

# Setting up a pediatric oncology program in Cambodia: successes and challenges

Sing Heng,<sup>1</sup> Prom Vireak,<sup>1</sup> Sreng Kea,<sup>1</sup> Bruce Camitta,<sup>2</sup> Katherine Tarlock,<sup>3</sup> Benjamin Watkins,<sup>4</sup> Scott Howard,<sup>5</sup> Ibrahim Qaddoumi,<sup>6</sup> Leslie Kean,<sup>3</sup> and Rathi Guhadasan<sup>1</sup>

<sup>1</sup>Angkor Hospital for Children, Siem Reap, Cambodia; <sup>2</sup>Children's Hospital of Wisconsin, Milwaukee, WI; <sup>3</sup>Seattle Children's Hospital, Seattle WA; <sup>4</sup>Children's Hospital of Atlanta, Atlanta, GA; <sup>5</sup>University of Tennessee Health Science Center, Memphis TN; and <sup>6</sup>St. Jude Children's Hospital, Memphis, TN

## Introduction

Angkor Hospital for Children (AHC) is a Cambodian pediatric teaching hospital providing free treatment. In addition to the many challenges faced by health workers in developing countries, Cambodia suffered the decimation of its medical workforce by the Khmer Rouge and subsequent civil war. In the last 2 decades, the country has been rebuilding and retraining doctors and nurses. However, most of the pediatric morbidity and mortality in Cambodia arises from infectious diseases and perinatal complications, where consequently the majority of resources are focused. This leaves most pediatric oncology patients without access to diagnostics or treatment.

In October 2013, AHC commenced a hematology-oncology project. An oncology fellow was appointed in 2015, and a multidisciplinary team gradually developed, comprising nursing, laboratory, pharmacy, and social work departments. In 2017, the Hematology-Oncology Unit was formed, incorporating 2 senior doctors, which rendered the project more sustainable. This program is supported by a partnership between the American Society of Hematology (incorporating various specialist partners) and Health Volunteers Overseas (ASH-HVO). They provide on-site, off-site, and remote training and technical support and pathology services.

## Aim

We aim to show how a pediatric oncology program can be set up in a low-resource setting without in-country expertise, using external networks, and to discuss the inherent challenges.

## Program description

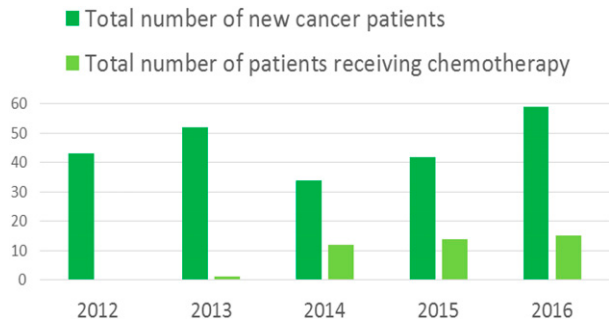
### Core team

The core AHC and off-site team are shown in Table 1. They are supported by the general medical and nursing staff, a wider network of international volunteers, and in particular by the hospital management, including the chief executive officer, who devised the strategic plan.

**Table 1. Core AHC and expatriate staff involved in the program**

Core AHC team	Expatriate consultants (off-site)
1 oncology fellow	3 hematologist-oncologists
2 hematology doctors	1 retinoblastoma expert
1 ophthalmologist	1 bone marrow transplant expert
1 full-time and 2 PT oncology nurses	
1 pharmacist (PT)	
1 laboratory technician (PT)	
AHC surgical team	
1 social worker (PT)	

PT, part-time.



