Supporting Global Critical Care in Resource Variable Settings through Medical Education

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GC3
Global Critical Care Collaboration

UNIVERSITY OF PITTSBURGH

Why Medical Education?

Rotations ≠ Competence

Experience ≠ Competence

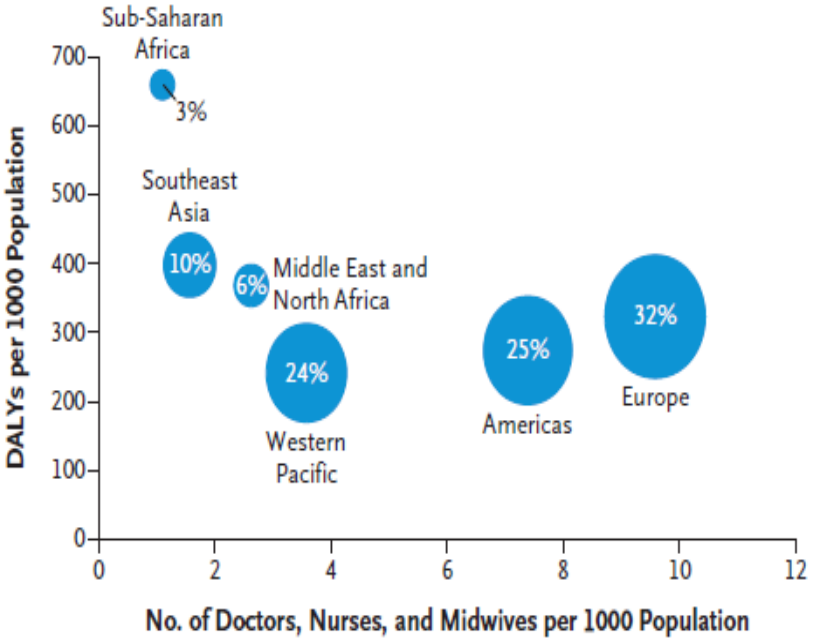
Boards Passage ≠ Expert

McGlynn NEJM 2003. 6712 Patient Records.	
% of Evidence-Based Recommendations Followed	55%
Colombo CCM 2011. 10 University ICU Physicians	
Accuracy of Interpretation of Ventilator Waveforms	44%
Fenske AJM 2010. 121 Patients with Hyponatremia	
Correct Diagnosis by Senior Physicians	43%

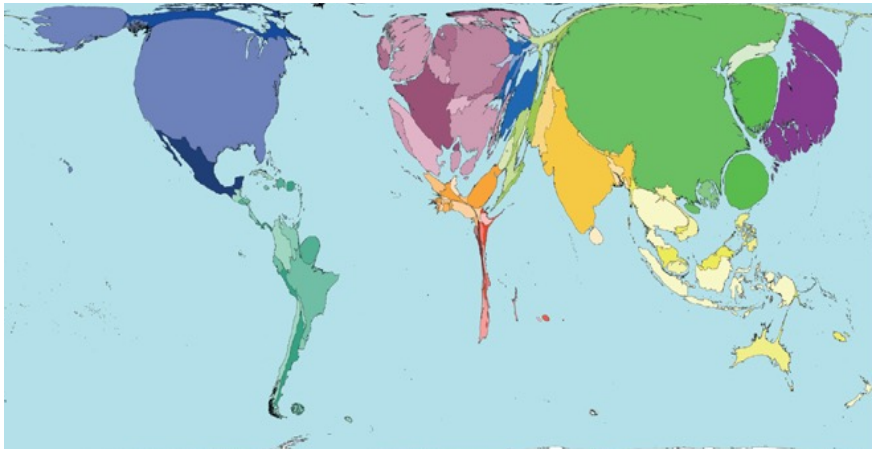
Why Medical Education?

Crisp. NEJM 2014;370: 950-7.

Potential Implications for You?



worldmapper.org University of Sheffield.



