and the OPD was consistently observed to be full beyond capacity. As of this study, the community, and by extension the medical center, did not have a dedicated ambulance service. Upon request, the medical center was able to supply data on inpatient, OPD, and ED patient volume (see Table 2). The medical center was unable to provide data on how many patients were referred by the OPD to inpatient and ED to inpatient. Given the medical center's reliance on paper-based medical records and manual processing of financial transactions, its inability to source reliable data on internal referral patterns is unsurprising as following patients longitudinally without computerized records is labor-intensive and cost-prohibitive.

AKMC, K Patient Volume in January 2020	
Total Inpatient Admissions	155
Average Inpatient Admissions per Day	5
Total Outpatient Visits	3,229
Average Outpatient Visits per Day	104
Total ED Visits	10
Average ED Visits per Day	0.3

Table 2: Aga Khan Medical Centre, Khorog's Patient Volume in January 2020

Most patients presenting to the medical center arrived seeking outpatient services. Presently, the medical center offers services in imaging, laboratory, family medicine, internal medicine, obstetrics, gynecology, pediatrics, ophthalmology, physiotherapy, oncology, dental, endocrinology, cardiology, neuroscience, and pharmacology. Patients generally arrived 1-2 hours before the OPD opened at 8:00 AM and organized in a line outside the entryway to the department. While the air temperature in the area remains comfortable in the summer, topping out at 79°F during the day in mid-July, patients seeking entry must wait in lows averaging 10°F in January (Weather Spark, 2019). Because the OPD operates on a first come first served basis, patients are conditioned to arrive early for preferred placement in line. All patients, but in particular, patients on their initial visit, are made to experience prolonged wait times before and after each administrative step in the process depicted in Appendix C. These wait times are largely attributable to four factors:

1. The department does not have a patient scheduling process in place to make access more stable and predictable.
2. The medical center maintains paper medical records (Appendix D, p.57) that have to be physically moved from person to person to deliver care.
3. The department does not clinically assess the patient (Appendix E, p.58) or the availability of the needed specialist physician until the patient has already waited between two and four hours.
4. Surges in demand for access when citizens of the community learn a foreign-trained physician will be seeing patients at the medical center for a limited number of days or weeks.

The net impact of prolonged wait times experienced by patients is further exacerbated by a societal norm in the area related to fasting before seeking medical care. With the aim of moving swiftly through the process of receiving medical care, patients fast the day before presenting to the OPD

so they may be able to receive lab and imaging services without experiencing any further delays. While patients have not been advised by the medical center or a clinician to refrain from eating in advance of seeking care, patients have conformed to this practice. Consequently, in addition to waiting for extended periods of time to receive care, many patients have not eaten for more than 24-hours.

Upon transitioning through the OPD, patients may be discharged with care instructions or, through the submission of an “Accommodation Request Form” (Appendix F, p.60) by the care provider, directed to an immediate or scheduled inpatient admission. The inpatient admission process is fairly standardized and commences with the patient or designated family member completing admissions forms and making payment arrangements. In instances where the patient or family is unable to pay, a request for financial assistance is submitted for approval to the manager of the medical center. After completing the requisite paperwork, the patient is transported to their assigned inpatient room by an orderly. For the period of time the patient remains inpatient, the patient’s care is coordinated by hospitalists and specialists. Once the patient’s clinical needs for an inpatient stay have been satisfactorily addressed, the patient’s physician completes a patient discharge form resulting in the conclusion of the patient’s stay. At this time, the patient or family settles the charges associated with the delivery of inpatient care in full, are placed on an installment payment plan, or, in cases of demonstrable financial hardship, have the charges discounted.

4.2 Results: Pharmacy

Through auditing services that support the inpatient and OPD, pharmacy operations was identified as an area of opportunity. The medical center’s pharmacy perpetually struggles with managing accurate inventory levels, selling higher-priced quality medicines, and optimizing the pharmaceutical ordering process. Inefficiencies in these areas are compounded downstream and

ultimately contribute to suboptimal performance from the patient's perspective as well as from the administration's perspective.

To effectively support the medical center, the pharmacy must be able to cater to the needs of patients referred by the outpatient and emergency departments as well as the inpatient department. Patients referred to the pharmacy by the OPD and ED have their prescriptions manually entered into the pharmacy's inventory management system. The inventory management system was purchased from a Russian firm specializing in software solutions for businesses named 1C. As OPD and ED prescriptions are filled by the pharmacist or pharmacy tech, they are entered into 1C so they may be subtracted from the current inventory and a receipt for the transaction is given to the patient (Appendix G, p.61). In this part of the world, high quality pharmaceuticals must be procured from firms like the IDA Foundation in large quantities to keep costs low. While purchasing in bulk reduces costs by better distributing overhead expenses like shipping costs, they can complicate inventory management efforts. In addition to ensuring medicines and supplies can be purchased at an acceptable price, the pharmacy must now also consider how it will account for fractional reductions in inventory. For instance, Appendix G shows the receipt for a transaction in which a single unit of inventory item T20160430 was sold for 0.05 Tajikistan Somoni (TJS). If this tablet was dispensed from a bottle containing 1,000 tablets of T20160430, the pharmacy must concurrently maintain a count of bottles in the 1C system as well as a manual count of units dispensed per bottle in real-time to show accurate inventory levels.

