Global Disparities in Trauma Care:

How You can Help

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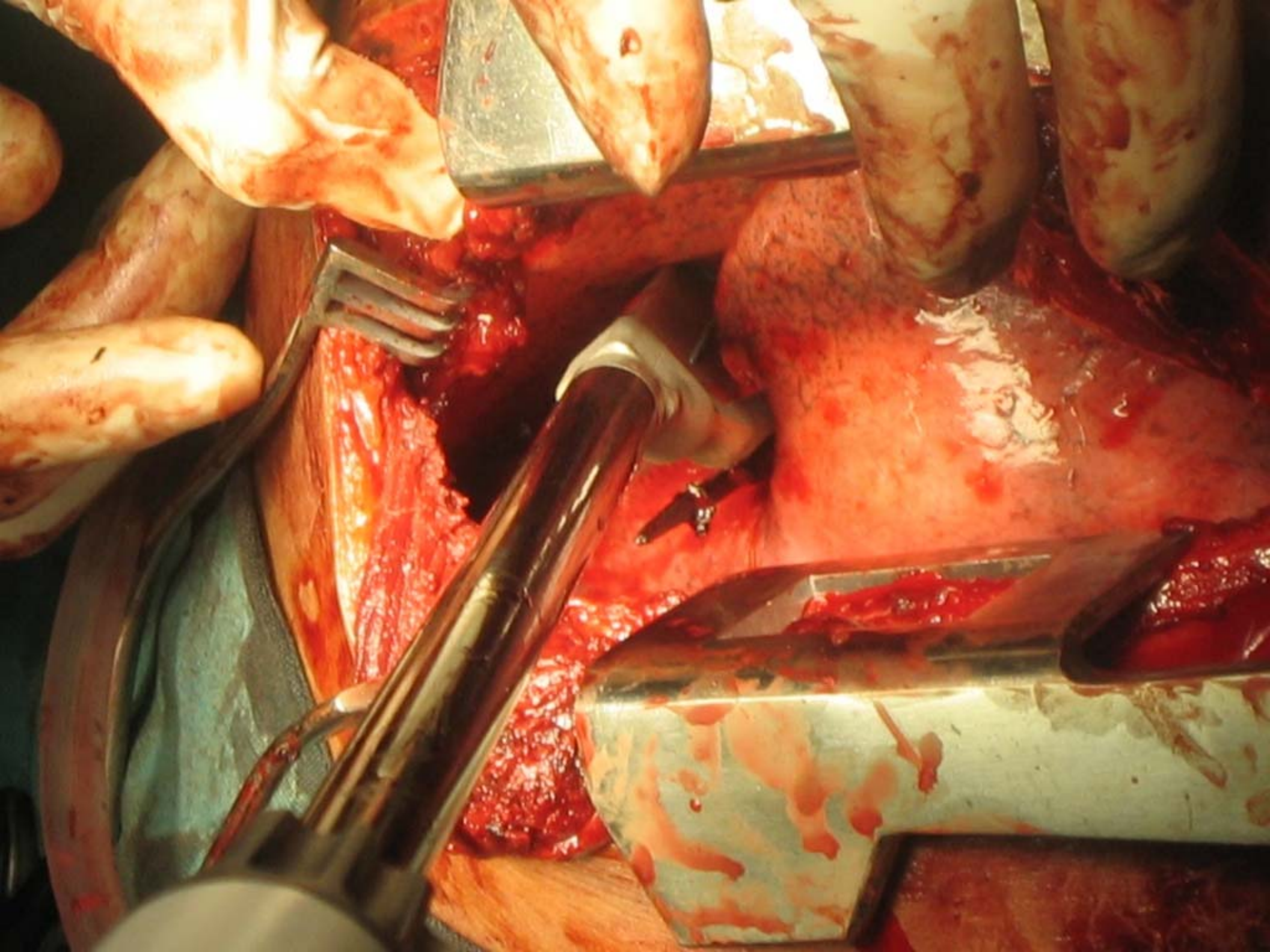
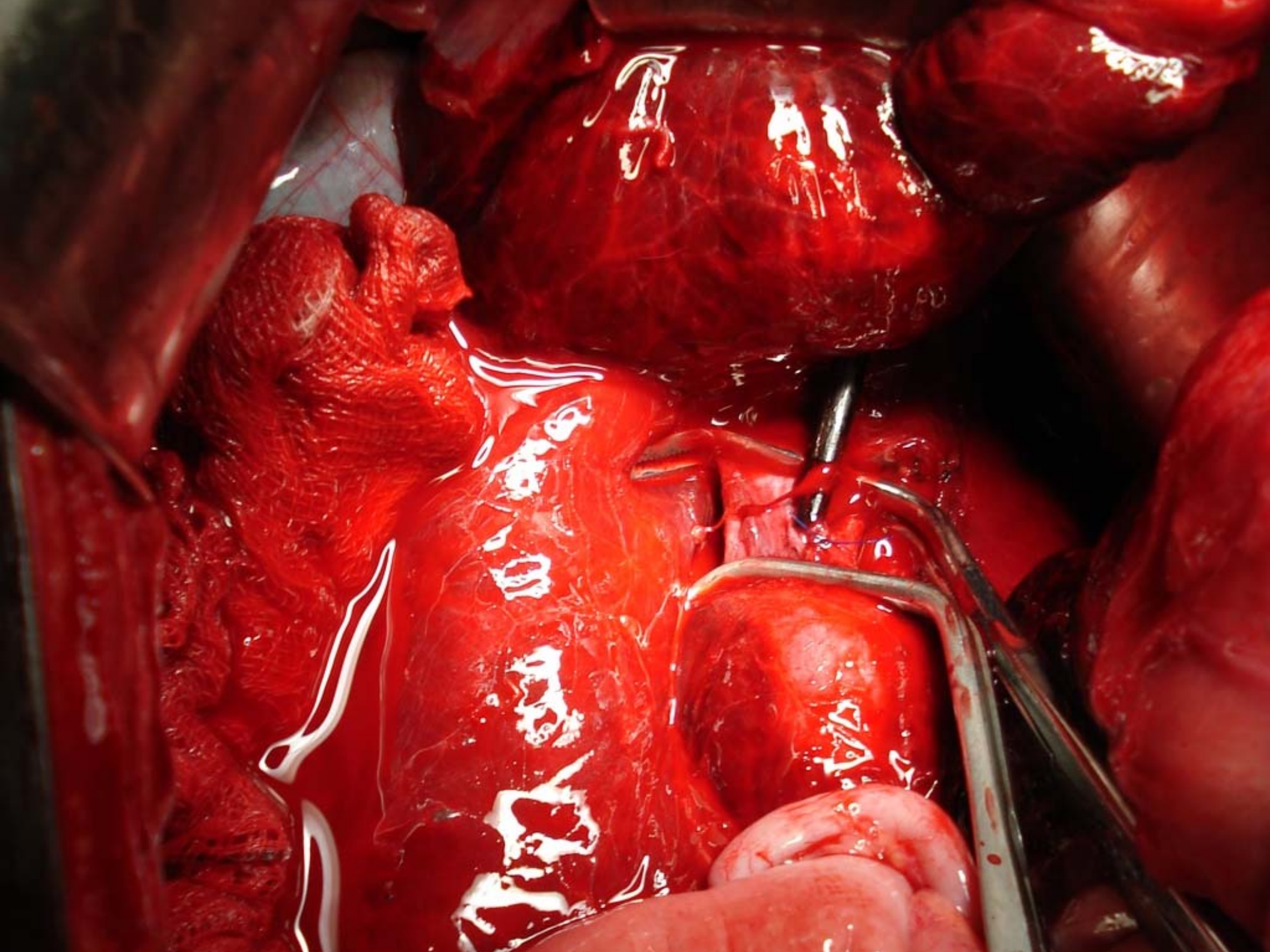
No
Conflicts of
Interest

