Viewing Time

The program will take up to one hour to complete.

Target Audience

This program is designed for primary care physicians.

Other health care professionals working with patients and their families may also find this program of interest.

Faculty Disclosure

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Faculty Disclosure

Anna Zimmermann, MD, MPH, has disclosed no actual or potential conflict of interest in relation to this educational activity.

During this educational activity **Dr. Zimmerman** will not be discussing the use of any commercial or investigational product not approved for any purpose by the FDA.

Neonatal and Infant Care in Uganda, Africa

Anna Zimmermann, MD, MPH
Neonatal Fellow
University of Minnesota

Neonatal and Infant Care in Uganda, Africa

A lecture presenting Dr. Zimmermann's recent volunteering experience at Mulago Hospital in Kampala, Uganda.

Program Objectives

Upon completion of this program, participants should be able to:

- Learn about infant care in a limited resource setting.
- Recognize the benefit of Kangaroo Cares.
- Compare resources available in U.S. vs. Third World Countries.
- Recognize opportunities for international medical volunteerism.

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Accreditation

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Receiving CME Credit

To receive CME credit you must view the entire program and complete the evaluation form at the end.

Special Care Baby Unit
Mulago Hospital, Uganda
October 2007

Anna Zimmermann, MD, MPH
Neonatal Fellow
University of Minnesota

Uganda

- Located in East Africa
- Population 30 million
- "Pearl of Africa"
  - Winston Churchill
- Languages:
  - English
  - Luganda, Swahili
- Money:
  - Ugandan Shilling
  - $1 = USh 1735

Brief Ugandan History

- Initially, tribal nation with over 300 tribes
- Buganda tribe largest - 20% population
- English protectorate, not colony, 1900 - 1952
- Independence from England in 1962
- 1960 - 1970's marked by Obote and Idi Amin - significant turmoil during and after their regimes
- National Resistance Army led by Museveni's gorilla troops took control in 1986
- HIV/AIDS hit Uganda hard. Rate 25% → 6%

Economy

- Free market economy
- Agriculture is 60% GDP
  - Coffee, tee, & tobacco are the major export crops
- 90% of Ugandans work in agriculture
- Working in retail shop brings $20 / month
- Typical poor < $200/month
- Typical middle class $400 - 1500 / month
- 30% of Ugandans live below the poverty line, living on $1 per day
- 50% of federal budget comes from foreign aid
- Health expenditure - $2 per person per year

Kampala

- Capital City
- Population 1.2 million +
- Built on 7 hills
- Mix of modern buildings and shanty towns
- Traffic, traffic, traffic!!!

Health Volunteers Overseas

- Founded in 1986
- Private non-profit organization
- Goal: to be a global leader in the development and implementation of educational programs designed to empower health care providers in developing countries
- Pediatric programs in Uganda, Cambodia, Malawi, and St. Lucia
- Known NICU volunteers in Uganda, St. Lucia

HVO Guest House

- One block from Mulago hospital
- Can house ~16 volunteers
- $10 / night to stay
- Lots of critters living with you
- Very safe and secure with armed guard at night and gated entrance

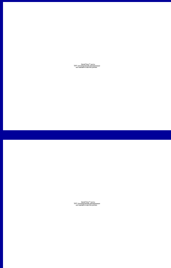
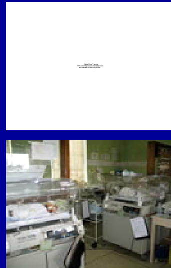
Mulago Hospital

- National Referral Hospital
- Built in 1960's by the Queen of England - to be the premier infectious disease hospital in Africa
- Smaller district hospitals around the country

Special Care Baby Unit

- Designed for 20 infants
- Average 38 - 45 babies
- No shoes (flip flops for staff, can only wear in unit)
- Mostly inborn
- Few referrals from district hospitals
- Few BBA (home)

Special Care Unit

Statistics of the SCU

- 62% all births in Uganda occur at home
- 35,000 deliveries / yr at Mulago Hospital
- 3,000 admits / yr to SCU
- Even split term & preterm
- Mortality Rate 31%
- Mean admission weight 1.6kg
- 14 maternal deaths per day in the country

August 2007 Data

	Admissions	Deaths	Mortality Rate
Full Term	138	26	19%
Preterm	124	52	42%
Total	262	78	30%

•Of the 52 preterm deaths, 30% of infants were < 1kg

•Term deaths most frequently due to "birth asphyxia"

•Preterm deaths mostly due to respiratory failure/distress.

