Bone marrow transplantation as part of «Help3 Project» in Tanzania

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Help3 2015-2022: activities

- **SINCE 2015** : **focus on «sickle cell disease»**

- **four SCD "outpatients" activated in** 4 Hospitals :
  TANZANIA : BMC -Mwanza, **St.Gemma H**-Dodoma , **Mnazi Mmoja H** -Zanzibar
  UGANDA : **Lacor hospital**
- **Donation of Hydroxyurea** for the treatment **of 800 SCD children**
- **Donation of "data base" SCD oriented**
- **Donation of three "Electrophoresis of Hb" instruments**
- **Italian hematologysts** available every day for consultation

- **SINCE 2019 : focus on «Bone marrow transplantation»**

- ***Collaboration with BMH (Dodoma) toward the Start up of Haematologic and BMT Unit for the diagnosis and treatment of SCD and other hematologic diseases***

SCD in Tanzania up to 2022

- **SCD birth prevalence /year**:
  6-10 per 1000 births (**around 20.000**)
- **SCD children MR/year** = 10.500 (J. Makani)
- **U5-MR for SCD = 50 to 90%**
- **U5-MR for Malaria = 10 % (WHO data)**

Five years interactivity at St.G.H , Dodoma

Training at the beginning…

Sickle cell clinic:

450 SCD treated children

Five years interactivity at MMH

MNAZI MMOJA HOSPITAL (ZZ) :
200 SCD treated children

HELP3 Project : our targets

- **to decrease the SCD "U5-MR" and to improve the SCD survival and QOL, decreasing also the "social costs"**
- *to create a fruitful advocacy within National and International NGOs in favour of Tanzania*
- **to cure definitively by standard therapy and BMT both childhood SCD and other blood diseases**

Estimated yearly Incidence of childhood leukemia and lymphoma in "Tanzania"

NEW LEUKEMIAS/YEAR

- **2000** patients (1 to 18 yrs)
- **700 in the areas of**
  - Mwanza
  - Dodoma
  - DAR
  - Zanzibar

NEW LYMPHOMAS/YEAR

- **2500** patients (1 to 18 yrs)
- **800 in the areas of**
  - Mwanza
  - Dodoma
  - DAR
  - Zanzibar

HELP3 ongoing strategy

Maintenance of collaboration, training and echonomical support to St.G.H and MMH

Since 2019 at BMH (Dodoma)

***At distance training (45teleconferences)**

** **Stages in Italy for Tanzanian nurses and medical staff of BMH (2021-2002)**

** **«Start up» of an hematologic and BMT center at Benjamin Mkapa Hospital (Dodoma) on 2022**

Direct beneficiaries up to now :

- **SCD** patients (650)
- **Nurses/medical staff** in the hospitals (20)
- **Parents and relatives** of the SCD patients (1250)
- **Doctors** on the districts (10)

WHY BMT CENTERS for childhood hematological diseases in "TANZANIA " ?

- **SITUATION in AFRICA up to 2020**

- **11 BMT centers in Africa** for 1 milliard of people (*1 in Nigeria, 6 in South Africa,1 in Tunisia, 1 in Morocco, 1 in Egypt, **1 in Tanzania***)
- **BMT centers needed in *"sub-saharan area"* : 15 (??)**
- **BMT centers needed in TANZANIA : 3-4 (??)**

- **Probable costs** for building up a Pediatric BMT Unit in sub-equatorial area (excluding personnel) : ***350.000 $***

- ***Probable costs for 1 allogeneic BMT in Tanzania : 15.000 $***
- ***Probable costs for 1 allogeneic BMT overseas: 40.000 to 150.000 $***

- ***Probable costs of 5 to 7 years of "SCD" standard treatment : 10.000 $***

Bone marrow transplantation (BMT) : definitions

** **Bone Marrow Transplantation** is a modern treatment consisting on the substitution of *"patient hematopoietic stem cells"* with " HLA compatible donor" stem cells