Physicians per 100K

US 549

Rank	Territory	Value
187	Uganda	4.7
188	Somalia	4.0
189	Burkina Faso	4.0
190	Gambia	3.5
191	Central African Republic	3.5
192	Niger	3.3
193	Eritrea	3.0
195	Chad	2.5
197	Liberia	2.3

Why Critical Care?

Potential Implications for You?

Kobusingye. Emergency medical services. World Bank, 2006.
http://www.ncbi.nlm.nih.gov/books/NBK11744/

In LMICs – emergency & critical care has the potential to impact

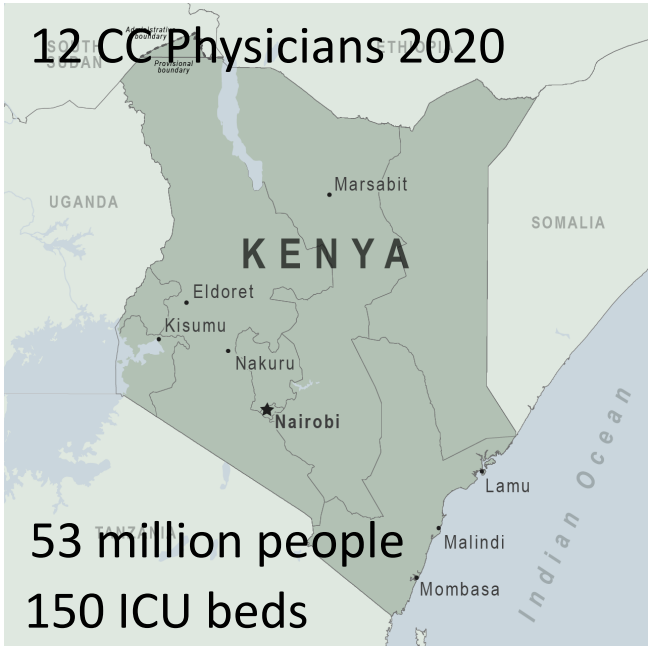
45% of the deaths

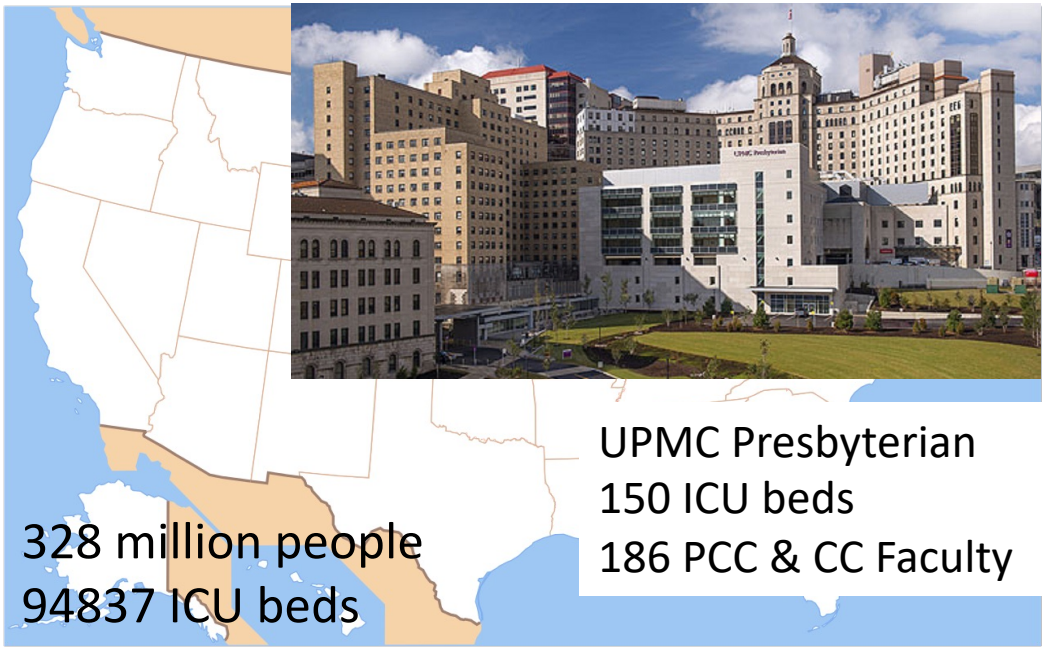
36% of the disabilities

Public Health vs. Primary Care vs. Critical Care?

