



Capacity Building in Urban Mongolia: Evaluating Optimal Strategies to Improve Pediatric Medical Training From Abroad

Citation

Neumann, Natalie. 2015. Capacity Building in Urban Mongolia: Evaluating Optimal Strategies to Improve Pediatric Medical Training From Abroad. Doctoral dissertation, Harvard Medical School.

Permanent link

<http://nrs.harvard.edu/urn-3:HUL.InstRepos:17295882>

Terms of Use

This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA>

Share Your Story

The Harvard community has made this article openly available.
Please share how this access benefits you. [Submit a story](#).

[Accessibility](#)

HISTORY:

Mongolia, perhaps best known to Americans as the nomadic, horse-loving homeland of Chinggis Khan, is today an independent country wedged between Russia and China. Its history is the consequence of that geography: its story is that of a small nation struggling to maintain independence from its larger, more powerful neighbors. Today, the country known as Mongolia represents a region which historically was only Outer Mongolia; Inner Mongolia, the more resource-rich region, is now a province of northern China. This division, frequently attributed to the collapse of the Manchu-Qing Empire in China in 1911, when the Bogd Khaanate was declared the new and independent theocratic government of Outer Mongolia, in truth originated in 1634. That year the Manchus took control of Inner Mongolia and organized it separately from Outer Mongolia, which they occupied in 1697.

During the course of its fifteen-year reign the Bogd Khaanate would struggle to maintain independence from China. It was this reality which ultimately compelled an allegiance with Russia in the 1920's, leading to the Mongolian Revolution of 1921 and the official establishment of the Mongolian People's Republic in 1924. From 1921 onwards, Mongolia was effectively a Soviet satellite, if nominally autonomous nation.

The balance of power would shift again in 1990 with the decline of the Soviet Union. Mongolia would again declare itself a fully autonomous nation, this time divorced of Soviet influence and possessed of a parliamentary democracy. The subsequent ten years, while politically stable, were a decade of fiscal hardship as the country adjusted to the lack of Soviet support and adopted a market economy; by the late 2000's however, the country would have the fastest growing economy in the world. Recent years have continued to show promising, if variable growth. Focused development of the mining sector and exportation of other natural resources – of which Mongolia has many – have spurred strong, if potentially unsustainable and asymmetrically-distributed economic development.¹ Poverty has decreased in the last decade although much of the population remains poor and the unemployment rate high.

STATE:

Today Mongolia is the fifth largest country in Asia and the second largest land-locked nation in the world.² It has a democratic parliamentary government called the State Great Khural which is directed by a prime minister. A president is also elected once every four years and has the power to appoint federal judges. Of the many parties in parliament (the State Great Khural), two predominate: the Democratic Party and the Mongolian People's Party (formerly the Mongolian People's Revolutionary Party). Today the executive, legislative, and judicial branches are all controlled by the Democratic Party.

The nation's greatest ongoing challenges are largely considered to be: desertification, water scarcity, urban air pollution, and environmental disaster precipitated by climate change. Infrastructure and trade routes (both national and international) need continued development. In Ulaanbaatar specifically, host to over half the country's population, gridlocked traffic, inadequate education resources, and insufficient infrastructure for provision of electricity and heating require investment. Furthermore, the ger district (shantytown), which houses over 60% of UB's population, lacks access to running water and

¹ Asian Development Bank. (2014 April). *Asian Development Bank and Mongolia: Fact Sheet*. Retrieved from <http://www.adb.org/publications/mongolia-fact-sheet>

² World Health Organization. (2011). *Mongolia Country Profile*. Retrieved from http://www.wpro.who.int/countries/mng/18MOGpro2011_finaldraft.pdf?ua=1

sanitation.³

ECONOMY:

Mining, agriculture, and trade are the greatest single contributors to gross domestic product (GDP). Ninety percent of Mongolia's exports in 2014 went to China. Canada and Russia were its next greatest exporters. Approximately forty percent of imports to Mongolia come from China, followed by Russia and Korea.

Mongolia has a negative net factor income of -1165.7 billion tugriks as gross domestic product (GDP) stands at 17550.2 and gross national income (GNI) at 16384.4. It is also worth mentioning that Mongolia also has a negative trade balance of -2088.88 billion tugriks per year.⁴ The most recent GINI coefficient was calculated in 2008 at 36.5. Given the country's recent rapid economic development however, this figure may not be accurate currently.⁵ Over half the population is employed in agriculture and industry. The 2014 unemployment rate stood at 7.9%, which is approximately where it has hovered for the last three years.⁶ It counts only those persons who apply for unemployment insurance.

DEMOGRAPHICS

On July 1, 2013 the population stood at 2.9 million with a two person per kilometer population density. This statistic makes it the least population-dense country in the world even as 68.1% of the national population lives in the urban setting. An estimated 2.81% of the population has migrated annually from the countryside to urban settings since 2010.⁷ The CIA reports that in 2014 persons under 15 comprised 26.8% of the population, those between 15 and 64 years of age represented 67.3%, and persons 65 and over made up 4.0%.^{8 9} In 2014 the World Bank estimated that 29.8% of the population lived at or below the national poverty line. This statistic represents an increase since 2012's 27.4% estimation; nevertheless, both numbers are a significant decrease from 2010 wherein 38.7% of the population was reported to live in poverty.¹⁰ Notably, despite this poverty rate, Mongolia's adult literacy rate was reportedly 97.8% in 2012. This statistic may reflect the country's abiding respect for education or else an insufficient definition for literacy.^{11 12}

HEALTH PROFILE

³ The ADB in its country review also notes that "Poor infrastructure and undeveloped trade systems leads to costly transport, complex logistics, and long transit times. Trading across borders is difficult and expensive. As a result, the cost of essential imports – including food – is driven higher, and the competitiveness of Mongolian exports is eroding." (Asian Development Bank. (2014 April). *Asian Development Bank and Mongolia: Fact Sheet*. Retrieved from <http://www.adb.org/publications/mongolia-fact-sheet>)

⁴ Asian Development Bank. (2014). *Key Indicators for Asia and the Pacific 2014: Mongolia*. Retrieved from <http://www.adb.org/sites/default/files/publication/43030/mon.pdf>

⁵ United Nations Development Programme Human Development Reports. (2013) *Income GINI Coefficient*. Retrieved from <http://hdr.undp.org/en/content/income-gini-coefficient> The World Bank. (2015) *GINI index (World Bank estimate)*. Retrieved from <http://data.worldbank.org/indicator/SI.POV.GINI?page=1>

⁶ Asian Development Bank. (2014). *Key Indicators for Asia and the Pacific 2014: Mongolia*. Retrieved from <http://www.adb.org/sites/default/files/publication/43030/mon.pdf>

⁷ Central Intelligence Agency. (2014 June). *The World Factbook : East & Southeast Asia :: Mongolia*. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/print/country/countrypdf_mg.pdf

⁸ World Health Organization. (2011). *Mongolia Country Profile*. Retrieved from http://www.wpro.who.int/countries/mng/18MOGpro2011_finaldraft.pdf?ua=1

⁹ Central Intelligence Agency. (2014 June). *The World Factbook : East & Southeast Asia :: Mongolia*. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/print/country/countrypdf_mg.pdf

¹⁰ World Bank. (2012, April 17). Poverty Level Estimated at 29.8 Percent in Mongolia. *The World Bank News & Views*. Retrieved from <http://www.worldbank.org/en/news/press-release/2012/04/17/poverty-level-estimated-at-nearly-30-percent-in-mongolia>

¹¹ World Health Organization. (2011). *Mongolia Country Profile*. Retrieved from http://www.wpro.who.int/countries/mng/18MOGpro2011_finaldraft.pdf?ua=1

¹² Rossabi, M. Personal communication, 9, February, 2015.

In the last quarter century Mongolia's health profile has transformed. Since the 1990's both death and fertility rates have declined. The fertility rate, at 4.3% in 1990, dropped to 1.9% in 2003-2006; by 2012 it had crept up to 2.4%. Similarly, the population growth rate was 2.7% in 1990, 1.2% from 2003 to 2006, and 1.37% in 2014.^{13 14}

Today the infant mortality rate rests at 23.15 deaths per 1,000 live births.¹⁵ The adult mortality rate (between ages 15 and 60) in 2012 was reported at 187 per 1000 persons for men and 124 for 1000 persons for women.^{16 17} The average life expectancy is 67 years.¹⁸ Notably, morbidity and mortality patterns have transformed with Mongolia's socioeconomic development. Communicable and respiratory disease has declined while neoplasia, cardiovascular disease, injuries, and poisonings have increased.¹⁹ Respiratory disease nevertheless remains the nation's leading cause of morbidity.²⁰ It is followed by gastrointestinal, genitourinary, and cardiovascular disease, in that order. Cardiovascular incident, malignancy, injuries, and gastrointestinal disease are, listed by incidence, the leading causes of mortality.²¹

Total healthcare spending has increased with GDP over the last several years and is the fifth greatest government expenditure.²² The World Bank and World Health Organization's most recent figures report that in 2012 total health expenditure represented 6.3% of GDP.²³ 62.8% of that expenditure was public, a decrease since the 1990's and early 2000's when public expenditure comprised approximately 80%.²⁴
25

FOREIGN AID:

In 2012 Mongolia received nearly 449 million USD in net official development assistance, this figure represents 4.8% of GNI and denotes a nearly twofold increase in aid since 2000.^{26 27} Japan, the United States, and the Asian Development Bank are, in that order, Mongolia's greatest donors. Social

¹³ World Health Organization. (2011). *Mongolia Country Profile*. Retrieved from http://www.wpro.who.int/countries/mng/18MOGpro2011_finaldraft.pdf?ua=1

¹⁴ Central Intelligence Agency. (2014 June). *The World Factbook : East & Southeast Asia :: Mongolia*. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/print/country/countrypdf_mg.pdf

¹⁵ Central Intelligence Agency. (2014 June). *The World Factbook : East & Southeast Asia :: Mongolia*. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/print/country/countrypdf_mg.pdf

¹⁶ World Health Organization. (2014 May). *Mongolia: health profile*. Retrieved from <http://www.who.int/gho/countries/mng.pdf?ua=1>

¹⁷ Note that statistics on adult mortality rates vary according to source. Another WHO account lists the same adult mortality rate as 314 out of 1000 for men and 150 out of 1000 for women. World Health Organization. (2014 May). *Mongolia: health profile*. Retrieved from <http://www.who.int/gho/countries/mng.pdf?ua=1>

¹⁸ The World Bank. (2015). *Mongolia. The World Bank: Data*. Retrieved from <http://data.worldbank.org/country/mongolia>