** **BMT donor** is generally a *family HLA identical donor*

** The new bone marrow is harvested in an operating room and infused intravenously to the patient previously conditioned

** **BMT** is applied on those patients who are *"poor responders"* to standard treatment

****BMT is the most complex organ transplant** due to the multiple complications (rejection…) *if not done by a very expert transplant team and in an adequate structure*

BMT INDICATIONS in children affected with:

Malignancies:

- **Leukemia**
- **Lymphoma**
- **MDSyndrome**
- Solid tumors

Non malignancies:

- **Sickle cell Disease (SCD)**
- **Severe aplastic anemia**
- **Immunodeficiency**
- Inherited metabolism disorders
- Autoimmune diseases

WHY BMT for "SCD" in childhood ?

- **is the only "curative treatment "** for **SCD** since 20 years in "high income countries" ***with 95% of "cure rate"*** and no *recurrence of clinical "vaso-occlusive crisis"* and no new ischemic lesions after successfull transplant
- **High "quality of life" after BMT**

WHY BMT for malignant diseases in childhood ?

- ***High "cure rate" (60-70%) in patients with "resistant diseases" after standard chemotherapy***
- **BMT success in a large series of patients all over the world since last 2 decades**
- **BMT , Innovative treatment , is feasible today also in "developing countries" including "Subsaharan area"**

S. Gerardo University hospital (Monza-ITALY)
BMT Pediatric Unit

- *First alloBMT : June 1985*
- 36 yrs of experience

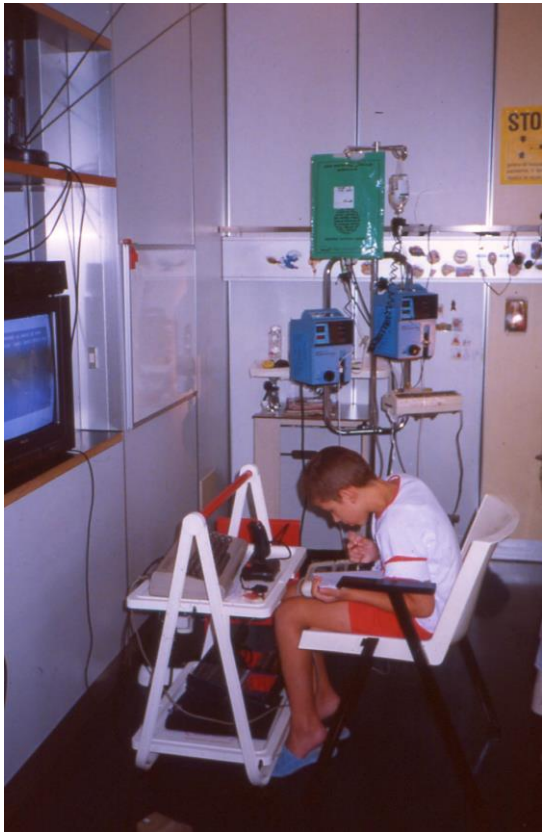
➢ Total n° of BMTs = 850
➢ 75% AlloBMTs and 25% AutoBMTs

➢ Malignancies : 70%
➢ Non-Malignancies : 30%
➢ Total Post BMT TRM : 10%
➢ Alive/well at median Fup of 10 yrs: **64%**

