

SOUTH ASIA UPDATE

Overview of pediatric oncology and hematology in Myanmar

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Abstract

Myanmar is a country in southeast Asia in political, economic and healthcare transition. There are currently only two pediatric oncology centers serving a population of almost 19 million children. An estimated 85-92% of children with cancer are undiagnosed or not receiving treatment. Abandonment of treatment is as high as 60%. Although a number of chemotherapy agents are available, difficulties remain concerning treatment costs, quality control and the availability of supportive care. Radiotherapy services are also limited and not usually included in pediatric protocols. Healthcare professional training, improved diagnostics, strategies to tackle abandonment of treatment and the development of a parents' support group are major priorities. Local and international partnerships including a recent partnership with world child cancer are essential in the interim to support the development of pediatric oncology and hematology in Myanmar. A unique opportunity exists to support the development of preventive, diagnostic, curative and palliative care for children's cancer in Myanmar from the outset.

Key words: Burma, hematology, Myanmar, oncology, pediatric

Introduction

Myanmar is a strategically located country in southeast Asia bordering China, Laos, and Thailand to the East; and India and Bangladesh to the West. Recent political reforms and increased international collaboration have led to dramatic changes in the country. There is now the unique opportunity for rapid improvements in healthcare. However, Myanmar suffers from the double burden of communicable and non-communicable diseases. There are also the incumbent health risks associated with the adoption of more "Western" lifestyles including smoking and obesity.

Country Demographics

Myanmar is the second largest country in southeast Asia with an estimated total population in 2010 of 59.13 million of which 18.84 million were children <15-years-old.^[1] There is no national population based pediatric cancer registry, but using global incidence rates of between 80 and 150/million children we would anticipate 1,500-2,800 new cases per year in Myanmar.^[2] Only a tiny fraction of these are currently being diagnosed in Myanmar.

In 2010, the gross domestic product and gross national income per capita in Myanmar was \$42,027 million and

\$876.2, respectively compared with \$14,447,100 million and \$47,153.2 in the US, respectively.^[3] Investigations and medications are funded through a cost sharing system between the government and patients dependent upon the ability of the patient's family to pay. Limited local community and international donations are also sourced to support this funding system although no formal local children's cancer nongovernmental organization (NGO) currently exists. Poverty is a major issue; however, the national economy has the potential to develop rapidly as has occurred in other neighboring countries.

In 2011, the under-five mortality rate was 62/1,000 live births.^[4] In children under 5, the main causes of death after the neonatal period are diarrhea, pneumonia, malaria, measles, and injuries.^[5] Government and international donors are primarily focusing on these communicable diseases and primary healthcare.

Pediatric Oncology Facilities Available Throughout Myanmar

There are two pediatric oncology and hematology centers in Myanmar located at Yangon and Mandalay Children's Hospitals serving the southern and northern regions of the country, respectively [Figure 1]. The pediatric oncology department in Yangon was established in 2003 and has 35 inpatient beds and 12 outpatient beds. It is only since 2011 that a pediatric oncology ward with 40 beds, separate from general pediatrics, has existed in Mandalay. These centers manage all pediatric oncology and hematology malignancies up to the age of 12 years. Patients often have to travel several hundred miles and for several days to be treated at these two centers. Most patients go home in between chemotherapy cycles which are often extended to 4 week cycles to give them sufficient time to travel home.

Other essential pediatric services are available at both centers including intensive care, surgery, nutrition and nephrology. There are three radiotherapy centers in Yangon, Mandalay and Taunggyi. However, few pediatric patients

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Figure 1: Location of pediatric oncology centres in Myanmar. Pediatric Oncology Centers in Yangon and Mandalay. Radiotherapy Centres in Yangon, Mandalay, and Taunggyi. Reproduced with kind permission from the Myanmar Information Management Unit (MIMU) <http://www.themimu.info>

receive radiotherapy as part of their treatment as these centers provide a predominantly adult service and have long waiting lists. Eye hospitals are able to perform enucleation and there are three pediatric ophthalmologists who have received some training in Australia and Singapore. Currently, there is not an established pediatric oncology multidisciplinary team that meets regularly.

Shared care is not well-established, although some patients have been successfully managed at general hospitals with telephonic advice from Mandalay or Yangon pediatric oncology departments.

The pediatric oncology departments are run by general pediatricians with support from adult oncologists. At the pediatric oncology department in Yangon there are two senior general pediatricians, one adult oncologist, one pediatric postgraduate trainee doctor, two medical house officers, two volunteer junior doctors, and six staff nurses. In Mandalay there is one general pediatrician, one pediatric postgraduate trainee doctor, three medical officers, and five nurses. There is no formal pediatric oncology subspecialty training for physicians or nurses. Nurses rotate through the department approximately every 6 months. Between 2011 and 2013, two pediatricians from Yangon have had the opportunity to spend 6 months training in pediatric oncology at specialist centers in South Korea and Singapore.