Transactions such as these are further complicated when serving patients in the inpatient setting. Because patients in the inpatient setting require smaller quantities administered over an extended period of time, the pharmacy must individually bag and label each tablet that is to be administered to each patient on a daily basis (Appendix H, p.62). While the inventory of medicines is being depleted, an invoice for payment by the patient or family cannot be generated

until the patient is discharged. This means a separate manual ledger must be maintained for each patient that remains inpatient and the individual items on that ledger must be totaled at the end of the patient's stay to secure payment. It is only after the patient is discharged and payment is made that all medicines consumed by that patient during their stay are subtracted from the inventory. In addition to resulting in artificially inflated inventory levels, the administrative burden of maintaining this workflow is high. The administrative cost of dispensing a single tablet of most medicines in this way is estimated to be higher than the cost the patient pays for the tablet.

The pharmacy also faces challenges associated with establishing and maintaining quality control standards. While less expensive and locally sourced pharmaceuticals may be available in the community, the medical center cannot be assured of their quality and thus prefers to purchase medicines and other supplies from well-established reputable manufacturers and distributors, often at higher prices. Studies on substandard and falsified medicines in low- and middle-income countries (LMIC) have noted as many as 10% of all medicines found in LMIC are either of subpar quality or fake (Nayyar et al., 2019). There was anecdotal evidence of patients opting not to purchase prescribed drugs from the medical center's pharmacy and purchasing lower-cost alternatives from other sources. Although the medical center remains vigilant in upholding quality standards, patients are not well informed of the risks associated with consuming substandard and falsified medicines.

Finally, the medical center's pharmacy lacks standard operating procedures for the ordering of pharmaceuticals. Currently, the pharmacy maintains an Excel spreadsheet of all the items they wish to order and requested quantities. This spreadsheet is not directly linked to or synced with the IC inventory management system resulting in the need to manually reconcile counts of drugs in inventory, drugs dispensed but not deducted from inventory for inpatients, and orders for additional drugs. These instances of misalignment also do not account for the lead time associated with ordering medicines as well as their accompanying expiration dates. This dynamic

results in the pharmacy, from time to time, running low on supply of critical medicines as well as the risk of having to wastefully dispose of medicines that have met their expiration date. Lastly, because the medical center is dependent on visiting physicians to train local physicians and clinical teams, the pharmacy is made to place orders for medicines with which western trained visiting physicians have a high degree of comfort, but with which the local Tajik physicians are unfamiliar and uncomfortable. This results in the pharmacy placing orders for medicines that, after the visit physicians leave, will not be used by local physicians and go to waste. The medical center's challenges associated with managing accurate inventory levels, selling higher priced quality medicines, and optimizing the pharmaceutical ordering process are not novel nor are they insurmountable. Acknowledging and addressing these issues in a systematic way will enable the medical center to keep them manageable as the leaders look to scale operations and serve a greater number of patients from the Khorog and neighboring areas.

4.3 Results: Thematic Evaluation

To address the aforementioned opportunities to improve patient flow, we must step back from the nuances associated with each individual challenge and their possible tactical solutions and approach the medical center's present situation from a broader perspective. To facilitate this way of thinking, looking at the medical center's challenges collectively and coalescing around foundational themes is useful as it enables us to consider, from a basic inputs viewpoint, what pieces are missing and must be addressed to optimize patient flow. Through this project, we isolated the following three themes as underpin the medical center's challenges at this time:

1. Limited availability of qualified health care professionals
2. Limited availability of sustainable financial resources
3. Limited availability of governmental support

Different combinations of these three themes can be highlighted as being the root cause of the medical center's current challenges.

First, lacking the financial resources to invest in an electronic medical record (EMR) keeping and patient scheduling solution and lacking qualified technical and administrative personnel to oversee their implementation and ongoing meaningful use, the medical center cannot readily address the issue of optimizing patient flow, in particular, through the OPD. Furthermore, and as previously mentioned, a nationwide shortage of doctors and nurses hinders the medical center's ability to safely scale its operations. Next, themes 1 and 2 are the underlying issues preventing the pharmacy from realizing its potential. While the pharmacy has been able to develop workarounds and make do with suboptimal approaches to inventory management and simultaneously serving the needs of the OPD and inpatient sides of the medical center, the current processes cannot be sustained as the medical center grows. With additional financial resources and recruitment of inventory management professionals, the pharmacy could move beyond the limitations of the 1C inventory management system and entertain more robust and scalable alternatives that offer the option of interoperability with other systems running in parallel. Lastly, limited governmental support in drafting and implementing policies that focus on improving the country's fragmented and deteriorating health care system limit how much NGOs and other enterprises are able to achieve in the short and long-term.

CHAPTER 5 DISCUSSION OF RESULTS

5.1 Summary of Results

As described in Section 4, a number of opportunities to improve operational workflows exist, particularly in the OPD and pharmacy. While this medical center, and others like it, may be conditioned to take an inventory of known problems and identify actions the medical center can take to address them, addressing systemic issues through the lens of a single organization or facility is limiting. Although the medical center may be working with suboptimal workflows, disparate systems, and significant constraints on resources, there is very little a single medical center can do to change circumstances beyond their area of direct influence. Issues like limited availability of qualified health care professionals, sustainable financial resources, and governmental support requires the medical center to strategically exercise its influence in the region to build a coalition of the willing and able to think about such issues from a holistic perspective rather than as issues unique to this medical center. By taking such an approach, the medical center and other likeminded organizations can employ options that are not scalable at the individual organization level but can be at the economic sector level.