Medical Education

- Follow British system
- All Level = High school - 4 years
- HSC = College - 2 years
- Undergrad = Medical School - 5 years
- Internship - 1 year
  - Do 3 months each of peds, OB, medicine, surgery
- Medical officer - indefinite, typically 3-5 years
  - Work in a clinic, but can't open your own clinic
- Residency = Postgraduate Masters - 3 years
  - Choose specialty
  - Costs $1200 per year, no salary

Medical Student Education

- In unit two half days a week.
- Minimal hands on experience, mostly lectures
- Generally very book smart with little clinical correlation
- Attendings have little to no time for teaching
- I did a lot of teaching

One Intern

- Covers preterm side
- No prior experience
  - Two weeks in medical school, lectures only
- Works 8am - noon and 6 -10pm
- Two week rotation
- No supervision

One Senior House Officer

- Covers term side
- Doing 3 year residency in pediatrics
- Month long rotation
- Works 8am - 1pm, lectures in afternoon
- No supervision
- No communication or discussion with intern about patients or plans

Attendings

- Total of 4 attendings
- Trained in pediatrics, no fellowship in neonatology
- Salary $600 / month
- Supplement with study funds ($600/month) and private clinics
- Time on unit *very* limited
- “The hospital with no doctors”

Nurses

- Only 9 nurses to cover ALL shifts
- Salary $240 / month
- Several times, worked long shifts (48 hours) because no one came to relieve them
- Freeze on hiring
- Severely overworked
- Very experienced

Admissions

- No delivery team
- Brought from L&D by midwife wrapped in linens
- Significant delays in initiating the resuscitation and stabilization of infants due to lack of staffing on the busy unit
- Generally 5 - 10 admits per day (average 8)
- Nurses start treatments by following protocols because no 24hr coverage by physicians

Term Resuscitation Area

Premature Resuscitation Area

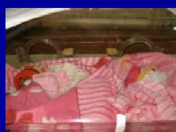
Resuscitation

- Oxygen, shared off wall
- Bag/Mask
- PIV
- Normal Saline
- D10W
- Adrenaline

- No ventilators
- Marginal use of CPAP
- No central lines
- Generally, no labs or Xray
- No thermoregulation

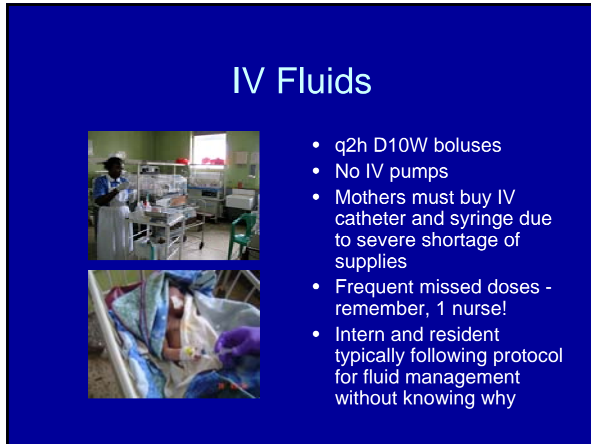
Equipment

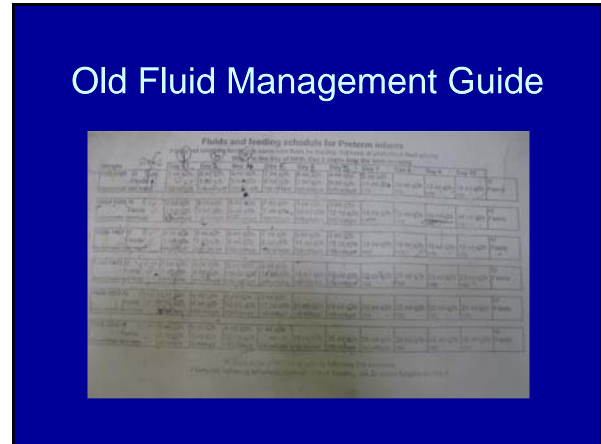
Isolettes



Admission Orders

- Ampicillin (100/kg/d)
- Gentamicin (5/kg/d)
- D10W q2hrs (~60/kg/d)
- Aminophylline
- Vitamin K - healthy term infants do not receive
- No eye ointment
- Immunizations before discharge - oral polio & BCG