The Economist 2020, Mar 28.

American Hospital Association. AHA Hospital Statistics. 2017 edition.





Why Clinical Officers?

Kijabe Hospital, Kenya

CO:MD 4:1. Kenya Health Workforce Report 2015. Ministry of Health, Kenya

Emergency Critical Care Clinical Officer 2015

ELSEVIER

Contents lists available at ScienceDirect

African Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/afjem

AFEM AfJEM

Development and delivery of a higher diploma in emergency medicine and critical care for clinical officers in Kenya

Peter Halestrap [a,*], David Aliba [a], George Otieno [a], B. Jason Brotherton [a], Hannah W. Gitura [a], Jonathan E. Matson [a], Burton W. Lee [b], Evelyn Mbugua [a]

[a] AIC Kijabe Hospital, Kijabe, Kenya
[b] Critical Care Medicine Department, National Institute of Health, USA

Why Kijabe?

VANDERBILT SCHOOL OF MEDICINE

Vanderbilt Global Surgery

About Us ▾ Faculty Involved in Global Surgery ▾ Our Work ▾ Research ▾ Preparation Resour

General Surgery Elective Rotation (R4) - AIC Kijabe Hospital

Vanderbilt Anesthesia broadens global efforts

Apr. 14, 2016, 8:41 AM

Training to Keep African Doctors in Africa

Training Programs @ Kijabe Hospital

Residencies - Family Medicine, Surgery, Orthopedics, Neurosurgery, Pediatric Surgery

Internship - Medical Officers (PGY-1)

APPs - Emergency Critical Care Clinical Officers (ECCCO), PECCO, Nurse Anesthesia

ECCCO Curriculum – 18 Months (Now 24 Months)

Cardiac ultrasound (Bedside echocardiography)
Extended Focused Assessment of Sonography in Trauma (E-FAST)
Assessment of intravascular volume by ultrasound
Arterial blood gas sampling and analysis
Rapid sequence induction and intubation of adults and children
Conscious sedation
Difficult airway management with bougie and laryngeal mask
Mechanical ventilation set up and continuous management
Non-invasive ventilation set up and continuous management
Stabilisation of open and closed fractures
Needle decompression for tension pneumothorax
Basics of ECG Interpretation
Utilization of IV vasopressors and anti-hypertensives
Basic Life Support
Advance Cardiac Life Support
Advanced Paediatric Life Support
Advanced Trauma Training
Emergency vascular access with intra-osseous needle or ultrasound guidance

Google

Search Drive

Burton

Drive

... > ... > ... > I... > **Reading Assignment**

NEW

- Kijabe ICU Curriculum
  - ICU Curriculum Folder Shared with L
    - **Reading Assignment**
      - 01.Physiology - Oxygen
      - 02.Mechanical Ventilation - Int

01.Physiology - Oxy... | 02.Mechanical Ven... | 03.Mechanical Ven...

04.Mechanical Ven... | 05.Mechanical Ven... | 06.Sepsis - Hypote...

07.Sepsis - Fluid Re... | 08.Sepsis - Pathop... | 09.Sepsis - Treatm...