**Figure 1.** Number of patients presenting annually to AHC and receiving chemotherapy.

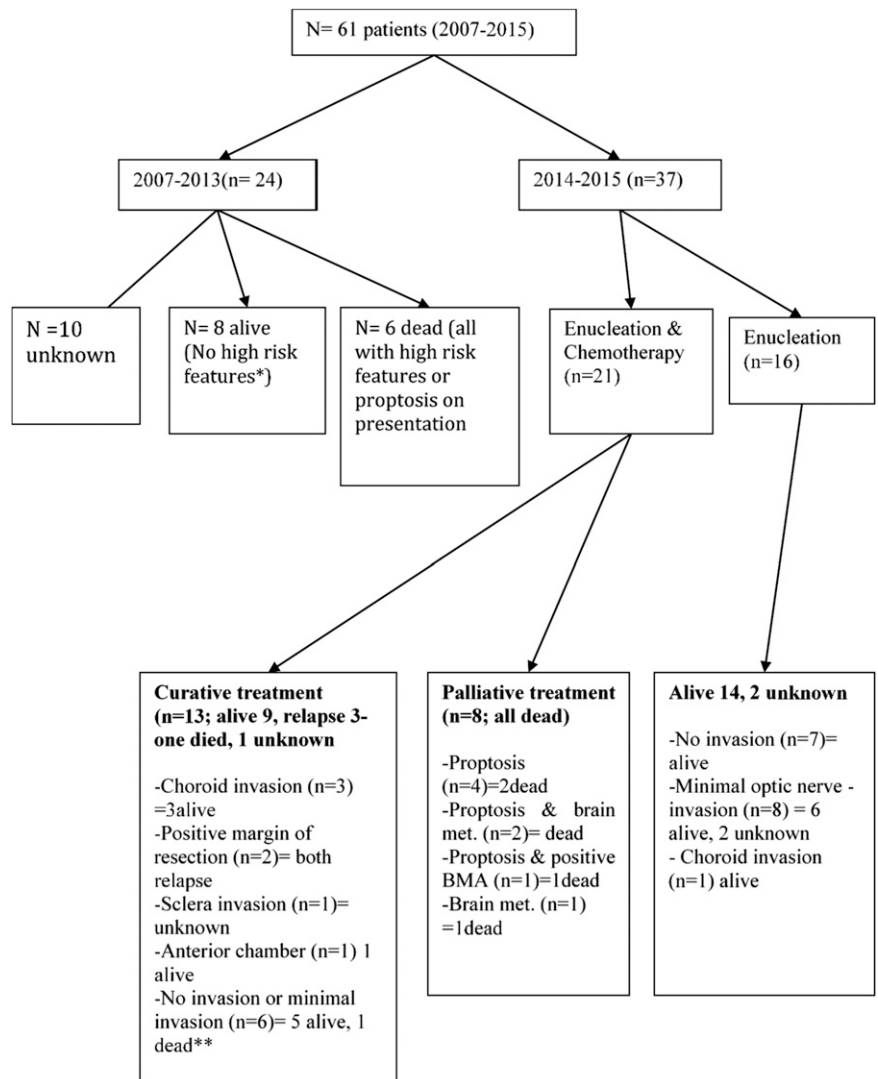
### Program partners

The partnership with ASH-HVO incorporates pediatric oncologists from Seattle Children’s Hospital, Wisconsin Children’s Hospital, and St Jude’s Children’s Research Hospital, who provide regular remote technical advice and guidance on case diagnosis and

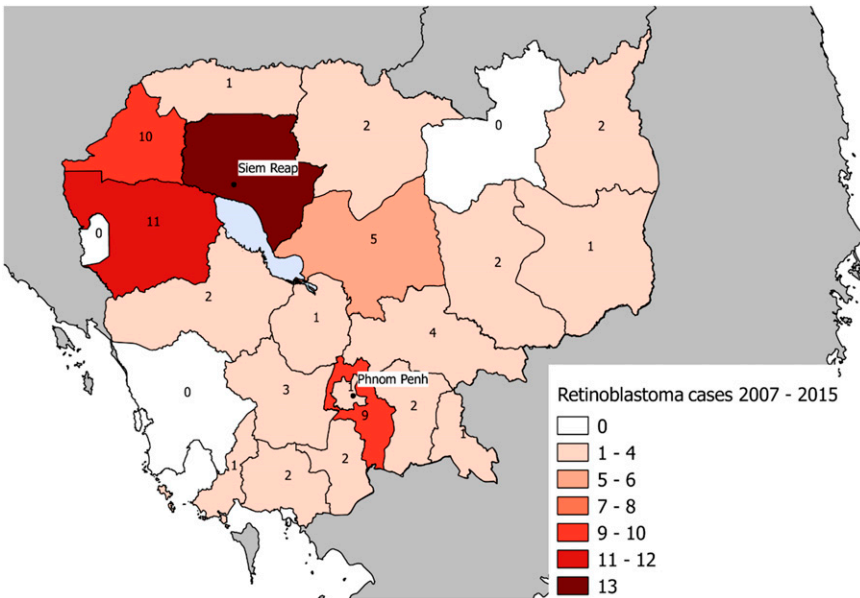
management. They are supported by a wider network of multidisciplinary HVO volunteers (laboratory, pharmacy, and nursing) from children’s hospitals across the United States. ASH-HVO also enabled AHC to join the VIVA-St. Jude network, bringing further training and support from regional specialists.

### Education and technical support

AHC has a Skype conference with ASH-HVO pediatric oncologists twice per month, allowing for case discussion and advice, mentoring, and education. In between these conferences, they provide technical advice as required via email. This is supported by face-to-face teaching at AHC at least 3 times per year for the oncology team and the general medical and nursing staff. In addition to the medical volunteers, ASH-HVO has sent oncology nurses, a hematopathologist, and an oncology pharmacist to the site. The ASH-HVO nurses have helped to develop an oncology-nursing curriculum, and the ASH-HVO oncologists have helped to develop protocols and guidelines for treating various oncological conditions and preparing and administering chemotherapy. All such protocols are approved by AHC’s medical department before use.



**Figure 2.** Outcomes of retinoblastoma patients before and after the availability of chemotherapy.



**Figure 3. Geographical origin of retinoblastoma cases seen at AHC.**

The AHC oncology fellow attends the annual pediatric oncology St. Jude-VIVA forum (along with 1 oncology nurse and our ophthalmologist) and has completed two 4- to 6-week clinical placements in the oncology department at Wisconsin Children's Hospital. The ophthalmologist learned focal therapy (laser) at St. Jude's Children's Research Hospital.