Newly Designed Fluid Guidelines

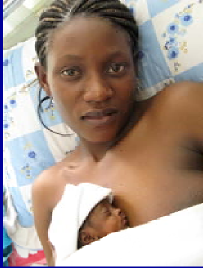
	Premature*	Term**
Day 1 of life	Dextrose 10% *** Total fluids 80 to 100 ml/kg/day	Dextrose 10% Total fluids 60 to 80 ml/kg/day
Day 2 of life	Dextrose 10%* Total fluids 90 to 110 ml/kg/day	Dextrose 10% Total fluids 70 to 90 ml/kg/day
Day 3 of life	Dextrose 10% Total fluids 100 to 120 ml/kg/day	Dextrose 10% Total fluids 90 to 120 ml/kg/day
Day of life 4	D10% and NS or Lactated Ringers (3:1)**** To make [illegible]NS/LR solution Total fluids 130 to 140 ml/kg/day	D10% and NS or Lactated Ringers (3:1) **** To make [illegible]NS/LR solution Total fluids 110 to 140 ml/kg/day
Day of life 5	D10% and NS or Lactated Ringers (3:1) **** To make [illegible]NS/LR solution Total fluids 150 ml/kg/day	D10% and NS or Lactated Ringers (3:1) **** To make [illegible]NS/LR solution Total fluids 150 ml/kg/day
Day of Life 6+	D10% and NS or Lactated Ringers (3:1) **** To make [illegible]NS/LR solution Increase slowly as tolerated to a maximum total fluids of 180 ml/kg/day	D10% and NS or Lactated Ringers (3:1) **** To make [illegible]NS/LR solution Increase slowly as tolerated to a maximum total fluids of 180 ml/kg/day

*The most premature neonate will require higher fluid volumes due to increaseevaporative losses
** Term asphyxiated neonates will require the lowest fluid volumes due to decreasedrenal function and SIADH
***Extremely premature infants (< 1 kg) may only tolerate Dextrose 5%
**** i.e. 7.5 ml of Dextrose 10% mixed with 2.5 ml of NS or LR = 10 ml of [illegible]NS orLR

Feeding Guidelines

Birth Weight/ Gestational Age	Initial Feedings	Initial Amount Route	Advance of Feedings Goal **Total fluids** of 150 ml/kg/day (Maximum of 180 ml/kg/day)
< 1 kg	EBM*	~10 ml/kg/**day** NG given every 2 hours** **Give same volume for 2 days**	**Advance** feedings as tolerated by 1 ml per feeding **every day (~ 10 ml/kg/day)**
1 to 1.5 kg	EBM	~ 15 to 20 ml /kg/**day** NG given every 2 hours **Give same volume for 2 days**	**Advance** feedings as tolerated by 1.5 to 2 ml per feeding **every day (~ 15 to 20 ml/kg/day)**
1.5 to 2 kg	EBM	~ 20 ml/kg/**day** NG (if not feeding from breast) given every 2 hours	**Advance** feedings as tolerated by 2 ml per feeding **every 12 hours (~ 25 ml/kg/day)**
2 to 2.5 kg	EBM	~ 30 ml/kg/**day** NG (if not feeding from breast) given every 2 hours	**Advance** feedings as tolerated by 3 to 4 ml per feeding **every 12 hours (~ 30 ml/kg/day)**

Kangaroo Care



- Encouraged parents to do every 2 hours with feeds
- Best method of temperature control available
- Not unusual to have hypothermic infants with temp averaging 34 - 35.
- Kangaroo Beds
  - Five without oxygen
  - Three with oxygen
- "Kangaroo Club" with reward for temperature > 36

Mother Education

- Done by head nurse on the unit
- Held in Hallway
- Information on:
  - Feeding
  - Kangaroo care
  - Infant cares
  - Discharge
  - Answer questions

Discharge Criteria

- Off oxygen
- Full NG feeds - minimum 100 cc/kg/day
- Will continue increasing feeds at home
- Continue kangaroo cares at home
- Smallest baby I sent home was 980g

Follow up Clinics

- Kangaroo Clinic
  - Tuesday, Friday in am
  - Until 2kg and oral feeds
- Follow-up Clinic
  - Thursday afternoon
  - General pediatrics for NICU grads
  - Until 2 years of age
- No appointments- first come, first seen
- No privacy - held in hallway entrance to unit
- Blue book medical record

Interesting Cases and/or Unusual Management

Meningitis/Sepsis/Kernicterus

Hyperbilirubinemia

- Two sets of phototherapy lights for whole unit
- Old “bili-bed” used in preterm room as bed
- All clinical diagnosis
- No lab draws
- Severely glowing yellow to warrant lights
- Nearly all were septic/meningitic kids. Never preterm.