Goals

- Differences in Trauma Care (Subsaharan Africa)
- How You Can Help (Examples)

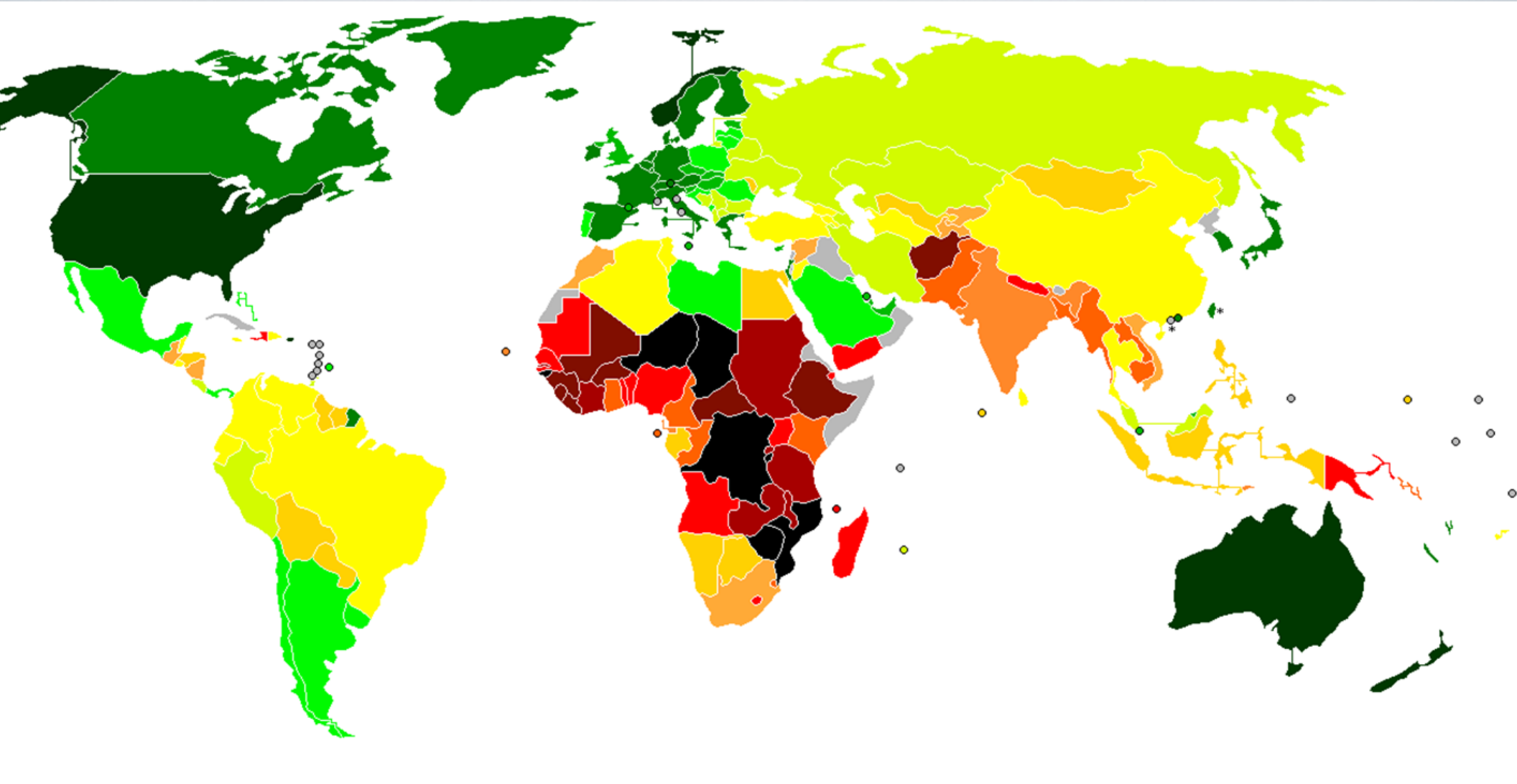




Trauma differences

Subsaharan africa

- Data
- Barriers
  - Roads
  - EMS
  - Trauma Centres
  - Training



Human Development Index

NUMBER OF INHABITANTS PER DOCTOR

Source : The World Health Report 2006

Not everybody in this world can see a doctor when in need. This is even more so in area's where people suffer from famine, war and diseases. Doctors of the world aims to provide everybody in this world with at least the most essential the medical care. Help the people the world is slowly forgetting.