¹⁹ World Health Organization. (2011). *Mongolia Country Profile*. Retrieved from http://www.wpro.who.int/countries/mng/18MOGpro2011_finaldraft.pdf?ua=1

²⁰ World Health Organization. (2011). *Mongolia Country Profile*. Retrieved from http://www.wpro.who.int/countries/mng/18MOGpro2011_finaldraft.pdf?ua=1

²¹ <http://hiip.wpro.who.int/portal/CountryProfiles/Mongolia/HealthProfiles/TabId/188/ArtMID/991/ArticleID/73/Default>

²² Asian Development Bank. (2014) *Key Indicators for Asia and the Pacific 2014: Mongolia*. Retrieved from <http://www.adb.org/sites/default/files/publication/43030/mon.pdf>

²³ The World Bank. (2015). *Health expenditure, total (% of GDP). The World Bank: Data*. Retrieved from <http://data.worldbank.org/indicator/SH.XPD.TOTL.ZS/countries>

²⁴ The World Bank. (2015). *Health expenditure, public (% of total health expenditure). The World Bank: Data*. Retrieved from <http://data.worldbank.org/indicator/SH.XPD.PUBL/countries>

²⁵ The ADB reports that in 2014 total governmental expenditure represented 2.9% of GDP, a decrease since 2012. (Asian Development Bank. (2014) *Key Indicators for Asia and the Pacific 2014: Mongolia*. Retrieved from <http://www.adb.org/sites/default/files/publication/43030/mon.pdf>)

²⁶ The World Bank. (2015). *Net official development assistance and official aid received (current US\$). The World Bank: Data*. Retrieved from <http://data.worldbank.org/indicator/DT.ODA.ALLD.CD>

²⁷ The World Bank. (2015). *Net ODA received (% of GNI). The World Bank: Data*. Retrieved from <http://data.worldbank.org/indicator/DT.ODA.ODAT.GN.ZS/countries>

Infrastructure (healthcare, educational, and social welfare systems) takes a third and greatest portion of development funds. It is followed by economic infrastructure development which receives one fifth.

Healthcare in Mongolia:

The following is a broad-brushstrokes overview of the modern medical system in Mongolia. It begins with a historical overview as so many of the problems encountered today are rooted in the recent past. It continues with a brief summary of selected issues affecting the modern healthcare system. This summary is broken into three sections: the first treats issues that directly affect care, the second practitioner experience, and the third larger systemic problems.

HISTORY:

Traditionally, medicine in Mongolia has been conducted by shamans, Mongolian Buddhist healers, acupuncturists, bonesetters, and countryside healers. The tradition continues, as even today, most public hospitals in Mongolia have both modern and traditional wings. The country's first system of "modern" medicine was structured under the Semashko model introduced by the Russians in the early twentieth century when that country (effectively, if not officially) controlled Mongolia. The Semashko model created a system of free national healthcare in which the state was responsible for delivering and financing healthcare. The Soviet model also presumed that health services (from primary to intensive care) were to be provided almost exclusively in the inpatient setting. This philosophy led to the establishment of a large, diffuse hospital network with intense human resource requirements.²⁸ In 1990, when the Soviet subsidies needed to support this large network of hospitals ceased, the system underwent partial privatization. Despite the larger systemic and political changes, much of the thinking regarding healthcare provision remained the same.

Mongolia has made great strides since 1990 in revising its healthcare system and adapting it to a market economy. This accomplishment is no small feat given the country's modern history of severe socioeconomic hardship. Still, there are several challenges existent today which trace to the Soviet era. Most patients still expect hospitalization for the treatment and diagnosis of even more minor medical problems. This reality understandably strains government finances and clinician time, and perpetuates the existing expansive hospital network and healthcare sector. There has indeed been some shift to outpatient treatment in the past twenty years, especially as private hospitals, capitalizing on their presumed superiority to public institutions, build clinics. It is challenging, however, to establish successful public outpatient clinics given the current system of reimbursement.²⁹

ISSUES OF CARE:

Access to Healthcare: The CIA reports a 2.79 to 1000 doctor to patient ratio (a relatively high proportion); however this statistic does not reflect the unequal distribution of physicians in the country.³⁰ As in many countries, doctors are concentrated in the capital and scarce in the countryside. Most prefer to stay in UB after medical school for both professional and personal reasons.

²⁸ Operations Evaluation Department, Asian Development Bank. (2008 October) *Mongolia: Health and Social Protection*. Retrieved from <http://www.oecd.org/countries/mongolia/42227662.pdf>

²⁹ Beyond the scope of this report is a full exploration of national efforts to fill the PCP void. Of note, traditional (alternative) medical practitioners very frequently function as primary care givers in both the countryside and cities. Multiple national and international projects exist to promote traditional medicine in order to increase the overall supply of practitioners with a mind to preventive care and countryside practice.

³⁰ Central Intelligence Agency. (2014 June). *The World Factbook : East & Southeast Asia :: Mongolia*. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/print/country/countrypdf_mg.pdf

In countryside soums (districts), healthcare access is challenged by lack of infrastructure, remote location, and residents' nomadic lifestyle. Similarly UB's public hospitals, built during the Soviet-era when the capital was less than half its current size, are clustered in the town center. They are on average an hour's commuting distance by car from the ger districts (shantytowns) that house about 60% of the city population. Furthermore, unless individuals are registered with the government – a difficult task, especially for the many recent city immigrants – they are not eligible for social services including health care, education, and disability or unemployment insurance.³¹

While the majority of the population goes to public institutions where care and medications are ostensibly paid for by national health insurance, wealthy inhabitants of UB seek treatment in higher quality private hospitals. The ADB, in its analysis of this phenomenon, reported “there is a risk that the health system will become a dual system in which public facilities are used by the poor and private facilities by the better off.”^{32 33}

Hospital System:

The public hospital system in Ulaanbaatar is organized as follows: there are nine UB district and twenty-one aimag (province) hospitals considered “second level hospitals” which treat people in their vicinity. (“First level” hospitals perform primary care and treat minor maladies. They are distributed throughout the nation.) District facilities feed to the five “zone” hospitals. These include the West zone (Bayan-Ulgii, Govi-Altai, Zavkhan, Uvs, and Khovd), the Forest zone (Arkhangai, Bayankhongor, Bulgan, Uvurkhangai, Orkhon, and Khovsgol), the Central zone (Govisumber, Dornogovi, Dugovi, Umnugobi, Selenge, Tuv, and Darkhan-Uul), the East zone (Dornod, Sukhbaatar, and Khentii), and Ulaanbaatar.

The zone facilities in turn refer to the UB hospitals, either the large tertiary care institutions: NCMCH, and hospitals one, two, and three, or else to the larger specialty centers. The specialty facilities, known as “National Centers” are many. They include: infectious disease, oncology, psychology, trauma, orthopedics, zoologic disease, dermatology, and gerontology. There are also centers for pathology (autopsy), blood bank, and public health. Even the generalist hospitals one, two, and three are somewhat specialized. All neurosurgery and cardiothoracic surgery in the country is performed at hospital three.³⁴ Hospital one receives most proctology. Hospital two was formerly the hospital for government officials and today remains unspecialized.

The national centers, by and large, also have emergency departments. Given that the field of emergency medicine does not exist in Mongolia, emergency departments reflect their hospital's specialty. That is to say, emergency rooms are staffed by practitioners of a hospital's given focus, or else by generalists with extensive experience in that given field. (Cardiologists at the cardiac hospital, oncologist at the oncology hospital, etc.)³⁵

³¹ Operations Evaluation Department, Asian Development Bank. (2008 October) *Mongolia: Health and Social Protection*. Retrieved from <http://www.oecd.org/countries/mongolia/42227662.pdf>

³² Operations Evaluation Department, Asian Development Bank. (2008 October) *Mongolia: Health and Social Protection*. Retrieved from <http://www.oecd.org/countries/mongolia/42227662.pdf>

³³ That quote continues with: “... Such enterprises may, for instance, bypass the HIF (health insurance fund) by registering individuals under subscription payments and charging fees or by entering into service contracts of PHC services with private enterprises.” (Operations Evaluation Department, Asian Development Bank. (2008 October) *Mongolia: Health and Social Protection*. Retrieved from <http://www.oecd.org/countries/mongolia/42227662.pdf>)

³⁴ Hospital three also has a cardiac catheterization laboratory.

³⁵ Amital, A., and Lundeg, G. (2006, July). Emergency Medicine in Mongolia. *Common Sense*. Retrieved from http://www.aaem.org/UserFiles/file/julyaug06_em-mongolia.pdf

The private hospital system is not organized similarly. It includes both traditional and Western-style hospitals. By and large these facilities are general, their greatest differentiation lies in the populations they serve and the style of medicines they utilize. Of the Western hospitals, many have tertiary-care level facilities if not always a full staff to support them. There are some more specialized clinics – maternity clinics for example – but specialization is by and large the province of the public hospitals.

Insurance and Inpatient Services: Adult admissions are strictly limited to ten days, regardless of pathology, prognosis, or disease course. If a patient requires continued care, he or she must go to a different facility for another ten days. Government insurance, available to all citizens, covers ninety percent of hospital costs. Pediatric inpatient stays are unlimited and public insurance pays for all necessary services except those outsourced to private hospitals. CT and MRI, for example, are frequently unavailable in public hospitals; for such imaging patients must go to separate facilities and pay out of pocket. Also note that unlike in some countries, public reimbursement is not linked to hospital performance.³⁶ As one would expect, admission to private hospitals requires the purchase of private insurance or payment out of pocket.

Pharmacy: All publically-prescribed inpatient medications are bought for hospitals by the government. Mongolian companies contract with foreign pharmaceuticals and bid against one another to supply public hospitals. Mongolia does have an indigenous pharmaceutical industry, but most medications come from Europe, Asia, and America. Quality control is determined by the contracting companies. All FDA approved medications are permitted in Mongolia, per a recent government law. (Previously all medications had to be re-approved by the Mongolian Ministry of Health. Now, if they have been certified by the FDA, they may be imported immediately.) Medication shortage is reportedly an issue in adult hospitals. When supply runs out at a given facility before the next shipment arrives, the patient's family must purchase the drug at a private location out of pocket. There have been no such shortages at NCMCH in the last two to three years.

In the outpatient setting selected few medications are free and provided by the government (insulin for diabetics and pain medications for oncologic patients, for example). Certain other common and generic medications may also be discounted by the government (i.e. partially covered by insurance). Other drugs must be paid out of pocket. As one would expect, Mongolian drugs are cheaper and hence more attractive to patients than those which are imported.