5.2 Discussion of Limited Availability of Qualified Health Care Professionals

Given the shortage of qualified health care professionals in Tajikistan and the limitation this places on the medical center and other similar organizations to grow their operations, a number of options can be considered. To start, Tajikistan should train and graduate more health care professionals by opening new medical schools. At present, there is only one university in all of Tajikistan, Avicenna Tajik State Medical University, in which clinical medical education is provided. The program requires 4-years of undergraduate training followed by 2-years of master's level training. While the country desperately needs a primary care foundation upon

which to build a stable and scalable health care system, specialists are held in far higher regard compared to physicians seeking to practice family medicine. This reputational difference makes pursuing a specialist status the more attractive option compared to training in family medicine for aspiring clinicians (Karanikolos et al., 2014). Once these freshly minted clinicians have graduated, Tajikistan should consider placing them in areas of need throughout the country. Other former Soviet republics employ a similar protocol in placing physicians. Known as “raspredelenie”, which literally translates to “distribution”, some former Soviet republics require medical school graduates to undertake a mandatory 3-year term of service under which they are sent to government selected locales, usually rural areas, to provide medical services to needy populations and gain experience. Currently, the Tajik government is considering the use of financial incentives to attract health care workers to remote parts of the country (Karanikolos et al., 2014). Beyond the training of physicians, the Tajik government and the country’s educational establishment would benefit from reevaluating the role of nurses in developing their health care infrastructure. Despite Tajikistan’s nursing program taking 4-years to complete, nursing is largely considered vocational education and not a professional career (Karanikolos et al., 2014). This disparity in the status gap between physicians and nurses results in fewer qualified people selecting nursing as a career path. In the long-term, the imbalance keeps nursing from “having a seat at the table” in terms of leadership representation in decision-making bodies.

5.3 Discussion of Limited Availability of Sustainable Financial Resources

In addition to addressing the limited availability of qualified health care professionals, the Tajik government and the medical center should partner to address the limited availability of sustainable financial resources. Finding itself in the company of primarily developing Sub-Saharan African countries, it is unlikely we will be witness to scalable solutions in the absence of a public-private partnership. In recent years, the idea of impact investing, also found in the

literature as social impact investing, has taken root in places with financial challenges similar to those found in Tajikistan. In brief, impact investment is an approach to investing in which investors seek a combination of financial returns as well as positive social impact (de Gruyter et al., 2020). Of interest to socially conscious investors, the market for impact investment is estimated to be at \$502 billion USD and is beginning to attract the interest of institutional investors in the health care, banking, and insurance industries (World Economic Forum, 2019). Viewed as an opportunity to diversify their investment portfolios, institutional investors are willing to accept lower rates of return to ensure their exposure to downside financial risk is not overly dependent on the performance of any one industry or country. Additionally, impact investment from multiple firms in a specified geographic area has been found to magnify the impact of each individual firm's cause of interest. For example, the investment in complementary services like building infrastructure, training in emergency response, offering clinical diagnostic services, and organizing vaccination drives all focus on improving the health of citizens in the community thereby ensuring multi-faceted challenges are addressed with multi-faceted interventions. Such activity has been shown to work in places like Africa where the United Nations' Sustainable Development Goals, which includes the target of achieving universal health coverage by the year 2030, has been strained by barriers like, "lack of financial resources, inadequate human and physical infrastructure and limited human resource capacity" (World Economic Forum, 2019).

One form of impact investing that has emerged in the health care sector in conjunction with public-private partnerships in developing countries are known as social impact bonds (SIB). While far from being considered a mainstream investment or project funding option, SIB are contracts-based instruments under which private investors provide the initial capital required to fund programs aimed at improving a specified social outcome. If the program is able to meet pre-defined performance targets within a specified period of time, investors stand to earn financial

returns on their initial investment. These returns would generally be paid by the organization for whom the outcome is of particular importance, usually the government or governments who have jurisdiction over the geographic region (de Gruyter et al., 2020). Such innovative approaches to traditional financial challenges have also spurred the use of technical language to explicitly define the terms under which programs funded by SIB are undertaken. Impact returns, for instance, refers to the anticipated change in a group of selected social outcomes. Conversely, impact risk refers to the likelihood of the selected social outcomes materializing. Impact risk utilizes a combination of uncertainty associated with the unknown or uncontrollable, variance associated with the expected outcome, and the probability associated with the likelihood of success to quantify downside risk. In 2017, the average SIB size was \$3.6 million, but this figure was heavily influenced by an outlier. South Carolina's Nurse-Family Partnership Pay for Success Project, aimed at improving child and maternal health outcomes for low-income families in South Carolina, was funded with a \$30 million SIB organized with support from private for-profit firms, private not-for-profit firms, and the State of South Carolina. Excluding this outlier in SIB funding, the average SIB size is reduced to \$1.5 million (de Gruyter et al., 2020). Given the challenges Tajikistan has experienced in the past and the opportunity to undertake projects with high social impact in the present and future, the country and NGOs operating in the region are primed to attract impact investment, in particular social impact bond-type instruments.

5.4 Discussion of Limited Availability of Governmental Support

Going hand in hand with the need to champion capital infusion and investment opportunities in the health care sector in Tajikistan is the need for governmental support. When Tajikistan gained independence from the former Soviet Union and in the absence of having its own fledgling legislative structure, Tajikistan inherited a number of USSR's government guaranteed entitlements. With respect to entitlements related to health care services, Tajik citizens

expected their newly sovereign nation to keep virtually all health care services free of charge, just as they had been under Soviet rule. When, following decades of conflict, Tajikistan did not have the financial resources to sustain free health care for its citizens, the country largely shifted to requiring out-of-pocket payments for health care services without formally acknowledging the need to draft governmental policies that set controls on out-of-pocket payments. Under the auspices of much needed reforms in the health care sector that would make good health a shared responsibility between the government and citizens, Tajikistan approved a constitutional amendment in June of 2003 that ended citizens' right to free health care and introduced a co-payment system in government operated facilities. This action also resulted in the less well-publicized outcome of reducing national spending on health care. This point was exemplified when, in 2007, the average annual salary for a physician was determined to be just \$653 TJS (approximately \$204 USD). By contrast, the average annual salary in the larger Tajik workforce was \$2,035 TJS (approximately \$636 USD) (Khodjamurodov & Rechel, 2010). To make ends meet, it would not have been uncommon to find a health care worker in a rural community supplementing their low income with other activities like farming (Wyss & Schild, 2006). Aggregated to the national level, in 2005, the WHO estimated that of all the countries that made up the WHO European Region, Tajikistan spent the least on health care per capita (see Figure 3).