Evidence Based Summary

Burton W. Lee, MD — April 2015

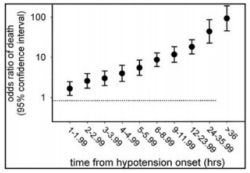
b. Despite the provocative findings of the FEAST trial, because it was conducted in children from Sub-Saharan Africa, the generalizability of its findings to adult patients in the rest of the world was not clear at the time. However, there are now three more PRCTs that have been completed in adult sepsis patients [illegible] *NEJM 2014; 370: 1683-93; ARISE. NEJM 2014; 371: 1496-506; Mouncey. NEJM 2014; 372: 1301-11.)* Overall, these three trials were well-designed with low risks of bias. (See table below.) In contrast to the River's trial, none of the better-designed trials demonstrated a significant survival benefit with EGDT.

	ProCESS Trial Process. NEJM 2014.	*ARISE Trial Arise. NEJM 2014.*	*ProMISe Trial Mouncey. NEJM 2015.*
Population	*1351 Severe Sepsis Patients at Hospitals without Routine Resuscitation Protocols*	*1600 Early Severe Sepsis Patients in Emergency Room.*	*1260 Severe Sepsis Patients Not Routinely Using Continuous SVCSat Monitoring*
Intervention A	*EGDT - Goals of CVP >8; MAP >65; SVSat >70%, HCT >30%.*	*EGDT - Goals of CVP >8; MAP >65; SVSat >70%, HCT >30%.*	*EGDT - Goals of CVP >8; MAP >65; SVSat >70%, HCT >30%.*
Intervention B	*Standard Protocol (SP) - Goals of SBP >100, HR/SBP <0.8.*		
Comparison	*Usual Care (UC)*	*No Protocol*	*Usual Care (UC)*
Outcome	*60-Day Mortality*	*90-Day Mortality*	*90-Day Mortality*
Registered	*Yes*	*Yes*	*Yes*
Allocation Concealed?	*Yes, Central*	*Yes, Central*	*Yes, Central*
Loss to Follow Up	*Minimal <1%*	*Minimal <1%*	*Minimal <2%*
Intention to Treat	*Yes*	*Yes*	*Yes*
Blind or Objective Outcome	*Not Blind but Objective Outcome*	*Not Blind but Objective Outcome*	*Not Blind but Objective Outcome*
Multicenter	*Yes – 31 US academic*	*Yes – 51 Hospitals in*	*Yes – 56 Hospitals in*

Pre-Lecture Questions

	ProCESS Trial Process. NEJM 2014.	*ARISE Trial Arise. NEJM 2014.*	*ProMISe Trial Mouncey. NEJM 2015.*
Population	*1351 Severe Sepsis Patients*	*1600 Severe Sepsis Patients*	*1260 Severe Sepsis Patients*
Intervention A	*EGDT: CVP >8; MAP >65; SVSat >70%, HCT >30%.*	*EGDT: CVP >8; MAP >65; SVSat >70%, HCT >30%.*	*EGDT: CVP >8; MAP >65; SVSat >70%, HCT >30%.*
Intervention B	*Standard Protocol (SP) - Goals of SBP >100, HR/SBP <0.8.*		
Comparison	*Usual Care (UC)*	*No Protocol*	*Usual Care (UC)*
Outcome	*60-Day Mortality*	*90-Day Mortality*	*90-Day Mortality*

2. Source Identification - What are the most common anatomic sites of infection?



3. Source Control
   a. Timing of Appropriate Antibiotics – Kumar. CCM 2006 34: 1589-96. Retrospective review of 2731 adult septic shock patients.

   b. A 50 year-old man is admitted to the ICU for cellulitis and hypotensive shock. Vital signs reveal: T 38.5, HR 135, BP 70/35, and RR 19. Laboratory finding include: WBC 22, negative u/a, and clear chest X-ray. He does not have any central lines. LFT, lipase, and amylase are normal. Lactate is 4.0. He denies cough, sputum, or abdominal pain. The abdominal exam was unremarkable. Left thigh is noted to be warm, red, and tender to palpation. Patient is admitted to the MICU on norepinephrine, IV fluids, and broad-spectrum antibiotics.