Technology: There are, in the public and private sectors combined, approximately ten CT's and ten MRI's, a significant increase since the reported three and zero reported in 2006.³⁷ There are numerable X-rays and Ultrasounds in country. NCMCH alone reports twenty-five ultrasounds and five x-rays.

PRACTITIONER EXPERIENCE:

Medical School and Residency Training: The six years of medical training are most commonly undertaken at the National Health and Sciences University, home to approximately seventeen hundred students. It uses a case-based learning approach and teaches by organ system.

³⁶ The World Bank, Human Development Sector Unit East Asia and Pacific Region. (2007, January) *Mongolian Health Systems at a Crossroads: An Incomplete Transition to a Post-Semashko Model*. Retrieved from http://www-wds.worldbank.org/servlet/WDSContentServer/IW3P/IB/2007/03/14/000020439_20070314133155/Rendered/PDF/390140PAPER0M0G0Health0report01PUBLIC1.pdf

³⁷ Amital, A., and Lundeg, G. (2006, July). Emergency Medicine in Mongolia. *Common Sense*. Retrieved from http://www.aaem.org/UserFiles/file/julyaug06_em-mongolia.pdf

In 2015 residency curriculum nationally will undergo drastic reform. In years past, residency followed six years of general undergraduate medical training and two years of paid but unstructured work (i.e. no curriculum) in countryside and district hospitals. Nonsurgical residencies including obstetrics were one and a half years long. Surgical residencies were three years long and fellowship in all fields was six months.

All graduates from 2015 onwards, having completed medical school, will now do two years of paid, structured work (following a curriculum) in countryside and district hospitals. All national residencies will be four years long, regardless of type. Fellowship remains six months.

Residents, in the future as in the past, will continue to pay for residency. The hospital requires an average of 700 USD a year to train. Previously, parents most frequently paid this fee for their children. However as residency starts at around age 24 – when the average Mongolian has a family to support – many doctors have had to take part time work to support themselves and their families in addition to paying for training.

In the future, what was once a peripheral opportunity for the willing, will become the national expectation. Namely, those countryside and city district hospitals (which typically lack personnel) where physicians do their immediate two year postgraduate work will now sponsor residents in exchange for practitioner promises to return to their facility. Physicians have typically been obligated to return for approximately three years. There exists no standardized contract between residents and hospitals nationally. If a resident chooses not to partake of such an agreement for personal or professional reasons, he or she must pay for training out of pocket. It is unclear whether or not these agreements will cover for living expenses, or if residents will still need to take part-time work.

On a theoretical note, medical training at all levels – medical school, residency, and fellowship – follows an observational and apprenticeship model. Medical students, even in their final year, are observers, meaning there is no equivalent to the sub-internship in the American system. Residents are, in the words of one physician, “attending’s helpers” and do not direct patient care. Fellows have a similar role to residents, but take priority on all procedures. It is thus not until one becomes an attending that one has real, full clinical responsibility. It is unclear if this aspect of training will also be reformed under the new system.

Quality Improvement: Quality improvement projects are directed at the administrative level. For many reasons, individual physicians tend not to drive systems-level change. Factors that limit physician-inspired reform are those common to hospitals throughout the world. They include a lack of reimbursement and training in how to design projects, limited funds to enact change, and the difficulty of transforming any large, public institution. In Mongolia physicians also note that changing practice frequently requires reading English-language journals and paying for new, expensive medications with English-language instructions. Both realities present a significant challenge.

Physicians may however request small-scale changes (to schedule, facility, etc.) which must be approved by the human resources department. There is a quality assurance board that reviews all cases of patient mortality and determines necessary reforms. There are also three government representatives – one each for surgery, pediatrics, and obstetrics – which enact relevant directives from the Ministry of Health.

Brain Drain: Public to private sector brain drain is acknowledged by all to be a significant problem. Private clinics that cater to the wealthy and foreign make it their business to snap up the best residents and more experienced doctors from state clinics. If they are willing to stomach some professional instability (state hospitals provide guaranteed employment, private clinics are only as stable as the national economy), physicians will enjoy shorter hours, less bureaucracy, and salaries up to five times greater.

Clinicians' reasons for changing institutions are manifold. Most physicians in both the private and public sectors opine that differences in salary spur the change. Anecdotally, one physician who trained abroad and worked briefly in the public sector before entering private practice, reported that her ideas for clinical improvement were contingent on the support of senior physicians and/or foreign consultants. She cited her frustration with that reality, as well as improved salary, as one of the reasons for leaving to work in the private sector.

It is difficult to quantify brain drain given the reasons cited by staff for leaving departments are many and frequently do not reference changing institutions. Often, it is not until months after someone departs that their coworkers discover the physician is working at a private hospital. NCMCH noted that of its two hundred and twenty five employees, approximately ten (of their best and most experienced physicians) left for the newest tertiary care hospital alone. In 2014, an average year for hospital turnover, a total of twenty-nine doctors and thirty-six nurses left.

Career Advancement: Moving up the professional ranks in Mongolia is facilitated by a series of post-residency tests. There are approximately three levels of advancement, each of which comes with improved hours, prestige, and a salary increase of ten to twenty percent. There is otherwise no change in pay for years worked.

Medical Mindset: Historically physicians were educated in the Soviet style of medicine. This approach relies heavily on visual diagnosis. It assumes that one diagnoses and subsequently explicates the patient's symptoms and treats accordingly. This system contrasts with the contemporary western approach in which one builds a differential diagnosis from the observation of symptoms and syndromes. Physicians note that the latter technique was adopted by the national medical school in the early 2000's, but that the transition in thought is still underway. This issue is compounded by the fact that clinician scientists are very few in Mongolia: one is either a practitioner or a medical researcher. There is however expressed interest in encouraging young doctors to perform research and incorporate that critical mindset in their clinical practice.

Mongolians are no stranger to study abroad. In a way, their culture of nomadism was transmuted during the communist era when all manner of professionals were sent to countries throughout the Soviet bloc to observe, study, and train. This practice has continued since Mongolia's democratization. They are people notably open-minded to adopting foreign practices which they deem functional and efficient. Mongolians are also frequently polyglots, and the younger generation is increasingly fluent in English.

SYSTEMIC ISSUES:

Institutional Turnover: Incoming political powers may, and traditionally have replaced all government employees. Healthcare consultants note that rapid turnover manufactures short institutional memory

and complicates program implementation as new staff must be trained and projects explained anew.³⁸ Notably, after the most recent election the new government retained top employees at the Ministry of Health (as well as the director of NCMCH), a very promising sign that this practice may be discontinued.

Resource Utilization: Given its strategic geopolitical position, Mongolia receives a significant amount of foreign aid from varied and different organizations, each with their own motives and demands. This aid takes the form of medical missions, donated technology, and donated funds. See the above section on foreign aid.

Mongolian hospitals have a respectable amount of medical technology and they have successfully sent practitioners abroad for advanced training. Observation suggests that the benefits of this boon could be increased with greater knowledge of how to maintain technologies and best deploy available human capital.³⁹ A simple example of the latter phenomenon is how physicians who train or study abroad frequently and quickly transition to working at the Ministry of Health where they do not practice clinically.

Overview of the National Center for Maternal and Child Health:

The National Center for Maternal and Child Health is in District Twenty-One on the northern, more polluted side of town. It is, as the name suggests, both a pediatric and an obstetric inpatient facility. It is not the only hospital with obstetric or pediatric subspecialty care in the country or Ulaanbaatar, but it is by far the largest and the only to host residents. Note that the bulk of this review will focus on the pediatric half of the facility.

National Role in Pediatrics

NCMCH is a national center for pediatric surgery and, as explained above, is the final stop for all complicated pediatric cases nationally (from both private and public hospitals). Aimag and zone hospitals have inpatient pediatrics (including ICU's) and perform basic pediatric surgery (appendectomy, etc.). Complex surgeries are immediately transferred to UB. District hospitals also have inpatient pediatrics (and ICU's of approximately five beds), but do not perform pediatric surgery given the proximity to NCMCH. All district, aimag, and zone patients deemed too complex for local care are referred to NCMCH.

NCMCH is not the only institution that performs pediatric surgery however. Per the specialized hospital system described previously, neurosurgery, trauma, and orthopedics are performed at their respective hospitals. Those patients who undergo surgery at other facilities are not infrequently transferred to NCMCH for continued management.

Infrastructure

The hospital's six hundred fifty-eight budgeted beds, thirty inpatient subspecialty departments including pediatric emergency, pediatric and neonatal intensive care, and two outpatient departments (general pediatrics and reproductive health) are staffed by two hundred twenty five physicians. (The entire staff totals 1,125 persons.) All departments practice western medicine, although acupuncturists and massage

³⁸ Warburton, D. Personal communication, January 13, 2015.

³⁹ Visitors to Mongolia have noted that relatively poor equipment maintenance undermines the applicability of said technologies. Amital, A., and Lundeg, G. (2006, July). Emergency Medicine in Mongolia. *Common Sense*. Retrieved from http://www.aaem.org/UserFiles/file/julyaug06_em-mongolia.pdf

therapists are available on request. (They are employed by the two rehabilitation departments – one pediatric, one obstetric.)

The hospital has nine buildings with constant access to electricity. It has 24/7 internet connection at 12 megabyte speed. It has a conference room with a large screen TV where most telemedicine conferences take place. Multiple party video chat is available. All labs are performed in-house except rare studies which are sent out to private laboratories. The five X-ray and twenty-five ultrasound machines are present in the hospital, but CT and MRI are only available at a neighboring private hospital at approximately 100 USD per use. Most medical devices have English-language instructions, some are exclusively in Korean and Chinese. Foreign engineers train hospital staff in how to use technology and are called in from their respective countries when repairs are needed. The facility also has a catheterization lab and dialysis machine, new as of the last three years.