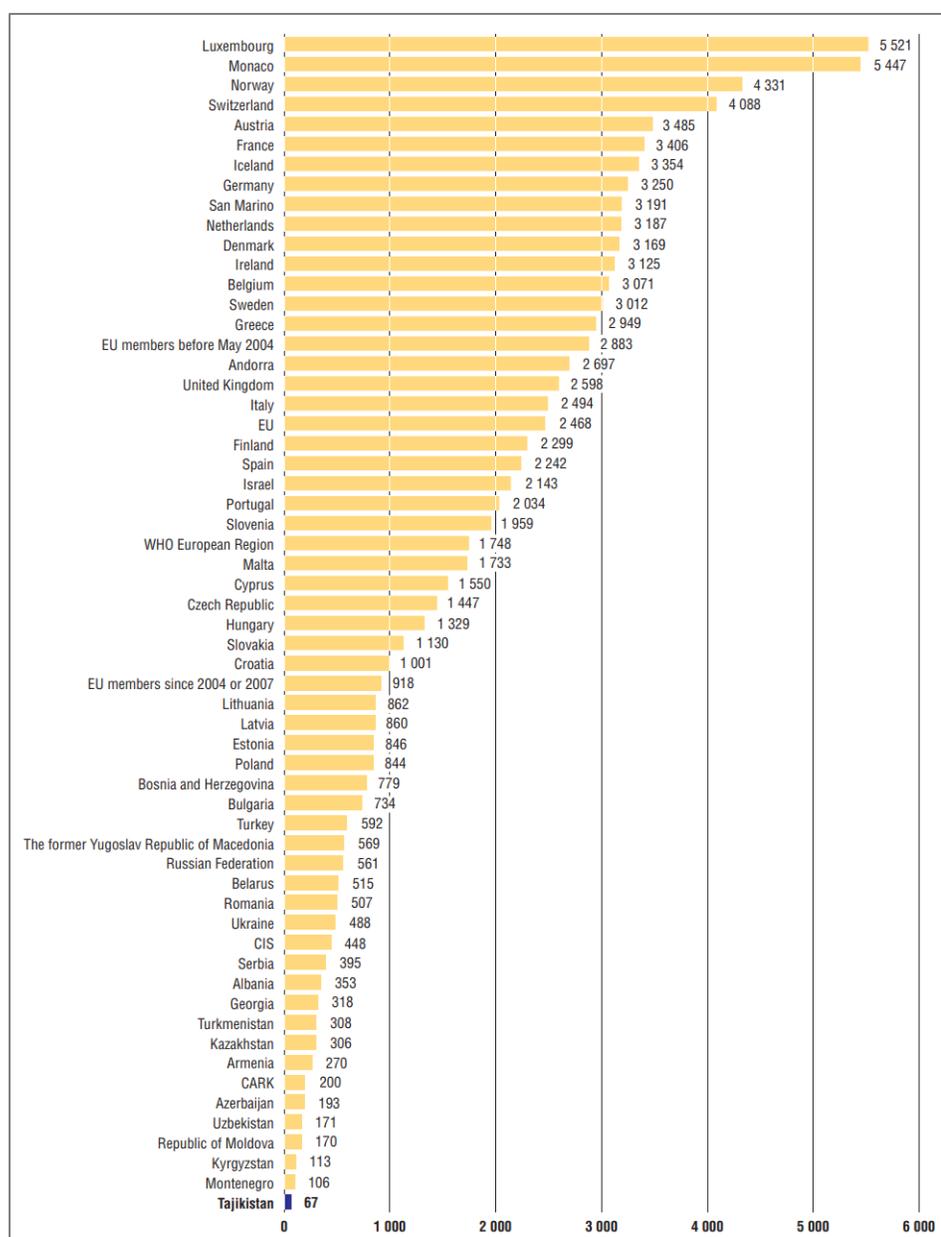


Figure 3: WHO estimates of health expenditure in PPP USD per capita in WHO European Region, 2005 (Karanikolos et al., 2014)

Limited availability of governmental support should not be oversimplified and framed as a lack of interest in improving health care systems in Tajikistan. Given the limitations discussed in sections 5.2 and 5.3, Tajikistan has struggled to secure the essential resources required to make greater strides. One area in which the country's government can make meaningful progress is by

approaching policymaking as a team sport. At this time, policymaking is recognized as a function of the national government and does not account for the fact that regional and local authorities do not have a voice in the process of enacting reforms. Consequently, policies made at the national level do not become the law of the land, but often cannot be acted upon at the local level. This disconnected approach to lawmaking starts with resources being utilized to pursue well-intentioned reforms and ends with changes that are little more than notational in nature (Karanikolos et al., 2014). For Tajikistan to make significant and meaningful strides in its pursuit of a better health care system, all of the impacted parties must have a seat at the table and a voice with which to draw attention to their needs.

