Global Telehealth 2015: Integrating Technology and Information for Better Healthcare
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Bridging the Distance in the Caribbean: Telemedicine as a means to build capacity for care in paediatric cancer and blood disorders

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Abstract. Over the past 50 years, survival for children in high-income countries has increased from 30% to over 80%, compared to 10-30% in low and middle income countries (LMIC). Given this gap in survival, established paediatric cancer treatment centres, such as The Hospital for Sick Children (SickKids) are well positioned to share clinical expertise. Through the SickKids Centre for Global Child Health, the SickKids-Caribbean Initiative (SCI) was launched in March 2013 to improve the outcomes and quality of life for children with cancer and blood disorders in the Caribbean. The six participating Caribbean countries are among those defined by the United Nations as Small Island Developing States, due to their small size, remote location and limited accessibility. Telemedicine presents an opportunity to increase their accessibility to health care services and has been used by SCI to facilitate two series of interprofessional rounds. Case Consultation

Review Rounds are a forum for learning about diagnostic work-up, management challenges and treatment recommendations for these diseases. To date, 54 cases have been reviewed by SickKids staff, of which 35 have been presented in monthly rounds. Patient Care Education Rounds provide nurses and other staff with the knowledge base needed to safely care for children and adolescents receiving treatment. Five of these rounds have taken place to date, with over 200 attendees. Utilized by SCI for both clinical and non-clinical meetings, telemedicine has enhanced opportunities for collaboration within the Caribbean region. By building capacity and nurturing expert knowledge through education, SCI hopes to contribute to closing the gap in childhood survival between high and low-resource settings.

Keywords. Paediatric oncology, Paediatric haematology, Small Island Developing States (SIDS), Telemedicine, Telehealth, twinning

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Introduction

With successful global efforts to reduce infectious causes of death in children, noncommunicable diseases such as cancer, are now emerging as an increasingly significant proportion of global childhood mortality.¹ Over the past 50 years, survival for children in high-income countries has increased from 30% to over 80%.^{2,3,4,5} In low and middle income countries (LMIC), survival is between 10 – 30%, accounting for over 90% of global paediatric cancer mortality.^{4,6,7,8} Unlike many adult cancers, most childhood cancers are not associated with modifiable risk factors, and therefore a focus on building capacity to enhance early detection, treatment and management of patients is appropriate.⁹

Given this gap in survival, established paediatric cancer treatment centres, such as The Hospital for Sick Children (SickKids), in Toronto, Canada are well positioned to share clinical expertise with low-resource settings. Through the SickKids Centre for Global Child Health, the SickKids-Caribbean Initiative (SCI) was launched in March 2013. The goal of SCI is to improve the outcomes and quality of life for children with cancer and blood disorders in six English-speaking Caribbean countries. Defined by the United Nations (UN) as Small Island Developing States (SIDS), Caribbean countries face unique challenges including small population size and limited accessibility that accentuates other challenges faced by developing countries, and must be considered to build sustainable capacity for paediatric cancer care in the region.¹⁰ Telemedicine presents an opportunity to increase accessibility to health care services for SIDS and other underserved populations. Defined by the World Health Organization (WHO) as "the delivery of health care services, where distance is a critical factor, by all health care professionals … in the interest of advancing the health of individuals and their

communities", this technology allows SickKids specialists to connect directly and instantly with the participating Caribbean sites, without incurring the cost and time associated with travel.¹¹

1. The SickKids-Caribbean Initiative: Building Capacity for Care in Children with Cancer and Blood Disorders

The SCI has established partnerships between health care specialists at SickKids and their counterparts in the Caribbean, working in partnership with the University of the West Indies (UWI), Ministries of Health and key hospitals and institutions. To reach the goal of improved child health, SCI has implemented a programmatic approach to the enhancement of infrastructure, training, strategies and advocacy. This approach focuses on six key thematic areas that have been operationalized through Working Groups: (1) Diagnostic Services; (2) Clinical Care; (3) Local Oncology Databases; (4) Specialized Nursing Education; (5) Sickle Cell Disease; and (6) Research & Evaluation. Each Working Group is championed by two Co-Leads, one from SickKids and one from one of the Caribbean.