Admission Statistics

In 2013, 37,171 pediatric and obstetric patients were admitted to the hospital, 36.5 percent of whom were referred from the countryside. The overall length of stay averaged 6.3 days.⁴⁰ The overall mortality rate was 1.02 percent. These figures represent a 12.1 percent increase in admissions and 21.5 percent decrease in mortality rate since 2009.⁴¹

The Children's Hospital (TCH) section of NCMCH has 402 beds, representing 61% of the hospital total. The Obstetric section has 256, at 39%. Of those 402 pediatric beds, 63% are medical, and 37% surgical. 2013 saw 121,294 overall pediatric visits and 17,005 pediatric admissions. Pediatric patients are admitted until sixteen years of age, or until they complete high school. The NICU is open and accepts all patients up to twenty-six days of age. Average pediatric length of stay in the last five years has ranged from 8.1 to 8.3 days. The bed fund was 372.⁴² Of admitted patients, 72% came from urban and 28% from rural regions. The overwhelming majority are from low-income families. The hospital does not keep track of how many patients' families have incomes below the poverty level given their care is equivalent and NCMCH is paid the same amount by government insurance regardless of patient income level. Administrators do note that all of the country's poor children come to the hospital as they have no other option. Wealthier children who may initiate care at a private hospital will also be transferred to NCMCH should they decompensate or their cases be deemed too complex for that institution.⁴³

Morbidity and Mortality

The overall mortality rate at TCH in 2013 was 1.2 percent, having ranged from 1.0 to 1.6 in the last five years. The 24-hour mortality rate was 14.2%, ranging from 9.2 to 14.2% in the last five years. 92.3% of those deaths were confirmed with autopsy. Note that excluding surgical cases, the mortality rate was 1.5. and 24-hour mortality rate 14.7%. The 2013 infant mortality rate was 16.1 per 1000 live in-hospital births and perinatal mortality rate is 23.4 per 1000 births. Maternal mortality in 2013 was 8.9%, a 18.4% decrease from the year prior.⁴⁴

⁴⁰ Ibid.

⁴¹ Note that the decrease in mortality is likely due to significant decreases in maternal mortality.

⁴² The "bed fund" represents the total number of days in a year that a bed is utilized. As there are 365 days in a year, this figure shows that on average, not only are all beds occupied, but sometimes by more than one patient. I.e. any bed vacated by a patient in the morning is immediately possessed by another in the afternoon.

⁴³ N. Gendenjamts's Memorial National Center for Maternal and Child Health. (2013) *Health Indicators 2013*. Ulaanbaatar: Department of Statistics and Informatics.

⁴⁴ Ibid.

The following represent the leading causes of pediatric mortality (combining both medical and surgical departments). They are calculated out of a total 197 deaths:

- 25.4% — perinatal complications
- 33.0% — congenital abnormalities
- 8.6% — diseases of the central nervous system
- 8.1% — gastrointestinal disease
- 3.9% — respiratory pathology
- 7.1% — oncologic disorder
- 2.4% — cardiovascular disease^{45 46}

Out of the total 143 patients who died in nonsurgical departments, 28% succumbed to perinatal complications, 25.9% to congenital abnormalities, 11.2% to CNS disorder, et. al.

The greatest causes of inpatient pediatric morbidity, calculated against a total of 16,811 patients, were diseases associated with the gastrointestinal system (17.5%), respiratory track (15.6%), perinatal complications (12.7%), and central nervous system dysfunction (7.6%). Among non-surgical patients, the foremost causes of morbidity were, against a total of 9226 patients, 23.2% from perinatal complications, 18.5% from respiratory pathology, and 13.8% from CNS disorder.⁴⁷

Training

Because NCMCH is the country's largest pediatric tertiary care facility, it also functions as the sole pediatric training site. It hosts a total eighty residents, forty pediatric and forty obstetric. Twenty of those pediatric residents are officially coordinated by the hospital itself and the other twenty by the National Health and Sciences University. The former program is considered to place a greater emphasis on clinical exposure, the latter on didactics. The groups perform equally on end of year exams. The medical school is planning to build a new hospital where it will house its own residents in the future. (All forty obstetrics residents belong to the NCMCH program.)

During training residents rotate at clinics affiliated with the main hospital including a psychiatric ward, hospice, and centers for infectious disease and oncology. Resident curriculum, which is the same for both NCMCH and University residents, is laid out with a series of learning goals in the following categories: skills, knowledge, and "attitude" (professional goals). There are numerous lectures and tests throughout the year to ensure adequate learning. NCMCH also hosts seventeen subspecialty fellowships in pediatrics and Ob/Gyn. Fellows do not rotate on other services during their six months of training.

Although medical students rotate through the hospital as well, NCMCH is not their only training site. They may choose to rotate at district hospitals as well.

As previously mentioned, Mongolia follows an observational and apprenticeship model of education. The same is true at NCMCH. Hospital administrators have openly expressed interest in reforming residency curriculum and structure with the help of foreign consultants.

⁴⁵ It is worth noting that these figures are altered slightly (although the relative incidence remains the same) when surgical cases are excluded.

⁴⁶ Only 0.5% mortality results from infectious and parasitic causes, 0.5% from endocrine and metabolic disease (including diabetes) and 1.0% from injuries and poisoning.

⁴⁷ N. Gendenjamts's Memorial National Center for Maternal and Child Health. (2013) *Health Indicators 2013*. Ulaanbaatar: Department of Statistics and Informatics.

Educational Resources

On the wards English-language literature predominates. Harriet Lane, Lexicomp, and Hinari are cited as the most frequently used texts. In 2014 the hospital had access to UpToDate but was unable to pay the subscription fee in 2015. Physicians who speak some English report that while they understand the gist of these materials, they are not entirely comfortable with their nuance. There are however Mongolian, as well as English, Russian, and other language textbooks in the hospital library.

Physicians also refer to guidelines known as the “Mongolian National Standards.” These are recommendations determined by the Mongolian government following review of various international and national standards. Mongolian physicians by and large did not report reading international journals such as the Lancet or New England Journal of Medicine, but they noted their own research center publishes a biannual Mongolian language journal, called the “Journal of Obstetrics/Gynecology and Pediatrics.” It covers new national and international research in those two fields. Its sections include: a review of research, opinions, manuscripts, specialist recommendations and consultations, case reports, “reminiscences of senior scientists,” and other NCMCH specific news and events.

Physician Experience

In general, physicians work weekdays from eight in the morning until four or five in the afternoon. Weekend shifts and night call rotate amongst members of a department, with a night shift averaging 27 hours in total. Most physicians have trained at the national medical school and older physicians have frequently done some amount of post-graduate training in the former Soviet Union. Younger physicians and the current head of the hospital have rotated through the United States and Western Europe.

It is important note that the hospital reports that approximately half of all staff speaks some amount of English. Observation suggests, and staff confirm, that there is at least one physician per department who can communicate fluently and with medical terminology.⁴⁸ Almost all other staff members are literate (given most textbooks are written in English) and by and large they understand spoken English (even if they cannot speak themselves). The foreign relations office has fluent staff members who may place visitors with house staff of sufficient language skill.

Brain drain in the hospital, as with the nation at large, is significant and detrimental. See the previous section on brain drain for NCMCH specific estimates. Administrative and ministry-level turnover, while recognized by staff to be a problem on a national level, anecdotally did not appear to affect daily moral or performance. As one physician observed, she had held the same position working with trainees for seventeen years, regardless of hospital leadership. However, staff members asked did agree that to ensure greater sustainability, an exchange program should be based at the hospital or university, rather than ministry level.

Foreign Aid

Both international organizations including the World Health Organization, UNICEF, and United Nations Population Fund, as well as private institutions from Switzerland, the United States (Children’s Hospital, Los Angeles), Japan, Australia, Luxembourg, Thailand, and Russia have visited on service missions and/or to enact programs of quality and systems improvement. Among these, Luxemburg has established a subnational telemedicine project to connect all twenty-one regional hospitals to NCMCH for

⁴⁸ Staff judge that the PICU, NICU, pediatric surgery, and pediatric cardiology departments have the highest numbers of fluent English speakers.

gynecological consultation. UNICEF similarly funds a telemedicine system that connects NCMCH to two central district hospital as well as aimag hospitals in Tuv and Khuvsgul for ICU consultation. Mongolians note that they have many foreign visitors to their hospital but that there is no global health rotation or any means by which they may rotate through other countries to experience care in another national setting.

All financial donations to NCMCH are listed on their website per government regulations. In 2014 the two largest donors were the Australian government with seven million euros, and the Japanese government with four and a half million euros; the funds from both countries were used to buy hospital supplies.

Delineation of Hospital Needs:

Given the above findings, several issues stand out as most in need of, and open to foreign aid:

1. Continued improvement of physician practice and knowledge.
2. Limiting brain drain, retention and proper utilization of the most experienced and most promising new physicians.
3. Increased exposure of staff to quality improvement projects and clinical research so as to familiarize clinicians with thinking in terms of systems-level change.
4. Improved access to resources (research, journals, textbooks) in Mongolian.
5. Support and increased capacity for ongoing research at NCMCH.
6. Reform of residencies to ensure more rigorous, comprehensive postgraduate medical training.

Note that not all of these issues can be treated with either an IHE or a program of telemedicine. The task at hand is to determine which modality may best treat the greatest number of issues.

International Health Elective for Residents: Relevance and Impact

A potential means of addressing the above-listed issues is through instituting an international health elective – frequently termed a global health residency program – whereby foreign graduates rotate through NCMCH for four to six weeks at a time.⁴⁹ For the purpose of this discussion I will assume that the Mongolian international health elective (IHE) is one in which in which an American residency adopts NCMCH as a location where its residents, fellows, or Masters Degree students may rotate to practice clinically and potentially participate in local research projects.⁵⁰

⁴⁹ International health electives generally take one of four forms in the context of global health residency training. The first, frequently termed a ‘global health track,’ is made available to selected residents who, (frequently) with mentorship, rotate abroad during elective time and study a global health curriculum. The second represents a longitudinal relationship between an American and foreign institution (hospital, medical school, NGO, etc.). The partnership serves to build capacity both in visiting US residents and host staff. The third model offers an additional year of training, frequently paired with a fellowship and/or academic degree (MPH etc.). The fourth and final model is informal: residents pursue international opportunities independent of their residency programs. (Stanton, B., Huang, C., Armstrong, R., Sectish, T., Palfrey, J., Nelson, B., Herlihy, J., Alden, E., Keenan, W., Szilagyi, P. (2008, December). Global Health Training for Pediatric Residents. *Pediatric Annals*. Doi: 10.3928/00904481-20081201-11)

Any of these programs could operate in Mongolia. For the purpose of this discussion, however, we will consider the first three programs. I.e. this IHE is one in which an American residency adopts NCMCH as a location where its residents, fellows, or Masters Degree students may rotate to practice clinically and potentially participate in local research projects.