5.5 Unintended Consequences of Progress in the Tajik Health Care Sector

An area of inquiry that immediately garners attention during periods of anticipated growth is a phenomenon known as reverse brain drain (RBD). Defined as the return of skilled and educated migrants back to their countries of origin (Badruddin, 2016), RBD may be an unintended consequence of investment and progress in the Tajik health care sector. As previously noted, highly educated and skilled physicians and nurses fled the country during periods of prolonged unrest and it would stand to reason they may return to their homeland after stability and opportunities return. A similar dynamic emerged in China in the early 2000s when students who had left the country to study abroad began returning to China at rates that were nearly twice as high as they had been less than half a decade earlier (Tharenou & Seet, 2014). In addition to the migration associated with a mobile workforce, this issue is also fraught with immigration policy issues as migrants may be returning with children born in other countries.

With the possible return of health care workers who left the country during troubled times, we must reflect on whether migrants will join the public or private sector upon their return. This issue requires careful consideration as there is the possibility of returning migrants, who had

the wherewithal and skills to exit the country and have acquired additional training and skills in other countries, may disproportionately favor joining private health care firms as opposed to public health projects. By self-selecting the private sector over the public sector, this dynamic may inadvertently grow the disparity in the quality of health care services available to the rich and poor. Research has shown how an imbalance in the equitable distribution of health care workers can have a downstream impact on the ability of developing countries to make progress toward the United Nation's Millennium Development Goals (Ashmore, 2013). Furthermore, there is evidence that suggests health care workers in Tajikistan, in particular ones with special skills like being able to speak English, favor working for NGOs and other international firms as they pay more than positions in the public sector (Karanikolos et al., 2014).

Next, as progress descends on Tajikistan's health care system, the need to help the country's citizens adjust to and accept the changes will become a critical factor in determining success. As was noted in the examination of Aga Khan Medical Centre's OPD patient flow, a combination of factors including the patients' unfamiliarity with the medical center's processes and the lack of a patient scheduling system resulted in long wait times in the outpatient clinic. When scaled to a larger stage, the downstream impact of these inefficiencies will be significant and may ultimately keep performance improvement projects from having the desired outcome. Because such changes are disruptive in nature, the ability to educate the public on what to expect and how to engage with the changing health care sector should be considered.

Lastly, investment in the Tajik health care system may pave the way for new markets to emerge. In more ways than one, investment in development, training or retraining the labor force, and business-friendly policy-making can be the catalyst for other industries to materialize. One industry that is likely to emerge is medical tourism. In models created to evaluate the appropriateness of sites to serve the needs of clients seeking medical services abroad, factors like the quality of health care infrastructure, supply of skilled health care workers, and medical

tourism-friendly government laws and policies were among the highest rated considerations (Roy et al., 2018). If firms operating in the health care sector in Tajikistan can pursue the offering of high quality services, the national and local governments can pass laws that make medical tourism hassle-free, and the country's educational systems can coordinate the training of additional clinicians in the coming years, the country stands to become a player in a rapidly expanding industry. In the next 6-years, the global market for medical tourism is expected to grow by 21.9% to \$179.6 billion USD (Grand View Research, 2019).

5.6 Lessons for Resource-Limited and Resource-Rich Organizations

Both resource-limited and resource-rich organizations stand to learn from the forces at play in developing countries. While we first thought the lessons to be learned by resource-limited organizations would be markedly different from the lessons to be learned by resource-rich organizations, our thematic evaluation of the underlying issues proved differently. Ultimately, we converged on the idea that resource-limited and resource-rich organizations have similar basic needs to be productive in similar situations in other developing locales.

The first lesson to be learned from this project is that operational challenges, like less than optimal patient flow, may not be the cause of an organization's problems, but rather may be the symptom of larger systemic issues. In such cases, unilaterally addressing the symptoms of larger system-wide issues in ways that are internal to the organization may yield limited success. To be able to scale operations in ways Aga Khan Medical Centre, Khorog aspires to will likely require a team approach wherein the NGO and local and national governments coordinate efforts to ensure resources are being utilized in mutually beneficial ways.

Next, both resource-limited and resource-rich organizations can learn to explore their level of creativity in securing capital in pursuit of their strategic goals. While raising funds

through courting philanthropists is expected to remain a mainstay in development related projects, the ability of organizations to explore unconventional options for fundraising may be the way of the future. With options like impact investment and social impact bonds, NGOs can attract institutional investment by marketing the idea that doing good and doing well are not mutually exclusive and firms can satisfy their fiduciary responsibilities to their investors while helping communities and nations rebuild.

5.7 Limitations

Due to geopolitical sensitivities in the area, considerations around the safety and security of persons and property, and general uncertainty around a rapidly evolving environment, a number of questions could not be addressed, in part or in full, in this study. These questions include:

- Why is the medical center choosing to expand and what are its broader objectives?
- How will the expansion be supported financially in an impoverished area?
- What is/will be the payer mix?

Another limitation of this study designed to examine patient flow in a resource-limited setting is this work is based on information about the medical center that was collected in early July of 2019. If the medical center or the region in general have gone through significant changes since that time, this study would not account for them. Furthermore, because this work is constrained by time and place, there may be a general lack of external validity. Organizations seeking to replicate or build on this work should pay careful attention to elements of this project that may not apply in all situations.

Lastly, the availability of quantifiable data about the medical center's clinical operations was low. Because the medical center operates on a paper-based medical record-keeping system, some data were too labor-intensive to amass. Consequently, certain lines of inquiry could not be entertained as a reliable source of quality data could not be secured.