2. Institutions Participating in the SickKids-Caribbean Initiative

2.1 The Hospital for Sick Children (SickKids), Toronto, Canada

SickKids, affiliated with the University of Toronto, is Canada's most research-intensive hospital and the largest centre dedicated to improving children's health in the country.¹² SickKids is a 300-bed paediatric (0-18 yrs) teaching hospital located in Toronto, Canada with a staff that includes professionals from all disciplines of health care and research. In 2012-2013, SickKids clinical activities included 102,037 patient days (average length of stay = 6.6 days), 281,583 clinic visits and 63,638 emergency visits.¹³ SickKids' Division of Hematology/Oncology is the largest in Canada and among the largest worldwide. Divided into 5 sections (leukemia/lymphoma, solid tumour, neuro-oncology, non-malignant haematology and stem cell transplantation), in 2013-2014 the Division registered approximately 374 children with newly diagnosed cancer, of which 169 (45%) were lymphoma/leukemia, followed by 124 (33%) solid tumours and 81 central nervous system tumours (22%).¹⁴

2.2 Participating Caribbean Institutions

The six countries that are part of SCI include: The Bahamas (Population (POP) 377,374); Barbados (POP 284,644); Jamaica (POP 2.715 million); St. Lucia (POP 182,273); St. Vincent and the Grenadines (POP 109, 373); and Trinidad and Tobago (POP 1.341 million).¹⁵ To strengthen the partnership in the areas of research, education and training in the Caribbean, a Memorandum of Understanding was signed with UWI in July of 2012. UWI is a regional public university with main campuses in Jamaica, Trinidad and Tobago and Barbados and over 50 open campuses throughout the Caribbean (including The Bahamas, St. Lucia and St. Vincent and the Grenadines). Formal relationships have been established with individuals within seven hospitals,

focused on those which register the majority of paediatric oncology cases. The hospitals are: Bustamante Hospital for Children, Jamaica; Eric Williams Medical Sciences Complex, Trinidad and Tobago; Milton Cato Memorial Hospital, St. Vincent and the Grenadines; Princess Margaret Hospital, The Bahamas; Queen Elizabeth Hospital, Barbados; University Hospital of the West Indies, Jamaica; and Victoria Hospital, St. Lucia. These clinical institutions have identified "lead physicians" and "lead nurses" who shape and drive SCI activities in the 6 partner countries.

3. Building Telemedicine Facilitates to Establish a Network for Consultations and Education

Through SCI, five telemedicine facilities have been opened and one upgraded, as outlined in Table 1. These new facilities are strategically located in, or very near to, the participating hospitals to facilitate engagement of Caribbean hospital staff. This is particularly significant in those countries where pre-existing telemedicine facilities were located far from the clinical sites, making it difficult for physicians, nurses and others working in these settings to travel to existing telemedicine locations during regular working hours. These facilities have allowed SCI to launch two distinct telemedicine-based series, bringing together interprofessional health care providers to engage in real-time discussions. Case Consultation Review Rounds focus on diagnostic management and treatment recommendations while Patient Care Education Rounds address various aspects of paediatric patient care. Leveraging a longstanding relationship with UWI Telehealth Programme in Trinidad and Tobago, SCI has established a standardized telemedicine network to connect participating partner sites in resource limited clinical settings.

