Experience with transplantation for hemoglobinopathies in limited-resource regions

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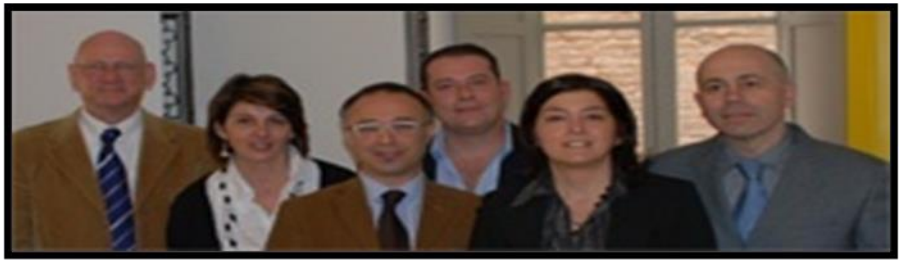
I have nothing to disclose



Mission

Cure2Children (C2C) is a non-profit, apolitical and secular organization promoting the cure of children with cancer and blood disorders directly in low- and middle-income countries.

Main achievements

- **Financial/professional support for the start up of 12 stem cell transplant centers in Asia, Middle East and Adfrica.**
- **Close to 800 transplants performed**
  - **Mostly for hemoglobinopathies**
  - **90% MRD, 10% PMRD.**

BMT center start ups

(12 BMT centers from 2008 to 2021)

- **Pakistan** – Islamabad
- **India** – Jaipur, Ahmedabad, Bangalore
- **Sri Lanka** – Colombo
- **Morocco** – Marrakech
- **Armenia** – Yerevan
- **Ghana** - Accra

Faulkner et al. Setting up and sustaining blood and marrow transplant services for children in Middle-Income Economies: An experience-driven position paper on behalf of the PDWP of the EBMT *Bone Marrow Transplantation, (*2021) 56:536–543. https://doi.org/10.1038/s41409-020-0983-5.

Thalassemia MRD, low-risk first BMTs the Cure2Children-Sankalp experience

	Pts	OS	DFS	TRM	Rej
Tt-BuCy	30	87%	80%	13%	7%
ATG-BuCy	85	89%	71%	10%	20%
Flu-ATG-BuCy	124	96%	90%	3%	7%
FluDex//Flu-BuCy	31	100%	100%	0%	0%

Additional concerns in low-resourse settings

- Malaria
- Tuberculosis
- Typhoid
- Amebiasis
- Intestinal parassitoses
- Polio
- Other…
- Multidrug resistant germs

598 first BMTs	
Median follow up (months)	23 (0 to 138)
Median age (yrs)	6.7 (0.4 to 21)
ANC > 500	19 (0 to 84)
Plt > 20.000	20 (0 to 89)
RBC Tx	3 (0 to 68)
Plt Tx	7 (0 to 112)
aGVHD > 2	69 (**11.5%**)
cGVHD > Mild	27 (**4.5%**)
SOS	72 (**12.2%**)
TA-TMA	26 (**4.3%**)
CMV Reactivation	116 (**19.4%**)
Clinical Sepsis/CLABSI	206 (**34.4%**)
Fungal infection (possible or probable)	27 (**4.5%**)
Hemorrhagic cystitis > grade 1	101(**16.9**%)
Tuberculosis	6 (**1**%)
Malaria	3 (**0.5**%)
Mixed Chimerism	210 (**35.2**%)