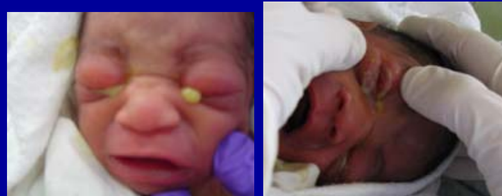
Bulging fontanelle

- 1 week old
- Asymptomatic
- No fever
- Unable to get LP
- Ventricular tap
- 7 days antibiotics
- No HUS

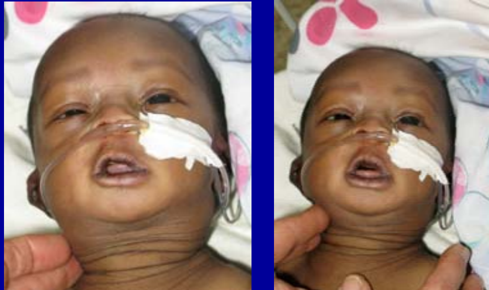
Spina Bifida

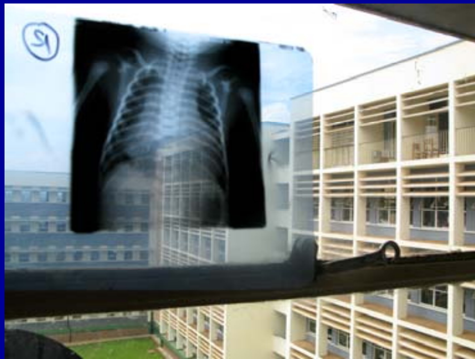
- Admitted to NICU only if in respiratory distress
- Gauze dressing applied
- Follow up with neurosurgery as outpatient - Tuesdays
- Correct defect, but shunt requires private pay by families
- HIGH incidence of acquired meningitis
- No therapy services

Ophthalmia neonatorum

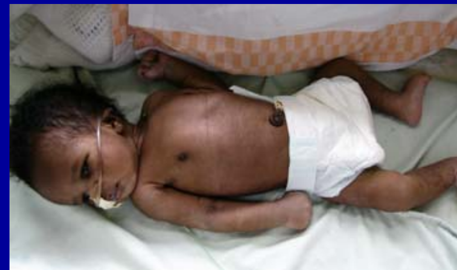


Puzzler





Hypoxic-Ischemic Encephalopathy



Birthweight: 3.8kg

Severe HIE

Admission Wt: 2.5kg

PAS 2008 Meeting

- Presented data from Uganda Kangaroo follow-up clinics from 2007 - 2008
- Platform presentation at 2008 PAS
- Successful weight gain and temperature stability in infants discharged home on kangaroo cares and mother led gavage feedings

Early Discharge Data

	Discharge	Visit1	Visit 2	Visit 3	Visit 4
Postnatal age (days)	3.5±2.6	10±2.8	22±6.3	32±7.5	42.6±7.3
AA (wks)	32.3±2.8	33.4±2.8	35±2.9	36±2.9	37±2.9
Weight (kg)	1.49±0.25	1.49±0.26	1.67±0.39	1.94±0.5	2.13±0.46
% Birthweight	-5%	-5%	+8%	+22%	+47%
Weight gain (gm/day)		-3	+17	+24	+31
Axillary temperature (C°)		36	36.3	36.3	36.6
Skin-to-Skin care (hrs/day)		7.7	8.7	7.6	7.3

Life Outside the Hospital

- Dinner at Margaret Nakakeeto's house
- Traditional Ugandan foods cooked in banana leaves

Nakaseero Market

Meeting Point Orphanage

Kayunga District - Home Visits

Queen Elizabeth Safari

Clinical Conclusions

- Newborn resuscitation in DR is essential for best infant cares.
- Minimal equipment needed to make a big difference for newborn cares.
- Low incidence of NEC despite early and aggressive feeds
  - Possibly related to exclusive use of BM
  - Selection bias from respiratory standpoint

•Could mild hypothermia be good? It is certainly not life threatening.
•Kangaroo Care is fantastic

What I Learned…

- Tons of experience with resuscitation and Bag-Mask Ventilation
- Importance of physical exam heightened when unable to confirm exam with lab or x-ray tests
- Humility and Futility
- Volunteering won't fix problems
  - Education and support is useful, but ultimately the solutions and motivation for change must come from within the country.

Comments

and

Questions

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