➢ **Global Medicine and Cooperation**
➢ **International Scientific research**

Bone marrow harvesting

Bone marrow infusion



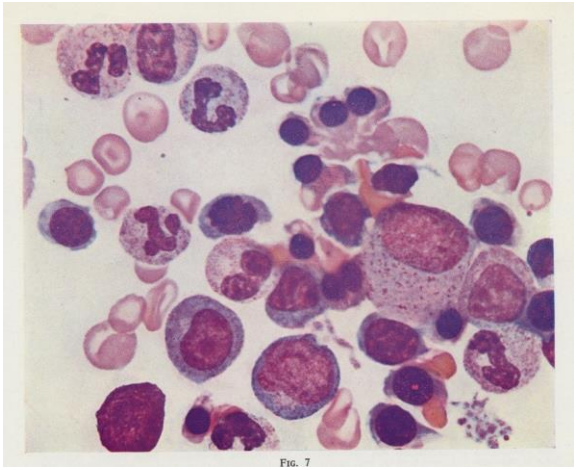


Fig. 7

Cured patients at S.Gerardo Hospital winners on Wordl transplant games

London, Canada – July 2006-2010

Autologous BMT in AML : longterm QOL

- A.Z., Male , 13 yrs old at diagnosis

** *1998 : Diagnosis of AML M2*

** *CR1 obtained and maintained for 3 months*

** 1999 : receiving an AutoBMT in first CR after BU-CY

** 2010-2014 : Olimpic Games champion

** 2014 : *owner of a riding school*

** 2015 : married

** 2021 : cured with excellent life satisfaction

BMH : «core» of the Help3 project since 2019

With proper «task force»

Successfull BMT program at BMH

depends from :

- will-power and commitment of «doctors and nurses»
- a competent local «BMT team» in a specialized Hospital
- a continued “training” and «updating»
- a comprehensive financial support since the beginning!
- assuring the maintenance of the BMT activity along the years

Our dream is to «cure» the childhood hematological diseases *in Tanzania as well as* it happens in HICs

CONCLUSION 1

- *In most developing countries*, a HSCT program must compete for allocation of limited funds with other priorities for basic health care services, such as food, sanitation, immunization, population control, and communicable disease prevention.
- Nonetheless, *developing countries* should have the expertise to offer state-of-the-art treatments, including HSCT, to enable treatment locally at a much lower cost than abroad.

CONCLUSION 2

- As new programs plan, Tertiary Care Centers in LICS should consider establishing a relationship early with an experienced HSCT center within the region or remotely (eg, telemedicine or a “twinning” partnership arrangement) *to provide experienced advice in the context of HSCT procedures*

- **Right to health is mandatory for children all over the world**

CONCLUSION 3

The development of curative treatment for children with cancer is a benchmark for medical progress and such treatment *must not be sequestered within the borders of few countries*

Raul C. Ribeiro and Ching Hon Pui

NEJM may 2005

Asante Sana

BMT BASAL REQUIREMENTS

OUTPATIENT FACILITIES (with air conditioning)

STAFF : 2 doctors + 4 Medical doctors ; 8 (10) nurses;1 chief of nurses

BASAL STRUCTURE :

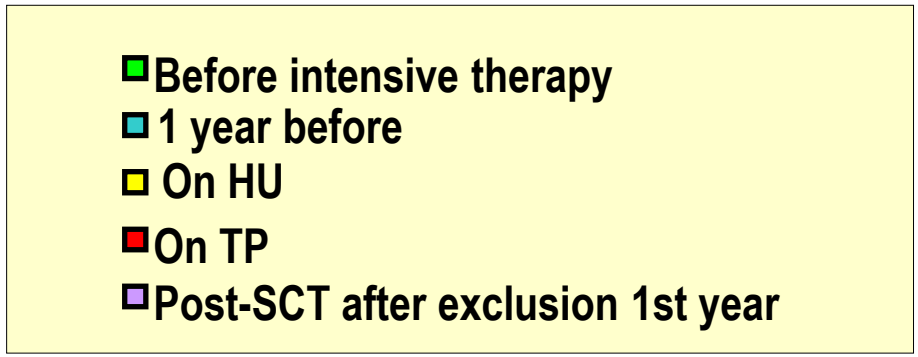
- **large common room with 10 beds for transfusions, infusions + 4 bathrooms**
- **2 rooms for invasive and non-invasive procedures (BM aspiration, lumbar puncture……..**
- **1 *Nurses station* for preparation of infusions and any kind of procedure (+ Internet/Intranet)**
- **1 *Doctors station* with Internet/Intranet**