4. Adjunctive Therapies - Corticosteroids – CORTICUS Study. NEJM 2008; 358:111-124. PRCT of 499 septic shock patients

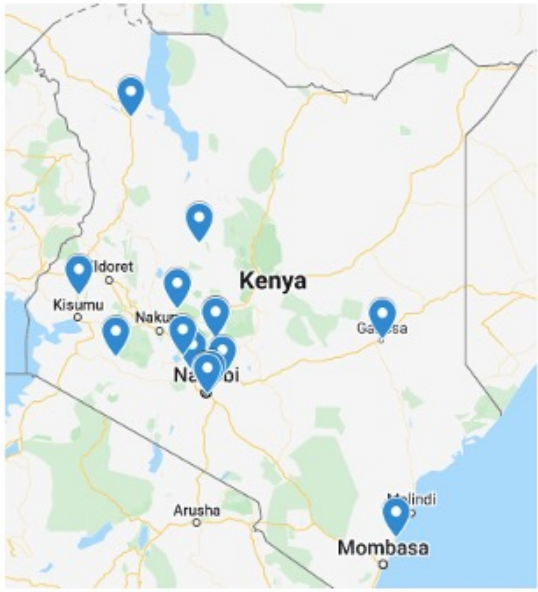
Milestones for the ECCCO Program

REPUBLIC OF KENYA

MINISTRY OF HEALTH

Formal Approval 2017

12 per Year @ Kijabe



Kenya Medical Training College
14 per year

Pediatric ECCCO 2020

Expect 250 by 2030

GC3

Global Critical Care Collaboration


Felix Riunga
Aga Khan U, Nairobi


Beth Riviello
Beth Israel, Boston


Burton Lee
NIH, Bethesda


Jason Brotherton
U of AZ, Tucson


Hannah Gitura
Kijabe, Kijabe


Tony Nguyen
Kijabe, Kijabe


Faith Lelei
Kijabe, Kijabe


John Park
Mayo, Rochester


Kristina Rudd
UPMC, Pittsburgh


Cameron Dezfulian
Texas Children's, Houston


Jonathan Kalehoff
UAB, Birmingham, AL

Support the development & maturation of critical care medicine in resource variable settings through collaborative partnerships for clinician & research capacity building.

Aga Khan University Hospital	Nairobi, Kenya	Felix Riunga
Beth Israel Deaconess	Boston, MA	Beth Riviello
Baylor College of Medicine	Houston, TX	Cameron Dezfulian
National Institutes of Health	Bethesda, MD	Burton Lee
Mayo Clinic	Rochester, MN	John Park
University of Alabama	Birmingham, AL	Jonathan Kalehoff
University of Arizona	Tucson, AZ	Jason Brotherton
University of Pittsburgh	Pittsburgh, PA	Kristina Rudd
Kijabe Hospital	Kijabe, Kenya	Hannah Gitura
		Faith Lelei
		Tony Nguyen

Global Critical Care Collaboration

Patient Care	Faculty Liaisons from Each GC3 Institution (≥2 Weeks) Fellow(s) from GC3 Institution (1 month)
Clinician Capacity	Bedside Teaching, Lectures Courses – US, Mechanical Ventilation, Biostats, etc.
Research Capacity	Database Mentored Research Partnerships "Protected" Academic Time for African Staff

Phase

I	Liaisons	2021-2023
II	Fellows	2023-?
III	Other Sites	?

Rahman. Pub Health 2003; 117: 274-84.

Biomedical publication—global profile and trend

Mahbubur Rahman*, Tsuguya Fukui

Table 1 Changes in publication from 1990 to 2000 in different continents.