The term “international health elective” is used here instead of “global health residency program” because of the former’s emphasis on sustainable system change rather than universal health equality. This distinction per the definitions proposed by Drain, et al in “Global Health

The potential benefits of this IHE are many. Existing studies suggest that Americans and other foreign visitors will enhance their skills in physical examination, cross-cultural communication, and professional self-management. Participating students also report greater familiarity with endemic disease, illnesses typically experienced by travelers and immigrants, and healthcare provision in resource-poor settings. As attending physicians, they are more likely to take positions amongst underserved populations.^{51 52 53 54 55 56 57 58}

Unfortunately, even though there is an extensive literature on the impact of IHEs and other global health experiences on visiting residents, research assessing these programs from the perspective of host institutions is scant.^{59 60} Mutchnic et al (October 2003) report that there exists no formal means of evaluating host impact and that “given the importance of the host population, there has been

Training and International Clinical Rotations During Residency” and Iserson et al in “Challenges in International Medicine.” In these papers international medicine is considered to emphasize sustainable change through indigenous capacity building in specific countries.

(Drain, P., Holmes, K., Skeff, K., Hall, T., Gardner, P. (2009, March). Global Health Training and International Clinical Rotations During Residency: Current Status, Needs, and Opportunities. *Academic Medicine*, 84(3), 320-325. doi: 10.1097/ACM.Ob013e3181970a37) (Iserson, K., Biros, M., Holliman, J. (2012). Challenges in International Medicine: Ethical Dilemmas, Unanticipated Consequences, and Accepting Limitations. *Society of Academic Emergency Medicine*. 19. 683-692. doi:10.1111/j.1553-2712.2012.01376.x)

⁵⁰ This in comparison to global health’s aim of health access and equity across all nations which “[implies] the consideration of the whole planet’s health (and often environmental) needs above the concerns of particular nations.” (Iserson, K., Biros, M., Holliman, J. (2012). Challenges in International Medicine: Ethical Dilemmas, Unanticipated Consequences, and Accepting Limitations. *Society of Academic Emergency Medicine*. 19. 683-692. doi:10.1111/j.1553-2712.2012.01376.x)

⁵¹ Shull, H., Tymchuk, C., Grogan, T., Hamilton, J., Friedman, J., Hoffman, RM. (2014, November). Evaluation of UCLA department of medicine Malawai global health clinical elective: lessons from the first five years. *American Journal of Tropical Medicine and Hygiene*, 91(5), 876-80. doi: 10.4269/ajtmh

⁵² Grigorian, A., Sicklick, JK., Kingham TP. (2014, September). International Surgical Residency: a collaborative effort from trainees to surgeons. *Journal of Surgical Education*, 71(5), 694-700. doi: 10.1016/j.jsurg.2014.03.003

⁵³ McIntosh, M., Kalynych, C., DeVos, E., Akhlaghi, M. (2012, January 17). Curriculum Development Process for an International Emergency Medicine Rotation. *Teaching and Learning in Medicine: An International Journal*, 24(1), 71-80. doi:10.1080/10401334.2012.641491

⁵⁴ Petrosniak, A., McCarthy, A., Varpio, L. (2010). International health electives: thematic results of student and professional interviews. *Medical Education*, 44, 638-689. doi:10.1111/j.1365-2923.2010.03688.x

⁵⁵ Drain, P., Holmes, K., Skeff, K., Hall, T., Gardner, P. (2009, March). Global Health Training and International Clinical Rotations During Residency: Current Status, Needs, and Opportunities. *Academic Medicine*, 84(3), 320-325. doi: 10.1097/ACM.Ob013e3181970a37

⁵⁶ Stanton, B., Huang, CC., Armstrong, RW., Sectish, TC., Palfrey, J., Nelson, BD., Herlihy, JM., Alden, E., Keenan, W., Szilagyi, P. (2008, December). Global Health Training for Pediatric Residents. *Pediatric Annals*, 37(12). 786-7, 792-6. Retrieved from <http://www.healio.com/pediatrics/practice-management/journals/pedann/2008-12-37-12/%7Bcff9503e-04ba-462b-8d8c-c9f15df99fca%7D/global-health-training-for-pediatric-residents>

⁵⁷ Yaeger, J., Conway, J., Butteris, S., Howard, C., Moreno, M. (2013, December). Pediatric Global Health Education: Correlation of Website information and Curriculum. *The Journal of Pediatrics*, 163(6), 1764-68. <http://dx.doi.org/10.1016/j.jpeds.2013.07.005>

⁵⁸ In order to maximize the benefits of IHEs to rotating graduates, the American Association of Pediatrics (AAP) requires that all IHEs have certain education features. These include pre-departure cultural sensitivity training, identification of a primary on-site contact person, and post-experience debriefing. While there exists no standardized global health curriculum, the AAP Section on International Child Health working group on Pediatric Resident Education has developed American Council of Graduate Medical Education (ACGME) core competency-based curriculum objectives in global health to better ensure appropriate learning and maximize visiting residents’ experiences. These include: “patient care,” “systems-based practice,” “medical knowledge,” “practice-based learning and improvement,” “professionalism,” and “interpersonal and communication skills.” (Accreditation Council for Graduate Medical Education. (2012, September). *ACGME Program Requirements for Graduate Medical Education in Pediatrics*. Retrieved from https://www.acgme.org/acgmeweb/Portals/0/PFAssets/2013-PR-FAQ-PIF/320_pediatrics_07012013.pdf) (Chase, J., Evert, J. *Global Health Training in Graduate Medical Education: A Guidebook. Second Edition*. Retrieved from http://www2.aap.org/sections/ich/toolkit/GH_Training_in_GME_Guidebook_2Ed_1.pdf)

⁵⁹ Mutchnick, I., Moyer, C., Stern, D. (2003, October). Expanding the Boundaries of Medical Education: Evidence for Cross-Cultural Exchanges. *Academic Medicine*, 78(10), S1-S5.

⁶⁰ Eneriz-Wiemer, M., Nelson, B. Bruce, J., Chamberlain, L. (2012, April). Global Health Training in Pediatric Residency: A Qualitative Analysis of Faculty Director Insights. *Academic Pediatrics*, 12(3), 238-244. <http://dx.doi.org/10.1016/j.acap.2012.02.005>

surprisingly little attention paid to formal evaluation of this aspect of the cross-cultural experience.”⁶¹
Speculated and anecdotally reported benefits include:

- “elucidation of international standards”
- “use of preexisting and proven curriculum in resident training”
- “receipt of didactic and clinical teaching from established physicians”⁶²
- donations of medical supplies, equipment, and funds by visitors
- assistance to pre-existing projects
- initiation of new and locally relevant research projects
- public health assessment, including appraisal of community health needs and reporting on patterns of endemic disease⁶³

IHEs also offer the potential for a bilateral exchange in which host country physicians may study, observe, and/or work at visitors’ home institutions pending the initiation of an IHE. Notably bilateral exchanges are considered a very valuable, if frequently missed opportunity in pediatric graduate education.^{64 65} It may be that this potential to introduce hosts to foreign medical training is the greatest boon of an IHE. Ultimately, educating a local physician at a foreign institution (one in which they are already networked and supported) may have a more sustainable impact on local knowledge and practice than receiving numerous American residents. This may be especially true in a country like Mongolia where citizens pride themselves on being ‘cultural chameleons’: able to fit in, learn from, and work exceedingly well in any environment – familiar or otherwise.

National health systems may also benefit if these interventions combat brain drain. Intellectual stimulation and professional growth are key to keeping staff happy, in country and, in the case of Mongolia, in the public healthcare system. Research and interaction with global partners (through electives and/or telemedicine) are potential strategies to achieve this end. The literature appears undecided as to whether or not the establishment of a global health presence and/or bilateral exchange diminishes or exacerbates brain drain. Some argue that international presence and exchange enable practitioners to leave more easily their countries of origin.^{66 67} Other, perhaps more compelling, reports note that improving national research quality leads to “retention of faculty through enhancement of job satisfaction, career progression, and implementation of country-relevant research.”⁶⁸ Similarly the BMJ’s “Fighting the Brain Drain” – quoting the WHO commissioned Global Health Workforce Alliance’s “Guidelines: Incentives for Health Professionals” -- argues that retention of local physicians is key to

⁶¹ Mutchnick, I., Moyer, C., Stern, D. (2003, October). Expanding the Boundaries of Medical Education: Evidence for Cross-Cultural Exchanges. *Academic Medicine*, 78(10), S1-S5.

⁶² Nowacki, A., Landes, M., Azazh, A., Puchalski Ritchie, L. (2013). A review of published literature on emergency training in low- and middle-income countries. *International Journal of Emergency Medicine* 6(26). doi: 10.1186/1865-1380-6-26

⁶³ Eneriz-Wiemer, M., Nelson, B. Bruce, J., Chamberlain, L. (2012, April). Global Health Training in Pediatric Residency: A Qualitative Analysis of Faculty Director Insights. *Academic Pediatrics*, 12(3), 238-244. <http://dx.doi.org/10.1016/j.acap.2012.02.005>

⁶⁴ Eneriz-Wiemer, M., Nelson, B. Bruce, J., Chamberlain, L. (2012, April). Global Health Training in Pediatric Residency: A Qualitative Analysis of Faculty Director Insights. *Academic Pediatrics*, 12(3), 238-244. <http://dx.doi.org/10.1016/j.acap.2012.02.005>

⁶⁵ International Exchanges: A Missed Opportunity in Pediatric Graduate Education

⁶⁶ Nicoll, A., Carter, E., Golden, B., Robson, J., Southall, D., Williams, T. (2001) Developing sustainable international partnerships in child health and paediatric care. *Archives of Disease in Children*, 84, 315-319. doi: 10.1136/adc.84.4.315

⁶⁷ Nowacki, A., Landes, M., Azazh, A., Puchalski Ritchie, L. (2013). A review of published literature on emergency training in low- and middle-income countries. *International Journal of Emergency Medicine* 6(26). doi: 10.1186/1865-1380-6-26

⁶⁸ Olaleye, D., Odaibo, G., Carney, P., Agbaji, O., Sagay, A. Muktar, H. ... Murphy, R. (2014, August). Enhancement of Health Research Capacity in Nigeria Through North-South and In-Country Partnerships. *Academic Medicine*, 89(8), S93-S97. doi: 10.1097/ACM.0000000000000353

equalizing health care access. Retention strategies included, among many things, adequate local training and career development opportunities. As argued above, an IHE may fulfill this goal.^{69 70}

It bears repeating that these host benefits (the specifics of which are frequently vague- i.e. how exactly is information delivered from visitors to hosts, who initiates and maintains research projects, and how frequently are bilateral exchanges initiated) are purported and not substantiated quantitatively by the literature. Common sense dictates that these benefits are legitimate and substantive, but their real impact is, at this point, conjecture.