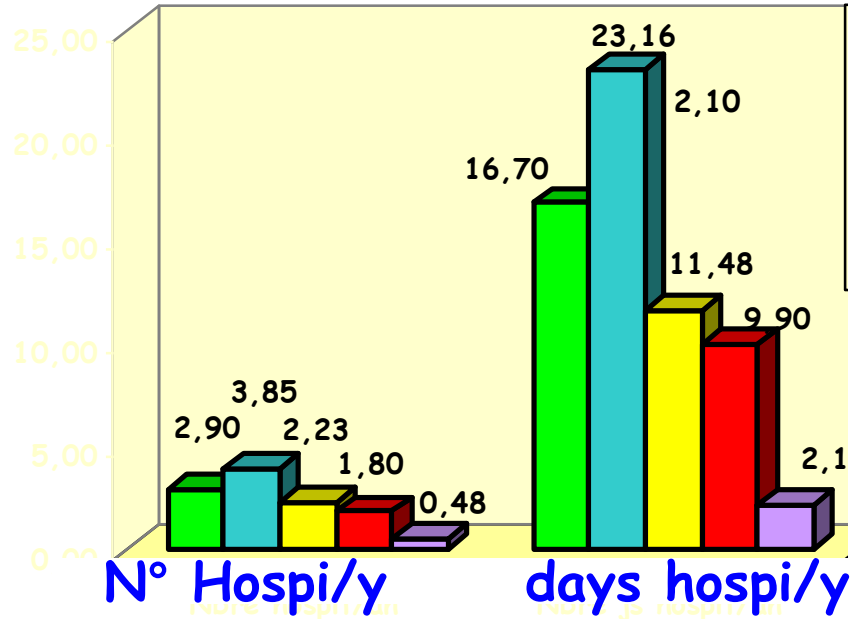
OUTPATIENT FACILITIES (with air conditioning

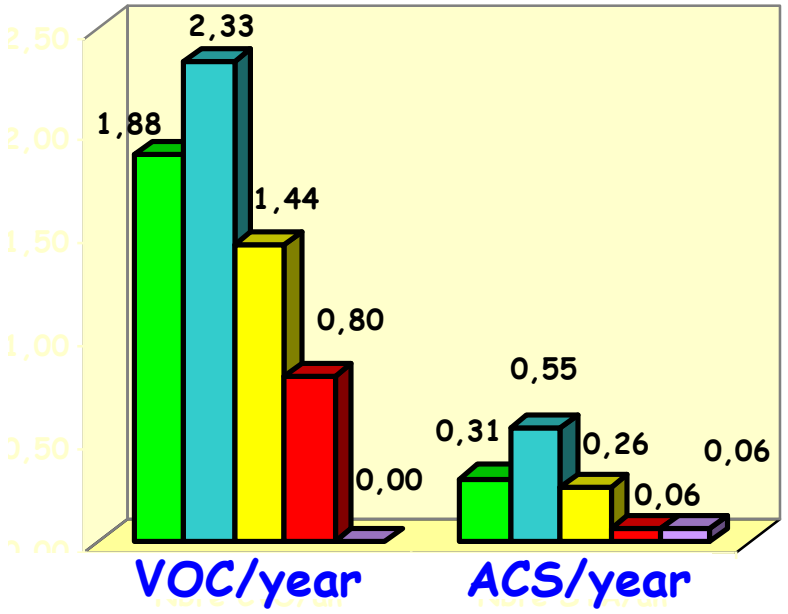
SUPPORT AEREA :

- **One protective cabinet**
- **Storage room (for drugs, (scales, monitors…….)**
- **1 "Play/rest room" for patients and/or parents**
- **1 rest room and 2 bathrooms for the personnel and parents**
- **1 room for "social worker and/or psycologyst**

Comparative effects of TP, HU and BMT on frequency of Hosp, VOC, ACS in 111 SCD-patients







Arnaud et al CHI-Creteil, ASH