3.1 Case Consultation Review Rounds

Case Consultation Review Rounds connect participating sites with SickKids specialists to provide management recommendations for complex cases through collaboratively developed presentations. Providing an educational opportunity for medical students, trainees and professionals, these sessions are a forum for learning about cancer and blood disorders in children including the diagnostic work-up, challenges in management and treatment recommendations. If required, direct pathologist to pathologist consultations provide a review of the histopathological diagnosis and/or provide additional diagnostic services that may not be locally available or accessible, which are then reviewed in the telemedicine rounds. To initiate this activity, a legally binding agreement was signed by a delegate for each participating Caribbean site to indemnify SickKids and contracted physicians for their participation. Select Division of Haematology/Oncology physicians representing key subspecialties were then formally contracted to participate in SCI consultations, thereby initiating a mechanism to backfill the Division for their time. A secure electronic file transfer system was established to send all case related summaries and reports to ensure adherence to ethical and legislative obligations required to protect personal health information.

Since launching the monthly rounds in September 2013, 54 cases have been submitted for consultation (Table 2). To connect all sites, a SickKids contracted bridge operator works with local IT staff. At these one-hour sessions, two cases are usually reviewed,

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leaving time for facilitated discussion. This discussion follows the formal case presentation and focuses on the recent management of the specific disease, which provides a valuable teaching element. Additional rounds are scheduled ad hoc based on volume and availability. Of all cases submitted, 35 (65%) were presented at rounds, fifteen (28%) required diagnostic imaging studies and 16 (30%) required additional pathology testing. Figure 1 illustrates the distribution of cases submitted for consultation, indicating the types of diagnoses that referring physicians deem most challenging. Leukemia/lymphoma accounts for the majority of cases reviewed (31.5%), followed by solid tumours (25.9%) and neuro-oncology cases (20.4%). Non-malignant haematology cases accounted for 16.7% of the cases reviewed. The rounds are well attended and received, as indicated by formal evaluation of the rounds. Evaluation data has been collected since May 2014, and asks the attendees to rate the session (i.e. technology, relevance, etc.), the presenter (i.e. knowledgeable, engaging, etc.) and their overall satisfaction with the session (Table 3).

3.2 Patient Care Education Rounds

Another key activity utilizing the telemedicine network is Patient Care Education Rounds. The objective of these sessions is to provide nurses and other professional staff working in SCI participating institutions with the knowledge base needed to safely care for children and adolescents receiving treatment for cancer or blood disorders. The topics presented are chosen based on a needs assessment and in consultation with the Caribbean SCI leaders. Each session is 60 minutes in length, consisting of a 30-minute presentation followed by 20 minutes of questions and discussion. A 10-minute buffer is left for technical issues and extended discussions. Five sessions have taken place to date, and 5 more are scheduled for the remainder of 2015. In total, 204 individuals have attended rounds, with 146 (72%) returning evaluation forms. Similar to those used for the Case Consultation Review Rounds, these evaluation forms ask attendees to rate the session, the presenter and their overall satisfaction with the session. Responses are summarized in Table 4.

4. Sustainable Impact of Telemedicine Activities

Utilizing telemedicine technology for international consultations expedites the review process and provides a forum for clinical education, thereby building sustainable capacity for specialized patient care locally and contributing to improved patient outcomes. Used for both clinical and non-clinical meetings, telemedicine enhances opportunities for inter-Caribbean consultation and collaboration, as learnings from a single case are shared across the region. The importance of dedicated technical support and of consistently collecting evaluations must be underscored. With successes in facilitating these sessions, this technology has been leveraged to connect SickKids to the region for other activities. For example, as part of the establishment of hospital-based paediatric oncology databases, two training sessions were conducted remotely from SickKids in August 2014, and February 2015 with Data Managers from multiple sites. The SCI telemedicine network is being further considered as a vehicle to deliver components of the post-basic nursing training course that is currently under development, to compliment e-learning and allow for weekly debriefing with students.

Importantly, these facilities are only used in part for SCI activities, but are regularly booked to allow for participating in other local needs.