Quality of life post-BMT for thalassemia

La Nasa et al. Blood 2013

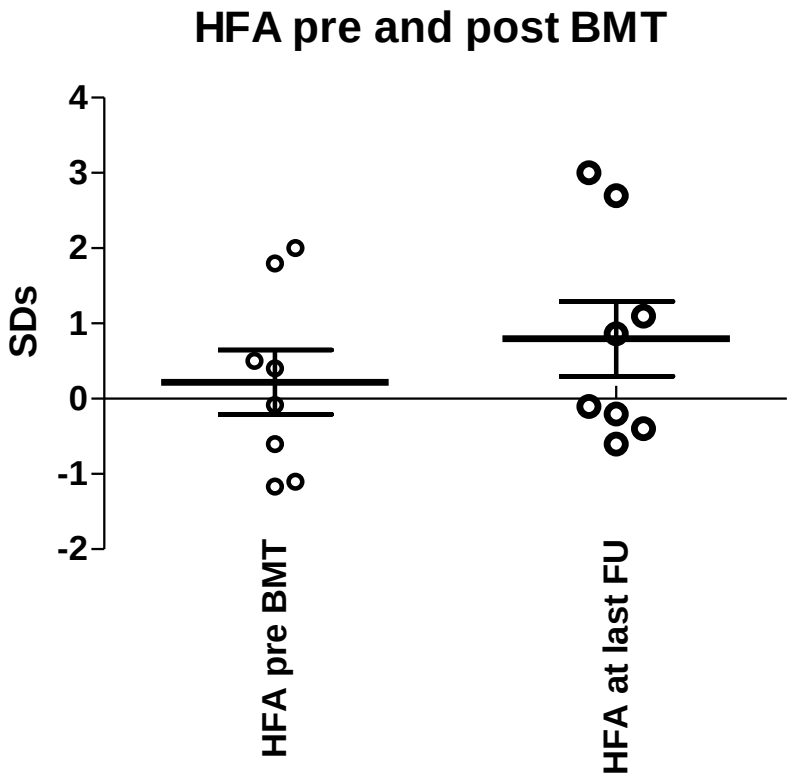
109 patients (44 females and 65 males) **assessed > 20 yrs from BMT** (BuCy), mean age at BMT 12 yrs (1-36) and 34 yrs (21-48) at time of study.

Long-term health-related quality of life, employment status and birth rate similar to the general population

Relevant variables affecting HRQoL:

- Extensive chronic GVHD (6%)
- Age at BMT (better if less than 15 yrs)
- Comorbidities (risk group at BMT)

Linear growth pre- and post-BMT in children living in SSA after BMT for SCD

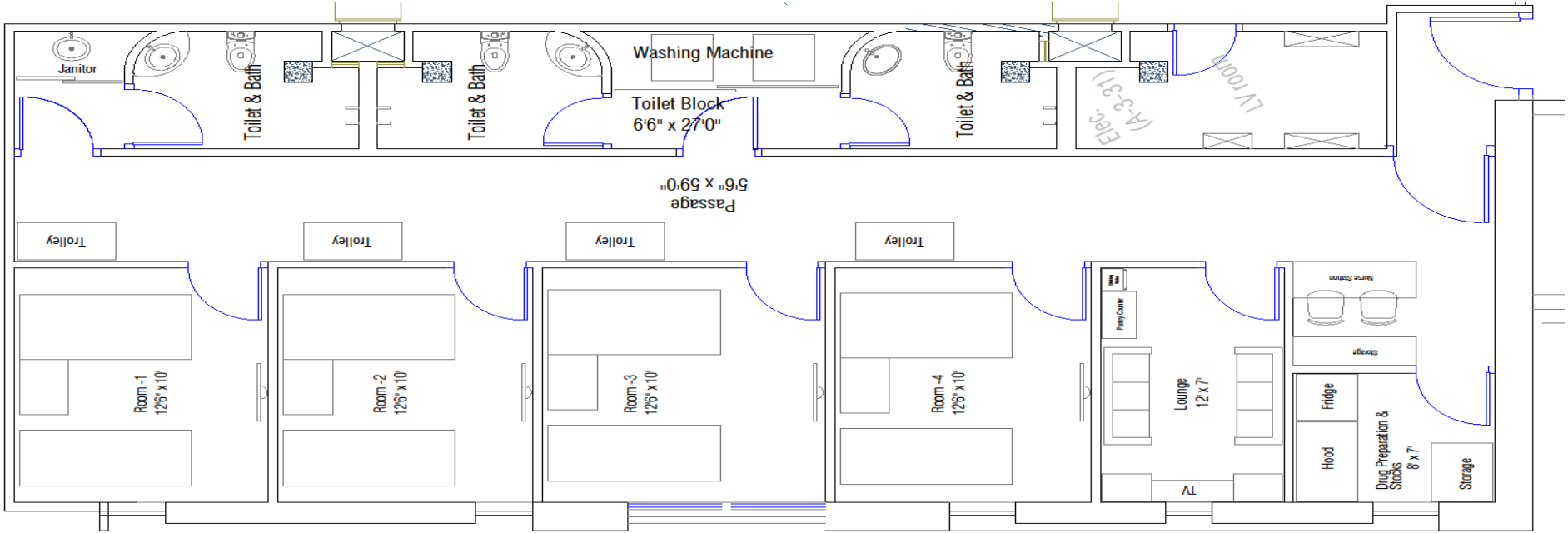


Cost and complexity issues

- **Cost is an important “risk factor”.**
- **If access to life-saving therapy is limited by unaffordability, then there will be cost-related deaths.**
- **Any significant cost needs to be justified by hard evidence of efficacy.**