Diagnostic facilities available include routine blood tests including for human immunodeficiency virus (HIV) and malaria, X-rays, and ultrasound scans. Computed tomography (CT) and magnetic resonance imaging (MRI) scans are not routinely available and their use in the private sector is limited by expense. Bone scans are available at Yangon General Hospital, but their use is limited by the availability of reagents. There are good basic diagnostic pathology and hematology services. A general pediatric pathologist is able to perform basic morphology evaluation. At Yangon Children's Hospital, a limited basic molecular pathology immunohistochemistry service is also now available. Limited cytogenetics and immunophenotyping can sometimes be performed at private laboratories or in Singapore if funds are available. Tumor markers including serum α -fetoprotein (AFP) and urine vanillylmandelic acid (VMA) are available although expensive. The clinical chemistry laboratory is not able to monitor antibiotic and antineoplastic drug levels. Although microbiology facilities exist for performing blood, urine, and cerebral spinal fluid culture; such investigations are not performed routinely due to the limited funds available. Antibiotic sensitivities are also not usually performed.

Blood component products are available including packed red cells, platelets, fresh frozen plasma, and cryoprecipitate. Irradiated and cytomegalovirus (CMV) negative blood products are not available. Sedation and anesthesia are not generally used for bone marrow aspiration and intrathecal chemotherapy. Central lines such as Hickman lines and portacaths are not available unless they are inserted abroad. An infection control team has recently been developed at

Yangon Children's Hospital, but has very limited resources. A constant supply of soap, water, and hand sanitizers are readily available in the wards. There are four isolation rooms in the pediatric oncology wards in Yangon and one in Mandalay; but without negative pressure facilities. A number of patients arrive malnourished. Total parenteral nutrition (TPN) is not available.

There are no pediatric oncology pharmacists or laminar flow hoods to prepare chemotherapy which is prepared and administered by nurses and doctors. Chemotherapy is funded partly by the patients, locally arranged donation funds and since 2013, by the government. Asparaginase is particularly expensive and its availability can be limited. However since 2013, the Ministry of Health has supplied asparaginase to all patients. The availability of supportive medications is also limited by the funds available. The quality control of medications remains limited, however there are plans to improve such procedures as a priority.

Several UK and other international treatment protocols are adapted depending upon the availability of investigations and treatment resources. Intensity of treatment protocols are restricted by the limited supportive medications and treatment toxicity monitoring available.

Oral morphine is not available and tramadol is the principal opioid used. Granulocyte colony-stimulating factor (G-CSF), is expensive and is usually only available if the patients can afford it or in cases of emergency through donation funds. Table 1 illustrates the chemotherapy and supportive medications available for patients in Myanmar.

Table 1: Chemotherapy and supportive care agents available

Chemotherapy agents available	Supportive care available
Actinomycin D	Allopurinol
Asparaginase	Analgesia (simple analgesia, tramadol, and occasionally intravenous morphine)
Belomycin	Antibiotics (oral, intravenous)
Carboplatin	Antifungals (oral)
Cyclophosphamide	Antiemetics (simple oral)
Cytarabine	Antimalarial (oral and intravenous artesunate)
Cytosar	Antivirals (oral aciclovir)
Darcarbazine	Folinic acid
Daunorubicin	Granulocyte colony-stimulating factor (G-CSF) grastin
Dexamethasone	Mesna
Doxorubicin	
Epirubicin	
Etoposide	
Fluorouracil	
Ifosfamide	
Methotrexate	
6-mercaptopurine	
Vincristine	

There are no parent support groups or formal cancer education programs for the families of patients.

Cancer Programs, Initiatives, and NGOs

The Global Neuroblastoma Network has recently provided support for a data manager at Yangon Children's Hospital to record neuroblastoma patient details into the Pediatric Oncology Networked Database (POND4Kids) which is a free online database developed by St. Jude Children's Research Hospital. Telecommunications are available, but the internet is limited and slow making teleconferences and input of data into the Pond database difficult.

The National University Hospital in Singapore, St. Jude's Hospital in the US, the Global Neuroblastoma Network, and Cure4kids are providing advice on individual patients and service development.

World Child Cancer and Maternal and Child Health Care in Myanmar (mcHcm) together with the pediatric oncology and hematology departments at Boston Children's Hospital and Guys and St Thomas' Hospital in the US and UK, respectively are in the initial stages of developing a partnership with the pediatric oncology departments in Yangon and Mandalay to support the development of pediatric oncology training and services.

Traditionally children from more wealthy families have been able to receive specialist treatment abroad particularly in Singapore. There is now increased collaboration with other Association of Southeast Asian Nations (ASEAN) countries and there are plans to develop a bone marrow transplant center at Yankin Children's Hospital in Yangon with support from a specialist center in Thailand.