AHC's oncology social worker also received training in Singapore through a connection made at the St. Jude-VIVA forum.

### Strategic plan

AHC decided to start by treating retinoblastomas because we had the only pediatric ophthalmologist in Cambodia, and he can provide focal treatment as well as enucleation, the chemotherapy is available in-country, has relatively low toxicity, and the regimen duration is 6 months. In 2016 to 2017, we started to treat low-risk solid tumors, such as Wilms and yolk sac tumors, as well as chronic myeloid leukemia (CML; treatment provided free of charge in Phnom Penh). The plan is to gradually increase the number and acuity of oncological conditions treated, as resources allow. ASH-HVO's training is designed to support this plan.

### Diagnostic support

Histopathology, flow cytometry, immunophenotyping, and genetic studies are provided through the ASH-HVO network.

**Table 2. Types of cancers seen at AHC**

Year	Leukemia	Lymphoma	Neuroblastoma	Retinoblastoma	Wilms tumor	Other	Total
2012	30	0	1	7	2	3	43
2013	32	1	0	9	7	3	52
2014*	11	2	1	12	4	4	34
2015	5	5	2	23	0	7	42
2016	20	2	1	23	2	11	59

\*The 2014 data are incomplete due to staff transition.

## Results

Since October 2013, 42 AHC patients have received chemotherapy: 37 patients with retinoblastoma, 2 with CML, and 3 with Wilms tumor.

Figure 1 shows the number of patients presenting annually to AHC and the number who received chemotherapy. The 2014 data was incomplete due to staff transition. Figure 2 illustrates the outcomes of retinoblastoma patients before (2007-2013) and after (2014-2015) the availability of curative treatment. Treatment for other conditions only started in 2016 to 2017 (CML, Wilms, and yolk sac tumor). Figure 3 shows from where in Cambodia our retinoblastoma cases originated. Table 2 shows the most common oncological conditions at AHC.

## Challenges and response

Some challenges remain. As the service expands, we will need to provide more chemotherapy and diagnostic services. Expertise in palliative care, particularly in pain management and psychological support for children and families, is still needed.

## Conclusions

Despite many barriers, the oncology program at AHC continues to grow. An active local education program coupled with strong

## Challenges and response

Challenge	Response
Lack of diagnostic capability	External computed tomography service in local private hospital Pathology services in Phnom Penh, Cambodia, and Milwaukee, WI Flow cytometry and molecular studies in Seattle, WA
Difficult for AHC to manage the service with 1 oncology fellow, especially when he is on external training	AHC Hematology-Oncology Unit created in 2017, comprising 3 doctors. ASH-HVO now provides teaching to the new team members.
Difficult to deliver the service with only 1 oncology nurse	Two part-time oncology nurses recruited from existing staff (work in the emergency department-pediatric intensive care unit)
Increasing number and complexity of cases	Teaching to general staff, including a multidisciplinary workshop delivered by AHC and the expatriate oncology team
Concern amongst staff regarding safety of chemotherapy drugs	Pharmacy safety hood and chemotherapy room provided for drug preparation Regular teaching to pharmacy and nursing staff: how to prepare and administer chemotherapy drugs safely Nursing and pharmacy standard operating procedures
Impoverished patient population, often living far from the hospital	Support from AHC social work (transportation costs, food while at AHC), phone consultations
Parents have limited understanding of cancer, may prefer to go to a traditional healer if no immediate recovery	Multidisciplinary counseling (doctors, nurses, social workers) Patient education booklet in development Case conferences Telephone support

support and direct involvement from AHC hospital management and training and guidance from overseas experts have been key components of progress. A successful partnership requires external partners to listen to the site staff and adjust for local context and resources.

**Acknowledgments:** The authors thank Claudia Turner, Khauv Phara, Sath Sainghan, Varun Kumar, Hour Putchhat, Path Bory, Bun Ly, Sinn Chhomrath, and Kim Dalen (Angkor Hospital for Children); Catherine Lam (St. Jude Children's Research Hospital); David Yang (University of Wisconsin School of Medicine and Public Health); Mary Kluck (Medical Mercy Cambodia; funded by the Max Foundation); Kazuyo Watanabe (Asian Children's Care League); Paige Johnson (Children's Mercy Hospital); and Elizabeth Sniderman (Anne and Robert H. Lurie Children's Hospital).

**Conflict-of-interest disclosure:** S.H. and P.V.: American Society of Hematology (consultancy); L.K.: Bristol-Myers Squibb (consultancy), Kymab Ltd (research funding), Regeneron (research funding), Juno

(research funding). Other authors: No competing financial interests declared.

**Correspondence:** Prom Vireak, Angkor Hospital for Children, Siem Reap, Cambodia; e-mail: [promvireak@angkorhospital.org](mailto:promvireak@angkorhospital.org).

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DOI 10.1182/bloodadvances.2017GS101997

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