Common sense also suggests that there is a risk of medical adventurism and strain to local systems by international health electives. Notably, several papers are cautiously critical of global health and international health rotations on the grounds that they promote medical adventurism and ultimately undermine the native systems they purport to help. It is unclear, especially given the above noted lack of evidence, whether or not global health rotations benefit visitors more than hosts. The relationship was described critically by Petrosioniak et al in the following terms:

“Participation in an international clinical health experience in a resource-poor destination by a medical trainee from a high-income country whereby, with or without the knowledge of the trainee, the net gain favours the trainee-participant and insufficient consideration is given to the needs, interests and expectations of the host country. Our participants reported that medical tourism, by definition, favours the global health participant over the host country.”⁷¹

Viewed in this light, rotations may represent the ungenerous exploitation of local resources.

It is possible that the distinction between medical adventurism and genuine international health work lies in whether visitors actively practice medicine, or encourage sustainable practice change. This idea is eloquently summarized in “Challenges in International Medicine”:

“Doing clinical practice (i.e., providing direct clinical care to patients), rather than helping to educate local practitioners and improving the health care system, could be termed “medical adventurism.” While often enjoyable and within a clinician’s comfort zone, this behavior may undermine local clinicians’ confidence, making them dependent on outside aid as well as undermining or competing with local health systems or healers. Rather than imposing the “correct” answer to local problems, sustainability requires that local health care providers are assisted in developing local solutions. In international medicine, ignoring the principle of sustainability can negatively affect the local health care system and providers, violating the bioethical principle of nonmaleficence.”⁷²

Similarly, there are anecdotal reports of patients requesting and actively preferencing foreign medical students and residents over their fully-trained and fully-qualified native physicians.⁷³ Such reports and

⁶⁹ McColl, K. (2008, September 15). Fighting the Brain Drain. *The British Medical Journal*, 337(a1496). doi: <http://dx.doi.org/10.1136/bmj.a1496>

⁷⁰ International Council of Nurses, International Hospital Federation, International Pharmaceutical Federation, World Confederation for Physical Therapy, World Dental Federation, World Medical Association. (2008) *Guidelines: Incentives for Health Professionals (pre-publication copy)*. Retrieved from http://www.who.int/workforcealliance/documents/Incentives_Guidelines%20EN.pdf

⁷¹ Petrosioniak, A., McCarthy, A., Varpio, L. (2010). International health electives: thematic results of student and professional interviews. *Medical Education*, 44, 638-689. doi:10.1111/j.1365-2923.2010.03688.x

⁷² Iserson, K., Biros, M., Holliman, J. (2012). Challenges in International Medicine: Ethical Dilemmas, Unanticipated Consequences, and Accepting Limitations. *Society of Academic Emergency Medicine*. 19. 683-692. doi:10.1111/j.1553-2712.2012.01376.x

⁷³ Bozinoff, N., Dorman, K., Kerr, D., Roebbelen, E., Rogers, E., Hunter, A., ... Kraeker, C. (2014). Toward reciprocity: host supervisor perspectives on international medical electives. *Medical Education*, 48, 397-404. Doi:10.1111/medu.12386

the above issues cast doubt on the theoretical validity of a global health rotation in which residents engage in direct patient care if that practice does indeed undermine the local healthcare systems and practitioners they purport to help, and/or if there is no reciprocal opportunity for local physicians.

One also wonders whether or not Mongolia would stand to benefit more from exchange with a country of similar economic development. High, middle, and low-income countries have distinct economic, social, and political challenges to delivering optimal healthcare. Hospitals may thus stand to benefit more from collaboration between institutions of similarly developed nations, say with a program paralleling the Latin American Association of Cooperation in Medical Emergencies and Disasters.⁷⁴ Developing such an exchange in Mongolia at the moment would no doubt be a logistical and financial ordeal. The effort alone would likely negate any advantage to a same-tiered exchange versus a program between high and middle-income countries like America and Mongolia.

A final concern lies in America and Mongolia's distinct approaches to education and learning theory. Mongolia, having an apprenticeship based model of education which places an emphasis on observation during the early years of training, may prove a trying professional and learning environment for an American resident trained in a competency and curriculum-based model. Notably, there exists no medical literature to substantiate this concern. Prior missions to the country do make mention of the need to overcome Mongolian learning and teaching styles in order to successfully impart skill-based knowledge.⁷⁵ It thus remains a point of concern, albeit one that has been overcome in the past.

Given the above listed advantages and concerns about IHE's, it is imperative that, should a international health residency be selected as the superior means of correcting apparent weaknesses at NCMCH, due attention be paid to the real impact on host institutions and the ability of Americans to function fully in the Mongolian environment. The literature on host impact being sparse, assessment of host benefit is in good part speculative, as discussed above. The relevance to American travelers has, on the other hand, been well established.

International Health Elective for Residents: Feasibility

Assuming a global health residency is in fact beneficial to NCMCH, it must also be feasible: the program must be practical and appeal to foreign residencies.

Notably most papers that review elements important to the successful establishment of global health tracks and rotations focus on American logistics. "Essential Factors for the Development of a Residency Global Health Track" describes the six factors considered key to developing a successful global health track within one's department They included: "[a] supportive residency director, resident commitment, [a] supportive department chair, protected resident time for international electives, a dedicated budget, and [Global Health] faculty with protected time."⁷⁶ Similar recommendations (and cautions about common pitfalls) have been made in even more qualitative reports.^{77 78 79} GHEC's guidebook on

⁷⁴ Nowacki, A., Landes, M., Azazh, A., Puchalski Ritchie, L. (2013). A review of published literature on emergency training in low- and middle-income countries. *International Journal of Emergency Medicine* 6(26). doi: 10.1186/1865-1380-6-26

⁷⁵ Vargas, G., Price, R., Sergelen, O., Lkhagvabayar, B., Batcholuun, P., Enkhamagalan, T. (2012, October) A successful Model for Laparoscopic Training in Mongolia. *International Surgery*, 97(4), 363-371. doi: 10.9738/CC103.1

⁷⁶ Campagna, A., St. Clair, N., Gladding, S., Wagner, S., John, C. (2012). Essential Factors for the Development of a Residency Global Health Track. *Clinical Pediatrics*, 51(9), 862-871. doi: 10.1177/0009922812450507

⁷⁷ Audcent, TA., MacDonnell, H., Samson, L., Brenner, J. (2013, August) Global Child Health Education in Canadian Paediatric Residency Programs. *Education for Health*, 26(2), 73-77. doi: 10.4103/1357-6283.120693

establishing Global Health programs recommends taking the time to develop full, long-term relationships with international sites (recommending bilateral exchange if possible).⁸⁰ All of these factors may be met easily in Mongolia, especially as the majority are internal to American departments.

There are also several boxes that must be checked on the host end to ensure that an American residency program would be interested in sending its residents. I.e. a foreign residency must be assured that its trainees will have an appropriately guided educational experience. Necessary elements include: high patient volume, available local mentorship for visiting clinicians, dedicated hospital wards, language interpreter availability, experience working with international groups, ability to provide safe housing, meals and drinking water, and supply of medicines and equipment. The GHEC echoes these remarks. It suggests: “ensuring that certain local practitioners will act as mentors of visiting residents and establishing a formal evaluation process of rotating clinicians.”⁸¹ These factors are basic to ensure a solid clinical learning experience; Mongolia can provide them all.⁸²

Absent in the literature are logistical concerns particular to Mongolia. To state the obvious, Mongolia is far away. A minimum 24-hour flight and twelve-hour time difference mean at least a day and a half are spent in transit. Likely many rural African rotations require similar transit time, but four days of a thirty-day elective spent travelling is not insignificant. Nevertheless, it is not a barrier to an elective program. It does suggest that a six-week elective, or longer, may be optimal.⁸³

The Mongolian language is also very difficult; more difficult than the average level 2 language per the Foreign Science Institute and Defense Language Institute rankings. Furthermore, it is not commonly spoken by foreigners without recent Mongolian ancestry. Unlike romance languages, it cannot be picked up with a few weeks of exposure and class. The hospital reports that half of the hospital staff understands English although one physician per department is a fluent speaker (and certain departments have a higher proportion of fluent speakers). This situation implies that either a resident must be solely paired with fluent English speakers or else have a full time translator (an additional expense).

Staff turnover in Mongolia – at NCMCH given sub-national brain drain and in governmental offices including the Ministry of Health given the governmental structure– is frequent and rapid. The existing literature does not discuss the impact of government and/or institutional turnover on IHE’s, suggesting that it is either not a relevant factor, or else that change of staff is not an issue in countries with successful programs.

Mongolia is fortunate in its low incidence of infectious disease, decreasing the cost and inconvenience of pre-travel vaccination and medication. It is however very cold (winters to -40 Fahrenheit), and pollution is overwhelming, especially during winter months. The WHO ranks Mongolia amongst the ten most

⁷⁸ Eneriz-Wiemer, M., Nelson, B. Bruce, J., Chamberlain, L. (2012, April). Global Health Training in Pediatric Residency: A Qualitative Analysis of Faculty Director Insights. *Academic Pediatrics*, 12(3), 238-244. <http://dx.doi.org/10.1016/j.acap.2012.02.005>

⁷⁹ Evert, J., Stewart, C., Chan, K., Rosenberg, M., Hall, T. (2008). *Developing Residency Training in Global Health: A Guidebook*. Retrieved from <http://www.mcgill.ca/files/globalhealth/GHECResidencyGuidebook.pdf>

⁸⁰ Ibid.

⁸¹ Ibid.

⁸² Grigorian, A., Sicklick, JK, Kingham, TP. (2014, September). International surgical residency electives: a collaborative effort from trainees to surgeons working in low- and middle-income countries. *Journal of Surgical Education*, 71(5), 694-700. doi: 10.1016/j.jsurg.2014.03.003

⁸³ One could very fairly argue that more than six weeks is necessary for visitors to have a lasting impact on host institutions. However this length of time is almost always a necessary convention as US residents may not leave their home duties for any greater length of time.

polluted countries in the world— its cities worse than those of Northern China, including Beijing.⁸⁴ This reality is not an obstacle to a residency program but it may impact the timing of rotations. While residents do not stand any greater chance of becoming sick in country than they would at home, they will likely have other options for away electives if they are in a Global Health oriented residency. (Meaning residents may choose to visit facilities in warmer, less polluted countries.) It is in the program's best interests to encourage interest and return visits; it may thus be best to welcome residents during warmer, more physically appealing months.