5.8 Future Research

Future research related to development projects undertaken by NGOs or impact investment driven firms would do well to better understand dynamics related to prioritization of improvement projects required to scale operations. Something akin to Centers of Medicare and Medicare Services' (CMS) Prioritization Worksheet for Performance Improvement Projects would be a good starting point (Centers for Medicare and Medicare Services, 2019). Worksheets like these would need to be adapted to account for the differences between projects undertaken in developed versus developing countries, but research devoted to adapting such tools would prove to be useful.

In addition to supporting the need for future research on tools to assist with development, project prioritization is the need to research and validate community engagement and education protocols. Ideally, research in these areas would be led by a public-private partnership that is able to use empirical methods with government support to inform the public. These elements are critical as the scholarly literature highlights the need for, “commitment from all stakeholders, a sense of ownership from communities, and dedication to long-term sustainability” (Kamaraju et al., 2019). Furthermore, in regions where significant portions of the population have migrated out of the country and may return in the future, developing ways of driving community engagement and education efforts are likely to be an evolving exercise as profile of the population changes over time.

5.9 Conclusions

As countries like Tajikistan move forward from decades of turmoil, they will require support from the international community to gain a foothold and make progress. While solutions to outwardly apparent issues may be easy to identify, it is important to consider the underlying systemic factors that may have contributed to their creation. Furthermore, it remains important to not simply evaluate the country based on what it needs in terms of international support and resources. Tajikistan and other similarly positioned countries should also be seen as classrooms within which others can learn about cultivating public-private partnerships, capacity building, ideating creative financial instruments, training and mobilizing a workforce, migration patterns, reverse brain drain, and formation of new industries. In brief, the country of Tajikistan, the city of Khorog, and Aga Khan Medical Centre, Khorog are laying the groundwork for transformational change in an area that is rife with opportunity today and for decades to come.

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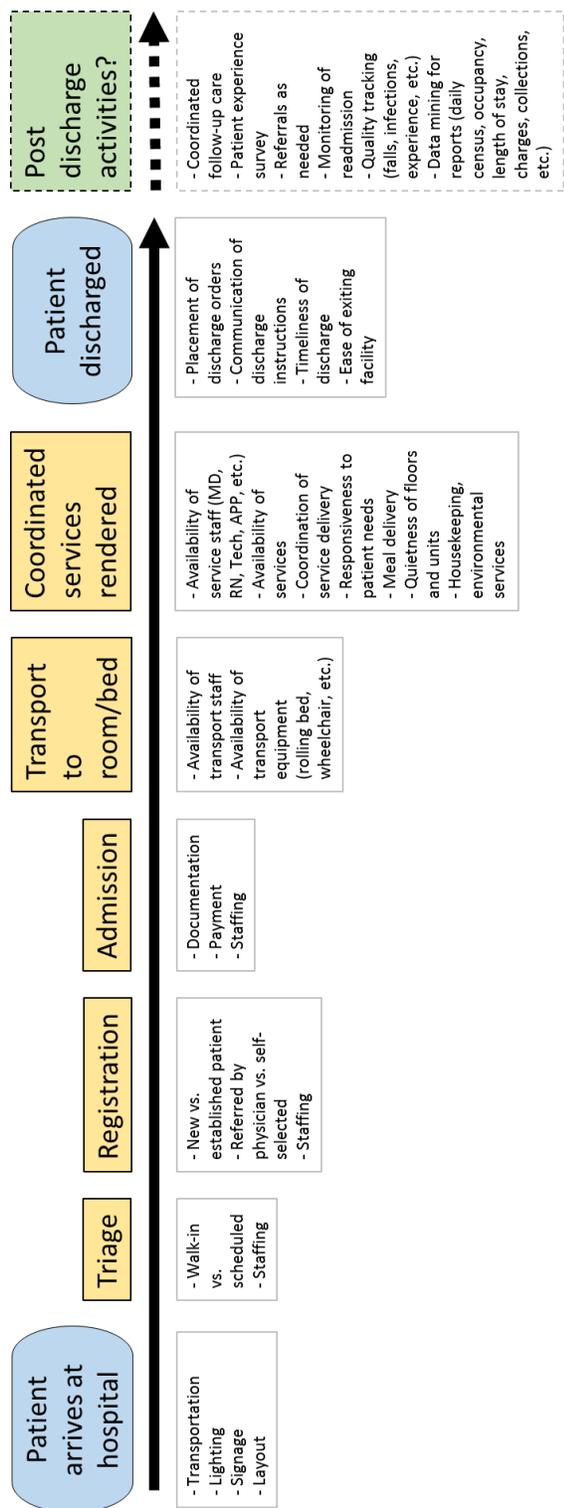
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Appendix A: Aga Khan Medical Centre, Khorog’s Expected Patient Flow and Activities