5. Conclusions

Serving as a forum for education, knowledge transfer and management recommendations, telemedicine involves the integration of technology, medicine, social systems and culture. It is a valuable tool to strengthen training and interprofessional collaboration, by increasing the expertise of subspecialists in the Caribbean SIDS. The rounds promote and facilitate bi-directional academic exchange both within the Caribbean region, and between the Caribbean and SickKids. Through candid discussion about real world challenges in the care of children with cancer and blood disorders, participating SickKids clinicians have also learned about how to refine treatment recommendations within a low-resource context, resulting in reverse capacity building. By building capacity and nurturing expert knowledge through education, paediatric patients with cancer and blood disorders will benefit from enhanced diagnostic and therapeutic management. In doing so, SCI hopes to contribute to closing the gap in childhood survival between low and high-resource settings with sustainable benefits for the Caribbean communities in which they live.



Figure 1. Cases submitted by disease type (September 2013 – February 2015)

Country	Name of Facility	Location of Facility	Date	
			Opened	
The Debaure	DTC T-law - diain - Daam	Princess Margret	July 2013	
The Banamas	BIC Telemedicine Room	Hospital		
D 1 1		University of the West	Nov. 2013	
Barbados	Shaw Family Telemedicine Room	Indies, Cavehill		
G. X .	Sandals Foundation Telemedicine	N7. 4 . TT . 4 1	Oct. 2014	
St. Lucia	Room	Victoria Hospital		
St. Vincent and the	Telemedicine Room of the Children	Milton Cato Memorial	0 1 2014	
Grenadines	of St Vincent and the Grenadines	Hospital	Oct. 2014	
Trinidad and	UWI Telehealth Programme	Eric Williams Medical	2014	
Tobago	(upgrade)	Sciences Complex	Nov. 2014	
Jamaica	Wayne and Nigela Purboo and	Bustamante Hospital for	E 1 2015	
	Quickplay Media Telemedicine Room	Children	Feb. 2015	

Table 1. Telemedicine facilities installed in SCI partner sites through SCI

Institution	Number of Cases	% of all Cases
Princess Margaret Hospital, The Bahamas	10	18.5
Queen Elizabeth Hospital, Barbados	8	14.8
Victoria Hospital, St. Lucia	2	3.7
Milton Cato Memorial Hospital, St. Vincent and the	1	1.9
Grenadines		
Eric Williams Medical Sciences Complex, Trinidad	16	29.6
and Tobago		
University Hospital of the West Indies, Jamaica	16	29.6
Bustamante Hospital for Children, Jamaica	1	1.9
Total Cases	54	100

 Table 2. Summary of cases submitted for consultation (September 2013 – February 2015)

 Table 3. Attendee overall satisfaction (1=Poor, 2=Needs Improvement, 3=Adequate, 4=Good, 5=Excellent) at Case Consultation Review Rounds (May 2014 – January 2015)

Date	Remote Sites Connected	Evaluations Collected (n)	Overall Satisfaction (/5)
May 21, 2014	6	21	3.90
June 4, 2014	2	12	4.42
June 18, 2014	6	13	4.23
July 16, 2014	6	22	4.05
Aug. 20, 2014	4	17	3.76
Sept. 15, 2014	3	22	3.95
Oct. 15, 2014	5	13	4.31
Oct. 29, 2014	3	9	3.89
Nov.19, 2014	5	21	4.14
Dec. 17, 2014	3	9	4.11
Jan. 21, 2015	6	9	4.00

 Table 4. Summary of the Patient Care Educations Rounds (1=Poor, 2=Needs Improvement, 3=Adequate, 4=Good, 5=Excellent)

Date	Title of Presentation	Evaluations Collected (n)	Overall Satisfaction (/5)
May 26, 2014	Pain Management in Children with Sickle Cell Disease	36	4.06
June 23, 2014	Childhood Leukemia: Care of the Family and Child	21	4.38
Sept. 30, 2014	Nutrition in Paediatric Cancer	25	4.32
Nov. 18, 2014	Potential Interactions between Natural Health Products and Chemotherapy	25	3.88
Jan. 27, 2015	Hydroxyurea in Sickle Cell Disease	39	4.26

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