A final concern is financial. Public information on program cost is scarce (and mostly treat medical student rotations) but is noted to run 2,000 to 5,000 USD per person (variation dependent on site).^{85 86}
^{87 88} Assume only three residents rotate per year, the program could run 15,000 USD annually. In the absence of third party sponsorship, given Mongolia's current financial limitations and contemporary medical ethics guidelines, this cost would fall squarely on an American residency program. Large expenses, needless to say, are unappealing to residencies already under financial constraint and render an IHE perhaps less realistic.⁸⁹

Notably, this assessment proves a residency rotation fully feasible, if expensive for American residency programs. It remains that barriers to program establishment are predominantly theoretical, not logistical.

Telemedicine: Relevance and Impact

Telemedicine, frequently termed telehealth, is defined by the American Telemedicine Association (ATA) as “the use of medical information exchanged from one site to another via electronic communications to improve a patient's health status... sometimes [it] is best understood in terms of the services provided and the mechanisms used to provide those services.” The ATA lists several examples of telemedicine to elucidate further the concept. These include: “primary care and specialist referral services,” “remote patient monitoring,” “consumer medical and health information,” and “medical education.”^{90 91}

⁸⁴ World Health Organization. *Ambient (outdoor) air pollution database, by country and city*. [Data Base]. Retrieved from http://who.int/phe/health_topics/outdoorair/databases/cities/en/

⁸⁵ University of Washington Department of Global Health. (2011, April 26). *Global Health Clinical Elective*. Retrieved from <http://globalhealth.washington.edu/resource-center/student-funding-fieldwork/global-health-clinical-elective-ghce>

⁸⁶ Indiana University School of Medicine. (2014, March 10). *Medical Education: ENLACE Global Health Elective, El Salvador*. Retrieved from <http://iufammed.iupui.edu/education/medical-education-enlace-elsalvador-global-health-elective/>

⁸⁷ Boston Combined Residency Program. (2015). *Global Health Electives with Established Partnerships*. Retrieved from <http://www.childrenshospital.org/bcrp/program/international-opportunities/global-health-electives-with-established-partnerships>

⁸⁸ University of Cincinnati College of Medicine. (2015). *Medical Student Education*. Retrieved from <http://www.familymedicine.uc.edu/education/meded/year4/globalhealth.aspx>

⁸⁹ Note that these costs are separate from expenses residents accrue directly to host hospitals by ordering tests which may be common in America but expensive abroad.

⁹⁰ Note that telehealth, a term that is frequently used interchangeably with telemedicine, is more specifically defined by the ATA “sometimes used to refer a broader definition of remote healthcare that does not always involve clinical services.” For the purpose of this discussion we will use the terms interchangeably

⁹¹ American Telemedicine Association. (2013, January 21). *What is Telemedicine?* Retrieved from <http://www.americantelemed.org/about-telemedicine/what-is-telemedicine#.VJ8Om50BvA>

Telemedicine is a relatively young field, far less established than international health electives. Nevertheless, it has the potential to transform cost-effectively and efficiently medical practice abroad in those countries open to electronically-based training.⁹²

In global health telemedicine is most frequently used to provide direct patient care: i.e. full evaluation, diagnosis, treatment and/or consultation are provided by a remote physician to aid in the care of one patient. There is also a small but growing body of literature demonstrating that telemedicine can be used to conduct clinical training remotely. Programs have shown to deliver effectively curricula and even hands-on skills to distant, resource-poor settings.⁹³ Note that research, while showing positive results, is very limited given the novelty of the field.

An important distinction in the field of international telemedicine may be drawn at this point, one not expressly outlined in the literature. There appear to be two kinds of global health/international medicine telemedicine programs: those reliant on institutional relationships and those which disseminate information at large, irrespective of hospital affiliation.

Direct patient care by a remote physician falls into the former category. So do hospital programs wherein specialists around the globe meet regularly via Skype to review interesting cases and literature pertinent to their field. Notably, while these meetings serve to disseminate information, they also have the potential to inspire more full relationships between hospitals. Albeit there is no published data to validate this theory, it is plausible that communication between specific institutions may potentiate relationships such as those described in the above section on IHE's. I.e. simple conversation between physicians may reveal a partner hospital's limited resources, need for research and/or education reform leading to supply of relevant aid.

Alternatively, programs such as OPENpediatrics (specific to pediatric critical care), PedsPLACE, and their larger University correlates -- EdX, Udacity, Coursera, the Carnegie Melon Open Learning Initiative -- provide, irrespective of institutional relationships and affiliation, an online platform to deliver clinical lessons, simulation, and in some cases a forum for asking questions to clinicians.^{94 95} They serve to enhance physician knowledge and have been shown to improve educational outcomes. One would not anticipate that they build the same long-lasting relationship with potential for aid distribution as do the previously described programs.⁹⁶

It thus appears that the full benefit of a telemedicine program depends on the type of program adopted. Direct patient care seems unwarranted and inefficient. Mongolian physicians are well trained and far better equipped to affect culturally-appropriate and economical care than a foreign consultant. However, continued medical education via online curricula, journal clubs, and/or case reports could enhance physician knowledge on a national scale, thus improving practice and resident training.

⁹² Conde, J., De, S., Hall, R., Johansen, E. Meglan, D., Peng, G. (2010, January). Telehealth Innovations in Health Education and Training. *Telemedicine and e-HEALTH*, 16(1), 103-106. doi: 10.1089/tmj.2009.0152

⁹³ Goldstein, S., Papandria, D., Linden, A., Azzie, G., Borgstein, E., Forrest Calland, J., ... Abdullah, F. (2014, February 12). A Pilot Comparison of Standardized Online Surgical Curricula for Use in Low- and Middle-Income Countries. *Journal of the American Medical Association Surgery*, 149(4), 341-46. doi:10.1001/jamasurg.2013.4830

⁹⁴ Wolbrink, TA, Kisson, N, Burns, JP. (2014, March). The development of an internet-based knowledge exchange platform for pediatric critical care clinicians worldwide. *Pediatric Critical Care Medicine*, 15(30), 197-205. doi: 10.1097/PCC.000000000000051

⁹⁵ OPENPediatrics. (2015). *OPENPediatrics*. Retrieved from <http://openpediatrics.org>

⁹⁶ Amgad, Mohamed, AlFaar, AS. (2014, January 7). Integrating Web 2.0 in Clinical Research Education in Developing Country. *Journal of Cancer Education*, 29, 536-540. doi: 10.1007/s13187-013-0595-5

Furthermore, depending on the system selected, a telemedicine program may provide similar aid, supplies, and potential for bilateral exchange as an international health elective.

Telemedicine: Feasibility and Utility

Assessing the feasibility of a telemedicine program is relatively straightforward given concerns are almost entirely logistical. NCMCH has 24/7 internet connection at 12 megabytes per second. Electricity is reliable. There are office spaces and computers available to chat online without interruption. Multiple person video chat is possible. The greatest challenge consultants cite is the time difference, Mongolia being twelve to thirteen hours ahead of the American East Coast (depending on the season). Notably, real time communication is frequently easier with the West Coast as meeting times may be selected which coordinate Mongolian's start and American's end of the work day

Furthermore, NCMCH has prior experience with telemedicine projects, suggesting comprehensive computer literacy amongst staff. The hospital runs two real-time connections to regional hospitals to provide direct patient care and specialist consultation. Similarly, since 2008 it has collaborated with the Luxembourg government and UNFPA on a telemedicine project to promote maternal and newborn health in remote areas of the country. This project, which was deemed a very effective strategy to improve national health given Mongolia's large geographic area, disperse population, and rural/urban health disparity – is again a project of direct patient care via telehealth.⁹⁷

Perhaps the greatest concern, one which is not precisely an issue of feasibility, is whether or not electronically-based learning is as efficient as in-person education. The literature is sparse, especially with regards to clinical education. However a large meta-analysis by the US Department of Education which compared electronic and in-person learning in all fields determined the following:

- 1) "Students in online conditions performed modestly better, on average, than those learning the same material through traditional face-to-face instruction." (Notably times spent learning were unequal between the two modalities.)
- 2) "Instruction combining online and face-to-face elements had a larger advantage relative to purely face-to-face instruction than did purely online instruction."
- 3) "Effect sizes were larger for studies in which the online instruction was collaborative or instructor-directed than in those studies where online learners worked independently."⁹⁸

Despite this positive finding, there is a dearth of research into aspects of electronically-based education theory in the clinical setting. No papers exist to determine whether electronically-based learning has variable impact on knowledge assimilation, storage, and utilization depending on clinician skill-level (medical students versus residents versus attending physicians). There is a need for research that compares (in the medical setting) technology which is used to replace versus enhance in-person teaching., Meaning, telemedicine can be used either to supplant entirely a pre-existing in-person

⁹⁷ Baatar, T., Suldsuren, N., Bayanbileg, S., Seded, K. (n.d.) (2012) Telemedicine support of maternal and newborn health to remote provinces of Mongolia. Smith, A., Armfield, N., Eikelbloom, R. (Eds.) *Global Telehealth 2012: Studies in Health Technology and Informatics Volume 182*. (27-35). Retrieved from <http://ebooks.iospress.nl/volume/global-telehealth-2012>

⁹⁸ US Department of Education Office of Planning, Evaluation, and Policy Development, Policy and Program Studies Service. (2010, September). *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies*. Retrieved from www.ed.gov/about/offices/list/opepd/ppss/reports.html.

curriculum, or it can be used as a teaching supplement, increasing the time and varying the means of information delivery for students. Synchronous (in which all learners participate at the same time) and asynchronous (wherein students participate when able, on their own schedules) programs also need comparison.

Furthermore, the three types of electronically-based learning experiences – expository, active, and interactive – have been poorly evaluated at large. This point is important given the applied nature of medical knowledge and the collaborative essence of the medical field at large. For those unfamiliar with these terms of education theory, note that there are three types of learning experience via electronic technology. They speak to varying levels of learning control and interaction. The first is expository: one-way delivery of content through a technological device. Active learning requires the learner to build knowledge by manipulating digital material (programs, quizzes, simulations, games). And an interactive modality is similar to active in that the learner builds knowledge through interacting,. However this time interaction takes place with other learners (discussion, problem-solving, etc.) rather than software. One would suspect that given the multifaceted nature of medical education, selecting the proper modality is important to ensuring optimal knowledge delivery. Needless to say, neither this particular issue, nor those mentioned previously have been explored in the global health realm of telemedicine. This reality is frankly surprising given the culturally-dependent nature of learning, as explored above.

It is clear given the above that there is inadequate information to assess whether or not telemedicine is without question valuable in Mongolia. The Department of Education's meta-analysis suggests that a telemedicine program has great potential to improve skill level in the country with relatively little financial expenditure. We have already shown that the plan is logistically completely feasible. These factors argue strongly in favor of a telemedicine program, even as the noticeable lack of nuance in electronically-based education research gives some pause.