	Total number of biomedical publications (% of total)				Biomedical publications per million population per year			
	1990	1995	2000	Average[a]	1990	1995	2000	Average[a]
Africa	2576 (1.2)	2554 (1.0)	2808 (0.8)	2676 (0.9)	3.37	3.34	3.67	3.50
Asia	29 709 (14.3)	38 601 (14.5)	53 587 (15.6)	45 219 (14.7)	8.42	10.94	15.18	12.81
Europe	66 749 (32.1)	93 879 (35.4)	123 563 (36.9)	108 372 (35.3)	84.32	118.59	156.09	136.88
North America	[b]	119 846 (45.1)	147 574 (43.0)	138 341 (45.0)	[b]	295.70	364.11	341.33
Australia and Oceania	5403 (2.6)	7219 (2.7)	9482 (2.8)	8250 (2.7)	188.85	252.32	331.42	288.35
South America and Caribbean region	2793 (1.3)	3359 (1.3)	6186 (1.8)	4448 (1.4)	6.56	8.15	14.53	10.80

Lessons & Challenges – Literature from HIC vs. LMIC

Rivers NEJM 2001	FEAST NEJM 2011	PROCESS NEJM 2015	Andrews JAMA 2017
US Adults	African Children	US Adults	Zambian Adults
Sealed Opaque Envelopes	Sealed Opaque Envelopes	Central Allocation	Sealed Opaque Envelopes
Not Registered	Registered	Registered	Registered
263 Patients	3141 Patients	1351 Patients	209 Patients
Single Center	Multi-Center	Multi-Center	Single-Center
Profit Motive	No Profit Motive	No Profit Motive	No Profit Motive
Resuscitate Aggressively	Higher Mortality with Fluid Bolus	No Difference in Mortality	Higher Mortality with Aggressive Resuscitation

Potential Implications for You?

Caution

Greyson. Glob Heal 2013;9:19.

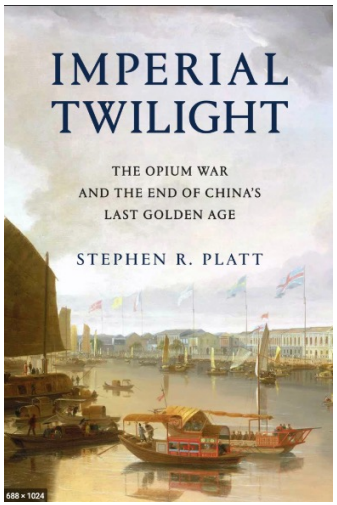
HIC Participant / Institution

- Increased Knowledge / Skills
- Cost-Effectiveness
- Social Determinants of Health
- Cultural Sensitivity & Competence
- Domestic Underserved
- Boosts Recruitment
- Hospital / University Branding / Image

Host Institutions & Patients?

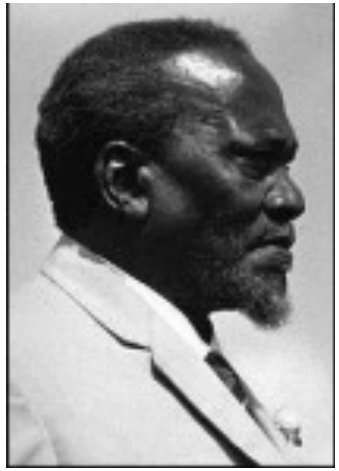
Lu. Ann Glob Heal 2018; 84:692-703. SR of GH elective.

- Practicing Outside of Competence
- Resource Drainage
- Cultural Insensitivity Mistakes
- Perpetuation of Neocolonialism / White Saviorism / Racism
- Power Imbalance / Unintended Dependency
- Displacement of Nationals



When the missionaries arrived, the Africans had the land and the missionaries had the Bible. They taught us how to pray with our eyes closed.

When we opened them, they had the land and we had the Bible.



Invitation to (Cautiously) Share in the Privilege

C. Cap New Yorker March 29, 2020
Plague of Cyprian 251-270

"Christianity grew as a religion in part because so many saw followers of Jesus ministering to the sick, and endangering their own lives to be with the dying… those Christians were providing medical care and companionship… not insisting on their right to carry on with life as usual."