Table 2: New pediatric malignancies diagnosed between 2004 and 2010 at Yangon Children's Hospital (n=425)

	Relative incidence (%)
Hematological malignancies	
Acute lymphoblastic leukemia	36
Acute myeloid leukemia	24
Non-Hodgkin lymphoma	22
Hodgkin lymphoma	9
Langerhans cell histiocytosis	4
Chronic myeloid leukemia	4
Juvenile myelomonocytic leukemia	1
Solid tumors	
Neuroblastoma	20
Wilms tumor	19
Retinoblastoma	17
Sacrocoyceal teratoma	17
Rhabdomyosarcoma	14
Brain tumor	6
Hepatoblastoma	3
Nasopharyngeal carcinoma	2
Osteosarcoma	1
Fibrosarcoma	1

Pediatric Malignancies and Outcomes

Between 2004 and 2010 there were 425 newly diagnosed pediatric malignancies at Yangon Children's Hospital [Table 2].

Table 3 shows the outcome of the 250 children diagnosed with acute lymphocytic leukemia (ALL) at Yangon Children's Hospital between 2003 and 2010. The overall abandonment of treatment is 25.3%, but is as high as 60% for some tumors such as retinoblastoma.

Approximately, 10-15 cases of retinoblastoma are treated at Yangon Children's Hospital each year. Table 4 shows the current outcome of retinoblastoma at Yangon Children's Hospital.

There were 223 children newly diagnosed with cancer in 2012 at the two centers in Yangon and Mandalay. This is considerably less than the predicted 1,500-2,800 new case per year based upon the population of Myanmar. In 2012 in Mandalay, there were 67 solid tumors and 37 leukemias

Table 3: Outcome of acute lymphocytic leukemia at Yangon Children's Hospital 2003-2010 (n=250)

Outcome	(%)
Alive	46
Expired	11
Relapsed and died	9.7
Relapsed and alive	8
Abandoned treatment	25.3

ALL=ALL acute lymphocytic leukemia

Table 4: Outcome of retinoblastoma at Yangon Children's Hospital

Outcome	(%)
Alive with no disease	10
Expired	16
Currently on treatment	14
Abandonment of treatment	60

Table 5: New pediatric malignancies diagnosed at Yangon Children's Hospital in 2012 (n=119)

	Number
Solid tumors	
Retinoblastoma	19
Neuroblastoma	13
Non-Hodgkin lymphoma	10
Rhabdomyosarcoma	9
Germ cell tumors	5
Other rare tumors (paranasal sinus tumor, Ewing sarcoma, sigmoid cancer, adrenocorticoid carcinoma)	5
Hodgkin lymphoma	4
Brain tumor	3
Hepatoblastoma	2
Pancreatoblastoma	2
Hematological malignancies	
Acute lymphoblastic leukemia	29
Acute myeloid leukemia	18

newly diagnosed in children. This is a similar number to the 72 solid tumors and 47 leukemias newly diagnosed in Yangon during the same year as shown in Table 5.

Major Challenges and Current Priorities

Poverty is a major challenge to providing equitable comprehensive treatment. Increased funding from government, local NGO, and international partnerships is essential to support investigation and treatment costs. A reliable supply of medications and adequate quality control is another priority.

Inadequate public and local healthcare worker awareness of the signs and symptoms of pediatric cancer contributes to late presentation with advanced disease and reduced curative treatment options. Abandonment of treatment is another major issue and may be as high as 60%. Initiatives to tackle such late presentation and high abandonment rates are major priorities.

Other priorities include the formation of a local children's cancer NGO, parents support group, and cancer registry. The development of supportive care, community and palliative care, pathology, microbiology, and other diagnostic facilities are also very important. Formal pediatric oncology training for nurses, physicians, and pathologists is of vital importance.

One of the next proposed initiatives is the development of a retinoblastoma program that includes a community awareness campaign, healthcare professional education, improvement in referral networks, specialist ophthalmology, pathology, and pediatric oncology training and the development of locally appropriate staging and treatment protocols.

Conclusion

Recent political reforms in Myanmar have led to a significant increase in healthcare spending by the Myanmar government,

the lifting of international economic sanctions, and an increased will of both the Myanmar Ministry of Health and international community to work together to support the development of government public healthcare services. Whilst poverty is a major impediment, Myanmar is rich in natural resources and the economy is predicted to grow quickly.

Pediatric oncology as a specialty is still in its infancy in Myanmar. However, there is a tremendous local will to develop quickly and appropriately with national and international support. As Myanmar develops, the burden from non-communicable diseases is likely to increase as the burden from communicable diseases falls and more "Western" lifestyles are introduced. There is a unique opportunity to introduce preventive healthcare programs that tackle from the beginning the potential adverse health effects associated with development and globalization.

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