Comparing International Health Electives and Telemedicine in the Mongolian Context

An earlier section delineated six main hospital needs that could be ameliorated by foreign involvement. They comprised the following:

1. Continued improvement of physician practice and knowledge.
2. Limiting brain drain, retention and proper utilization of the most experienced and most promising new physicians.
3. Increased exposure of staff to quality improvement projects and clinical research so as to familiarize clinicians with thinking in terms of systems-level change.
4. Improved access to resources (research, journals, textbooks) in Mongolian.
5. Support and increased capacity for ongoing research at NCMCH.
6. Reform of residencies to ensure more rigorous, comprehensive postgraduate medical training.

The task remains to determine if a program of telemedicine or an international health elective would be more effective in treating these issues. Overall, the above sections reveal that neither program is well validated or fully explored by the existing literature (especially from the point of view of recipient institutions), but that NCMCH is potentially well-positioned to explore both. The foregoing also reveal that telemedicine and IHE's – while both purportedly designed to improve indigenous knowledge and practice – have other varying goals and effects.

IHE's are cumbersome. Expensive, they depend on significant and consistent foreign intellectual and financial input. There is no evidence to show that they improve clinical outcomes. They have positive

anecdotal reviews, but in the absence of evidence we may be suspicious that residents, being young in their professional careers, may not be the best equipped to impart new practice guidelines. In fact, many papers suggest they may represent a strain on the indigenous system – a disastrous consequence to Mongolia’s already strained hospital system. Residents do, however, frequently donate necessary supplies and American dollars to host institutions. And, in comparison to telemedicine, IHE’s provide more in-depth exposure to alternative practice and ways of clinical thinking, especially to a culture which values highly in-person interaction. The prestige accrued to a hospital with foreign affiliation is very valuable in Mongolia. It may serve to boost funds (governmental and philanthropic) and may help to retain top, intellectually-minded physicians interested in greater professional esteem and foreign collaboration (especially if there is potential for bilateral exchange). Foreigners rotating through may also – either during their time in Mongolia or following their return to America – support existing and/or start new research relevant in the Mongolian practice setting. Interacting with residents from an alternate training method may inspire reform of current residency curricula.

Telemedicine is sleek. Cheap and flexible, it is not so dependent on foreigner investment. It bypasses inefficiencies unavoidable when sending first-timers to work in a foreign country unlike any they have ever experienced. A program like OPENpediatrics does not require the cultivation of a larger institutional relationships. It would efficiently disseminate knowledge to all practitioners and its teaching models (which include simulation, may impact post-graduate training in the country). It is also possible that should a program with singular institutional affiliation be selected, it may provide physicians with enough intellectual stimulation to combat private sector brain drain. It may also serve to attract foreign interest in local research projects. Furthermore, funds that in an IHE would go to shipping residents back and forth and hiring translators when needed, could instead be used to translate basic pediatric texts into Mongolian. It is also possible (albeit less likely than with an IHE) that depending on how the program is presented to government officials, the public at large, and philanthropists, affiliation with foreign institution via telemedicine may provide a similar level of prestige and subsequent funding and esteem.

Comparing the two, it becomes clear that the decision to adopt either an IHE or a program of telemedicine is goal-dependent. If purely clinical information is desired, a telemedicine program wins. Particularly in a facility familiar with such modes of communication. If there are any other goals, especially related to systems improvement and the downstream effects of more full international collaboration, an IHE appears a safer bet, assuming there is an American residency program willing to take on the project. Still, properly structured and very carefully overseen, it is possible that a relationship between two institutions rooted in an initial project of telemedicine could achieve similar ends. Nevertheless, it is a much riskier proposition. It depends on the active solicitation of foreign involvement in specific projects, an attitude which may not accord with Mongolian social mores.

It is also possible that, should an IHE be developed which does not rotate residents but rather fellows, all of the same goals could be met, with minimization of associated problems. Fellows, having greater clinical experience, not only may prove less of a drain on hospital resources but bring more specific skillsets and research interests. More nuanced attention could be paid to particular aspects of clinical practice (PICU, NICU, PedsEM, etc.), and given fellow’s research requirements and greater level of responsibility at home, they may be better positioned to pick up research projects and help in quality improvement and systems-level reform. A fellowship level rotation may be especially effective in Mongolia where congenital disease and perinatal comprise the majority of morbidity and mortality. It

may also be a more attractive to American programs, as one paper points out, given the increasing interest in global health and sub-specialization in pediatrics, despite a dearth of rotation opportunities.⁹⁹ An idea with even greater flexibility and potential is one whereby an individual hospital or regional program, perhaps subsidized by the ADB and other development institutions, sponsors all manner of fellows (all pediatric subspecialties, administrative, educational, EMS and other fellows) to rotate through Mongolia for four to six weeks at a time, thus imparting a whole array new skills.

Mongolian Perspective:

These ideas were presented in full to the Mongolian hospital administration and to staff with whom the researcher interacted. By and large, they agreed with the needs assessment and determination of hospital needs amenable to foreign aid. They were, and are, very strongly in favor of developing an International Health Elective. Specifically they want their own physicians to have the opportunity to observe clinical practice in the United States. Furthermore they want their physicians to see how systems are structured, resources utilized, and residency structured in other countries of medical repute so that they may bring back that knowledge to Mongolia and transform their home institutions. As mentioned previously, Mongolians are no strangers traveling for education.

They also wanted Americans to come to their country for extended period of time. For Mongolians, in-house foreign clinicians would serve as valuable clinical resources, even if they were only observers. Several staff members also noted coming to Mongolia would be helpful training for Americans given NCMCH's burden of disease. The NCMCH research team was also excited by the prospect that American and their own physicians could be encouraged to do clinical research relevant to the Mongolian setting.

Notably, concomitant with the on-site research required for this report, NCMCH also made initial contact with the USC Lopez Family Foundation program of telemedicine in order to start a program of teleeducation and teleconsultation. Staff, including the foreign relations office and pediatric residency director, were also introduced to Boston Children's OPENPediatrics program.

Conclusion

As noted in the introduction, this paper, a needs assessment, represents the first-order objective of larger project to enhance post-graduate education and patient outcomes at NCMCH. It has accomplished this task and several others. It has summarized Mongolia's political, economic, and historical context, and outlined the state of healthcare nationally and at NCMCH in particular. Subsequently the paper evaluated the relevance, impact, feasibility, and utility of international health electives and programs of telemedicine both at large and in the Mongolian context. Ultimately, semi-structured interviews, observational study, and the aforementioned comprehensive, comparative literature review suggested that a bilateral exchange program, ideally at the fellowship level, was the best way of improving identified hospital and health-system weaknesses.

In the process of determining an ideal intervention, not only was a means of evaluating the relative efficacies of telemedicine and in-person global health rotations developed – an important exercise heretofore not described in literature or explored in the national dialogue – but the depth and breadth

⁹⁹ Dixon, C., Castillo, J., Castillo, H., Hom, K., Schubert, C. (2013, June). Global health opportunities within pediatric subspecialty fellowship training programs: surveying the virtual landscape. *BioMed Central Medical Education*, 13(88). doi:10.1186/1472-6920-13-88

of the literatures in both fields were appraised. This review elucidated several areas in need of further research. They are listed below, grouped by topic.

Learning Theory

- Determining the relevance of culturally dependent learning, training, and work styles in enacting optimal telemedicine programs, global health rotations, and even aid brief missions abroad

International Medicine at Large

- Clarification of factors that encourage and discourage brain drain, at the subnational and international levels

Global Health Rotations

- Describing the perceived and quantifiable impacts – both positive and negative – of a unilateral global health rotation on host institutions
- Describing the perceived and quantifiable impacts – both positive and negative – of a bilateral global health rotation on host institutions
- Development of a literature to determine the relative strengths and weaknesses of bilateral as compared to unilateral programs
- Evaluation of the role of global health rotations on brain drain
- Development of exchange programs and collaboration between countries of similar economic development, and determination of their relative impact compared to those programs between high and middle, and high and low-income countries

International Telemedicine

- Continued research on the ability of telemedicine projects to effectively deliver curriculum and hands-on skill sets to distant and resource poor-settings
- Evaluation of whether or not institutionally-based programs of telemedicine may, at a lower cost, potentiate the same relationships between institutions as do global health electives, or if in-person communication is an essential factor to medical education and health care change

Telemedicine at Large

- Development of electronically-based medical educational theory: i.e. the determination of whether electronically-based learning has variable impact on knowledge assimilation, storage, and utilization depending on clinician skill-level, and if such tools should be used to replace or enhance in-person teaching
- Improved understanding of the relative efficacy of synchronous and asynchronous teaching styles

Having accomplished the aforementioned, this needs assessment was presented to the Mongolian children's hospital and the author developed a program of bilateral exchange at the fellowship and young-attending level. A program proposal was formally submitted to NCMCH and an American partner with longstanding interest in Mongolia– Children's Hospital Los Angeles (CHLA) – was identified. Following multiple electronic communications and tele-conferences between CHLA and NCMCH, hospital administrators determined that the exchange program should begin in 2015 so as to train oncologists at the new cancer center.

A bilateral, rather than unilateral, exchange program was adopted for several reasons. Firstly, it is a more ethically sound proposition given unilateral programs' lack of validation and potential for medical adventurism. Also, as elucidated above, NCMCH needs not simply raw medical information as could be delivered by rotating American physicians, but exposure to a different diagnostic approach and to critical, systems-oriented clinical thinking. An optimal way of encouraging this intellectual skillset is by

immersing indigenous physicians in another culture where such patterns of thought are standard. Similarly, a bilateral program accomplishes the hospital's stated goals of granting Mongolian physicians the opportunity to observe clinical practice abroad and to see how systems are organized, resources utilized, and residency structured in other countries so that that knowledge may be used to transform Mongolian healthcare.

Furthermore, by introducing an interesting and prestigious professional opportunity for local physicians (and requiring participants to remain at NCMCH subsequently), the exchange may help to combat subnational brain drain and thereby equalize healthcare access nationally. Ultimately, these physicians, endowed with opportunity and administrative support, will be better able to identify and to solve both individual clinical, and larger systemic problems. They, rather than singular individual foreign consultants, will be the ones best suited to improve the Mongolian system from within and perhaps form a part of the next generation of national medical leaders.

This needs assessment thus represents not only an academic work with the manifold findings listed above, but a project with direct clinical impact. A new and innovative global health program was developed, one with the potential not only to improve clinical knowledge and patient outcomes in Mongolia, but to reform global health rotations internationally. Its true and lasting impact will only be determined in the years to come as the exchange matures.