- **Hospital infection control**
- **Source of stem cells**
- **Drugs**

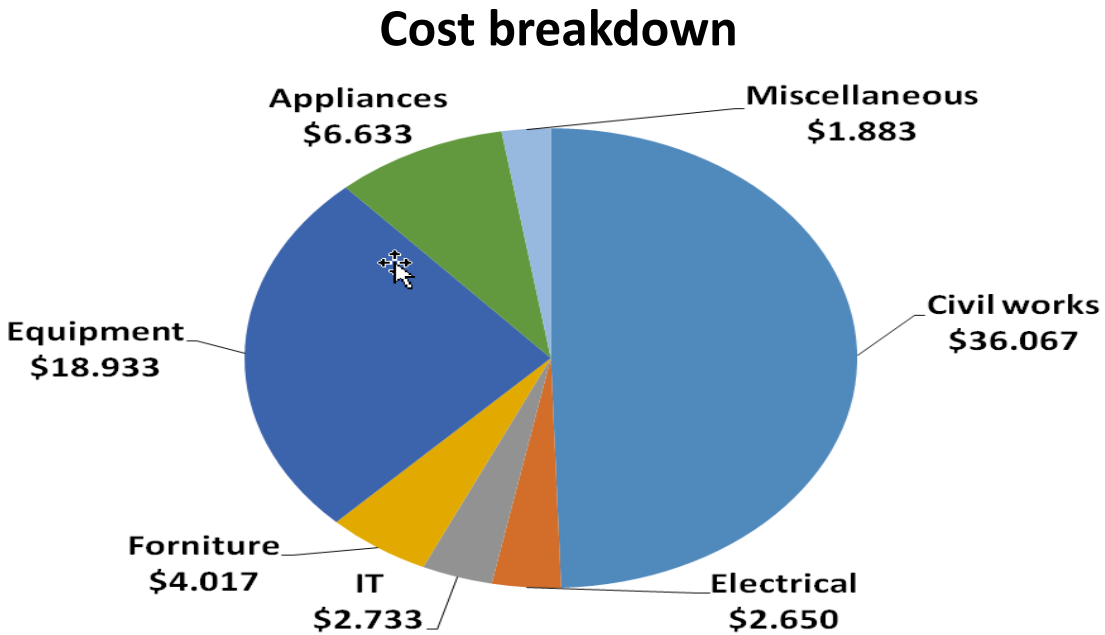
BMT unit design



BMT units set up costs

For a 4 bedded BMT unit an average of 73.000$

(from 45.000$ to 122.000$ depending on civil works required



BMT costs

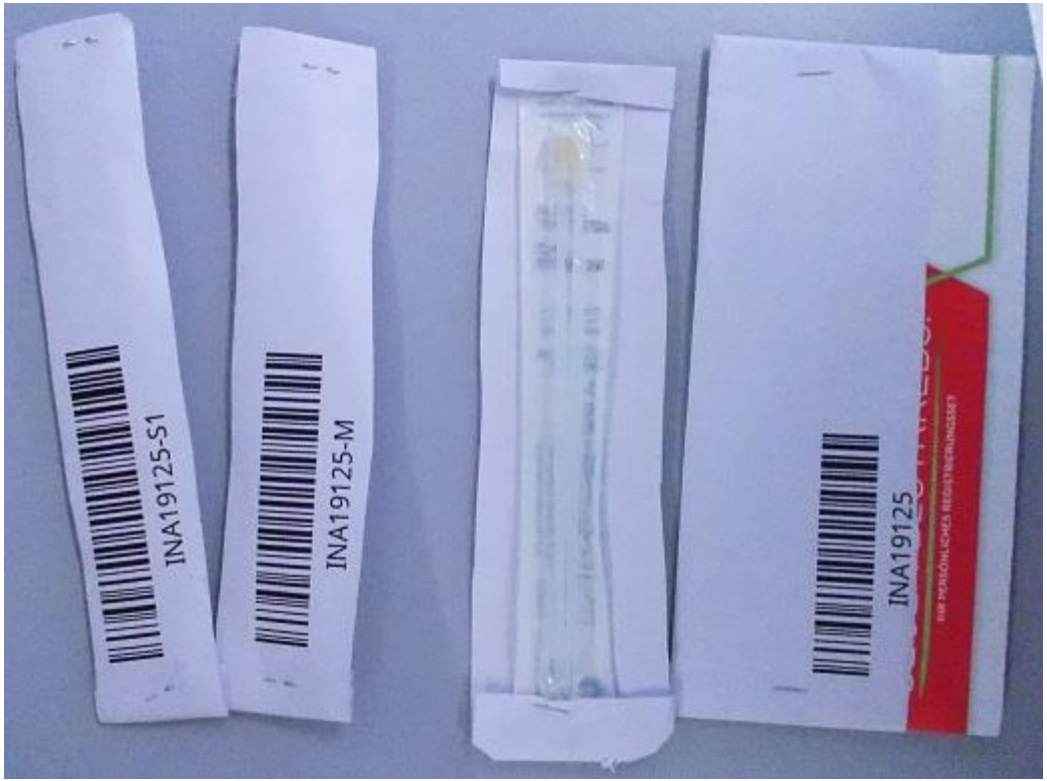
(matched-related, covering 1 year post-BMT)

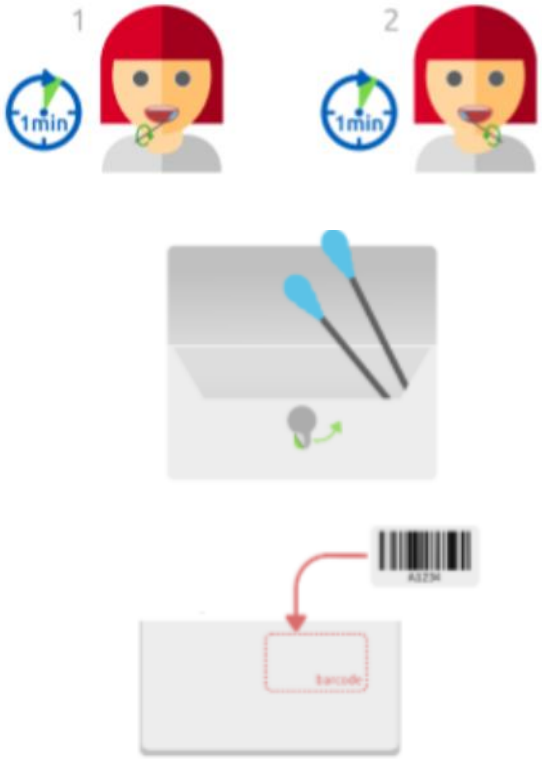
	SEAIT-India (4 beds)	PTH India (4 beds)	CIMS India (4 beds)
Minimum	$7.945	$6.009	$10.122
25% Percentile	$9.439	$8.769	$11.616
Median	**$9.943**	**$10.238**	**$12.310**
75% Percentile	$10.240	$11.351	$13.191
Maximum	$29.813	$30.249	$24.036

Limitations of the cost model

- **Restricted largely to low-risk BMTs**
- **Primarily dealing with healthy children at BMT**
- **Aggressive GVHD prophylaxis**
- **Nurses salaries below average market rates for professionals**
- **Some tests and blood products at reduced rates.**

Accessible HLA screening





The SankaIp-Cure2Children database

- Web-based platform (BMTPlus)
- As of May 3, 2023: **8.284 children**
- 80% with severe thalassemia, 8% Sickle Cell Disease
- **4.507 HLA typed** (DKMS)
- **1.475 found to have a fully matched related donor** (33%)
- **660 have been transplanted**, largely at no or subsidized cost

Armenia startup

What have we learned?

- Nursing team is the most precious asset.
- Complex and expensive “sterile” facilities are not required for low-risk BMT.
- Remote consultation and information technology can compensate for local inexperience and steepen learning curves.
- Low-risk BMT for hemoglobinopaties is an appropriate start up target.

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Thank you

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