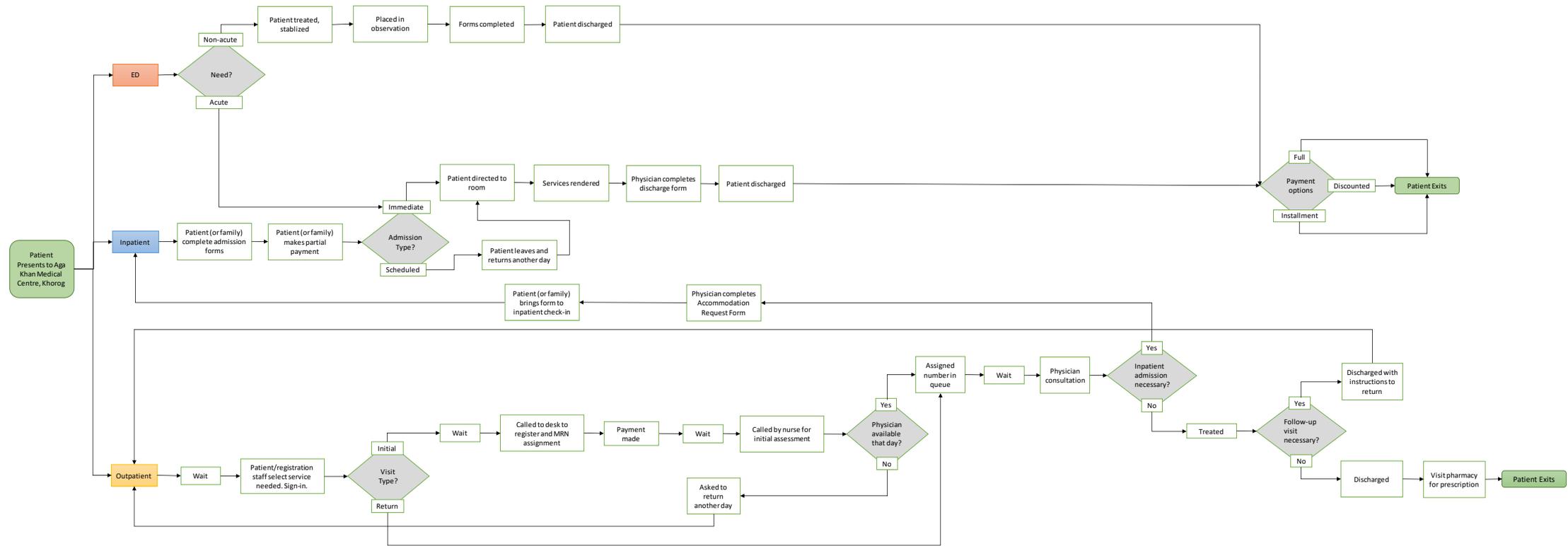


Appendix B: Inventory of Preferred Areas for Observation and Review

Aga Khan Medical Centre - Khorog: Patient Flow Checklist						
Updated: 06/09/2019						
Line	Level 1	Level 2	Yes/No			
			Is there a documented Workflow?	Are there standard operating procedures (SOP)?	Is the activity available for observation?	Are staff available for Q&A?
1	Pre-Admission	Inventory Mgmt (non-medical supplies)				
2	Pre-Admission	Inventory Mgmt (medical supplies)				
3	Pre-Admission	Inventory Mgmt (pharmaceutical)				
4	Pre-Admission	Staff Scheduling (non-medical)				
5	Pre-Admission	Staff Scheduling (medical)				
6	Pre-Admission	Patient Scheduling				
7	Patient Arrival	Transportation/Parking				
8	Patient Arrival	Signage/Map				
9	Patient Arrival	Lighting				
10	Patient Arrival	Facility Layout/Maintenance				
11	Consult/Triage	Walk-in				
12	Consult/Triage	Scheduled				
13	Registration	New Patient				
14	Registration	Established Patient				
15	Registration	Physician Referred				
16	Registration	Self-referred				
17	Admission	Patient Identification				
18	Admission	Forms				
19	Admission	Payment				
20	Inter-facility Transport	Transport Request				
21	Inter-facility Transport	Transport Equipment				
22	Service Delivery	Clinical				
23	Service Delivery	Pharmacy				
24	Service Delivery	Diagnostic				
25	Service Delivery	Imaging				
26	Service Delivery	Nutrition				
27	Service Delivery	Environmental Services				
28	Patient Discharge	Discharge Orders				
29	Patient Discharge	Discharge Instructions/Patient Education				
30	Patient Discharge	Patient Exiting Facility				
31	Post-Discharge	Patient Follow-up				
32	Post-Discharge	Patient Experience Surveys				
33	Post-Discharge	Referrals for Additional Services				
34	Post-Discharge	Quality Tracking (falls, infections, etc.)				
35	Post-Discharge	Data Mining (daily census, occupancy rates, length of stay, etc.)				

Appendix C: Aga Khan Medical Centre, Khorog's Current ED, Inpatient, and Outpatient Patient Flow

AGA KHAN HEALTH SERVICES, TAJIKISTAN
AGA KHAN MEDICAL CENTRE, KHOROG
PATIENT FLOW
ED, INPATIENT, AND OUTPATIENT PATIENT FLOW
Prepared by Salman Moti as of 07/07/2019



Appendix D: Aga Khan Medical Centre, Khorog's Paper Patient Medical Records



AGA KHAN MEDICAL CENTRE, KHOROG

CONFIDENTIAL MEDICAL RECORD

PHOTOCOPYING OF MEDICAL RECORDS IS PROHIBITED
EXCEPT BY AUTHORIZED MEDICAL RECORDS PERSONNEL

Information contained herein may be released only with the patient's written authorization, or to medical personnel presently providing care. Refer requests to the Medical Records Department.

MEDICAL ALERT		
Allergy	Prosthesis	Other

OF

|

VOL

|

Appendix E: Aga Khan Medical Centre, Khorog's OPD Patient Assessment Form

 Aga Khan Medical Center Khorog OUT PATIENT DEPARTMENT PATIENT ASSESSMENT FORM	Patient Identification & Location Patient's Full Name: _____ _____ MR#: _____	
Date: _____ Time: _____ AM/PM Age: _____ Sex: _____		
Nursing Assessment: Vital Signs: BP: _____ mm/Hg Temp: _____ °C PR: _____ /min RR: _____ /min Ht: _____ cm Wgt _____ kg Pain Score: _____ <input type="checkbox"/> Facial Pain Rating (FPR) <input type="checkbox"/> Verbal Numerical Pain (VPN)		
Nurse's Name: _____ Time: _____ Signature: _____		
Physician's Name: _____ Time: _____ AM/PM Chief Complaints: _____ _____ _____ _____		
Present Illness: _____ _____ _____		
Past History: _____ _____ _____		
Drug History: _____ _____		
Nutritional & Birth History: _____ _____		
Vaccination: _____		
Family History: <input type="checkbox"/> CAD <input type="checkbox"/> HTN <input type="checkbox"/> DM <input type="checkbox"/> Asthma <input type="checkbox"/> TB <input type="checkbox"/> Stroke <input type="checkbox"/> Cancer <input type="checkbox"/> Other: _____		
Psychosocial: Mood: <input type="checkbox"/> Calm <input type="checkbox"/> Angry <input type="checkbox"/> Sad <input type="checkbox"/> Tearful <input type="checkbox"/> Anxious <input type="checkbox"/> Withdrawn <input type="checkbox"/> Others: _____		
Socioeconomic: Marital status: <input type="checkbox"/> Single <input type="checkbox"/> Married <input type="checkbox"/> Divorced <input type="checkbox"/> Widow(er) # of Children: _____		
Living situation: <input type="checkbox"/> Staying alone <input type="checkbox"/> Spouse <input type="checkbox"/> Children <input type="checkbox"/> Friends <input type="checkbox"/> Relatives Other: _____		
Economic situation: <input type="checkbox"/> Business <input type="checkbox"/> Employed <input type="checkbox"/> Unemployed <input type="checkbox"/> Student <input type="checkbox"/> Retired (if employed, occupation _____		
Habits: <input type="checkbox"/> Smoking <input type="checkbox"/> Alcohol <input type="checkbox"/> Tobacco <input type="checkbox"/> Others: _____		
AKMC,K 04/MUL/01	December, 2018	Revision #00

PHYSICAL EXAMINATION

General Appearance:

CNS:

HEAD:

Eye:

ENT:

NECK:

RESP. SYS.

CVS:

GIS:

UGS:

Extremities:

LAB & RAD Investigations:

DIAGNOSIS:

Need for Admission: YES NO

Follow up need: YES NO

Referrred to: Physiotherapy KOGH Other _____

Medication Prescribed:

Attending Physician's Name and Signature: _____ Date: _____

AKMC,K 04/MUL/01

December, 2018

Revision #00

Appendix F: Aga Khan Medical Centre, Khorog's Inpatient Accommodation Request Form



Aga Khan Medical Centre, Khorog

ACCOMMODATION REQUEST

INSTRUCTIONS:

1. The form is filled by the concerned physician
2. Give request form to the patient and forward him/her to the Cash Office
3. Doctors are requested to keep the third copy of all admissions and drop it in the OR Booking Box in case of surgery
4. Patients are requested to submit one copy to the Finance Office

PLEASE NOTE Illegible, incorrect and/or incomplete information does delay the admission process!

SECTION A: Patient Information

(Information received from the patient or patient's relative)

1. PATIENTS'S FULL NAME
a) Family Name _____
b) First Name _____ c) Middle Name _____
2. Patient's MR (Medical Record) Number

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3. Patient's Full Address _____
4. Mobile Phone Number(s) _____
5. Sex Male Female
6. Date of Birth/Age _____

SECTION B: Admission Data

(To be completed by Physician)

7. Admitting Physician _____ Phone #. _____ 8. Referring Physician _____ Phone # _____
9. Provisional Diagnosis at the time of Admission _____
10. Proposed Date Of Admission _____ Reporting Time in Cash Office _____ 11. Estimated Length of Stay _____ days
- Surgical Procedure Planned (if any) _____
13. Type of care requested () HDU () NICU () ER () IPD Ward _____ By Doctor _____
14. Propose Date of surgery if any _____ Type of bed requested by Patient/Attendant: () SB () DB () GWB
15. Status

INPATIENT: () Regular () Day Care

DAY CASE: () Day Surgery () Endoscopy: Other _____
--
16. Operating Room (in Minutes)

() 0 - 15	() 16 - 30	() 31 - 45	() 46 - 60	() 61 - 90
() 91 - 120	() 121 - 150	() 151 - 180	() 180 - 210	() 211 - 240
17. Initial Deposit Required TJS: _____

(Signature of Physician)

(Date)

(Signature of Finance Officer)

DISTRIBUTION: 1 COPY: PATIENT 1 COPY: FINANCE OFFICE 1: COPY: In-patient's file

AKMC_K 33/ FIN 01

March 2019

Revision # 00

Appendix G: Aga Khan Medical Centre, Khorog's Pharmacy Receipt


AKMS, K

Чек № 3710 от 05.07.2019 14:46:53
 Отдел: Pharmacy Department

**Обмен или возврат купленных лекарств,
 осуществляется при наличии чека на день
 покупки!**

=====

Пакет для расфасовки 60мм x 80мм (60мм x
 80мм / T20160430 / 31.05.2029), (шт)

1.000 x 0.05

=====

ИТОГО:	0.05
Наличные	0.10
 СДАЧА	 0.05

Фармацевт: Гуломайдаров В.

Спасибо за Ваш выбор!

Appendix H: Picture of a large bottle of medication sourced from the IDA Foundation repackaged into a small plastic bag for distribution to a patient on an inpatient floor of the hospital