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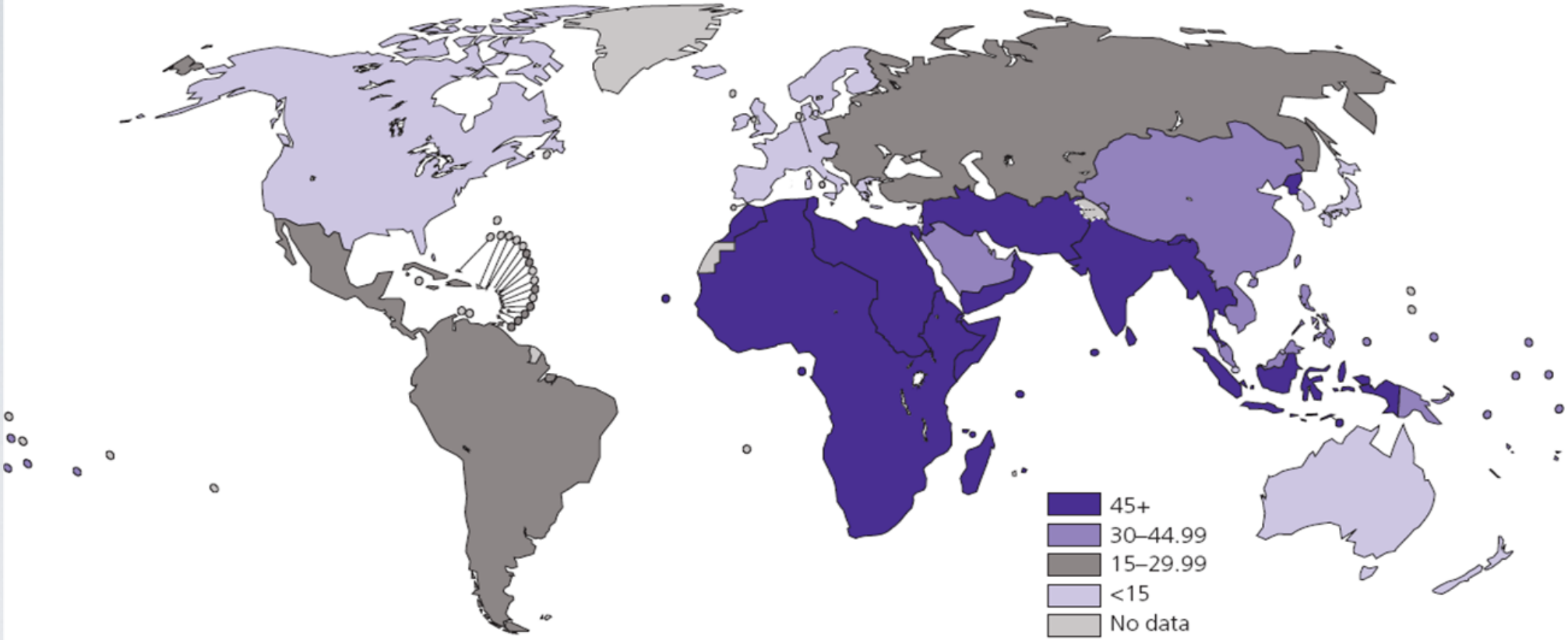
Data

Subsaharan Africa

- Poor quality data; limited
- ~11% GBD is surgical
- 6-12% pediatric admissions are surgical
  - Of those, half are trauma
- After age 4, the #1 cause of disability and death
- 10% of people in Uganda will have an injury-related death

Rate of unintentional injuries per 100 000 children[a], by WHO region and country income level, World, 2004



Africa	Americas		South-East Asia	Europe		Eastern Mediterranean		Western Pacific	
LMIC	HIC	LMIC	LMIC	HIC	LMIC	HIC	LMIC	HIC	LMIC
53.1	14.4	21.8	49.0	7.9	25.4	41.6	45.7	7.8	33.8

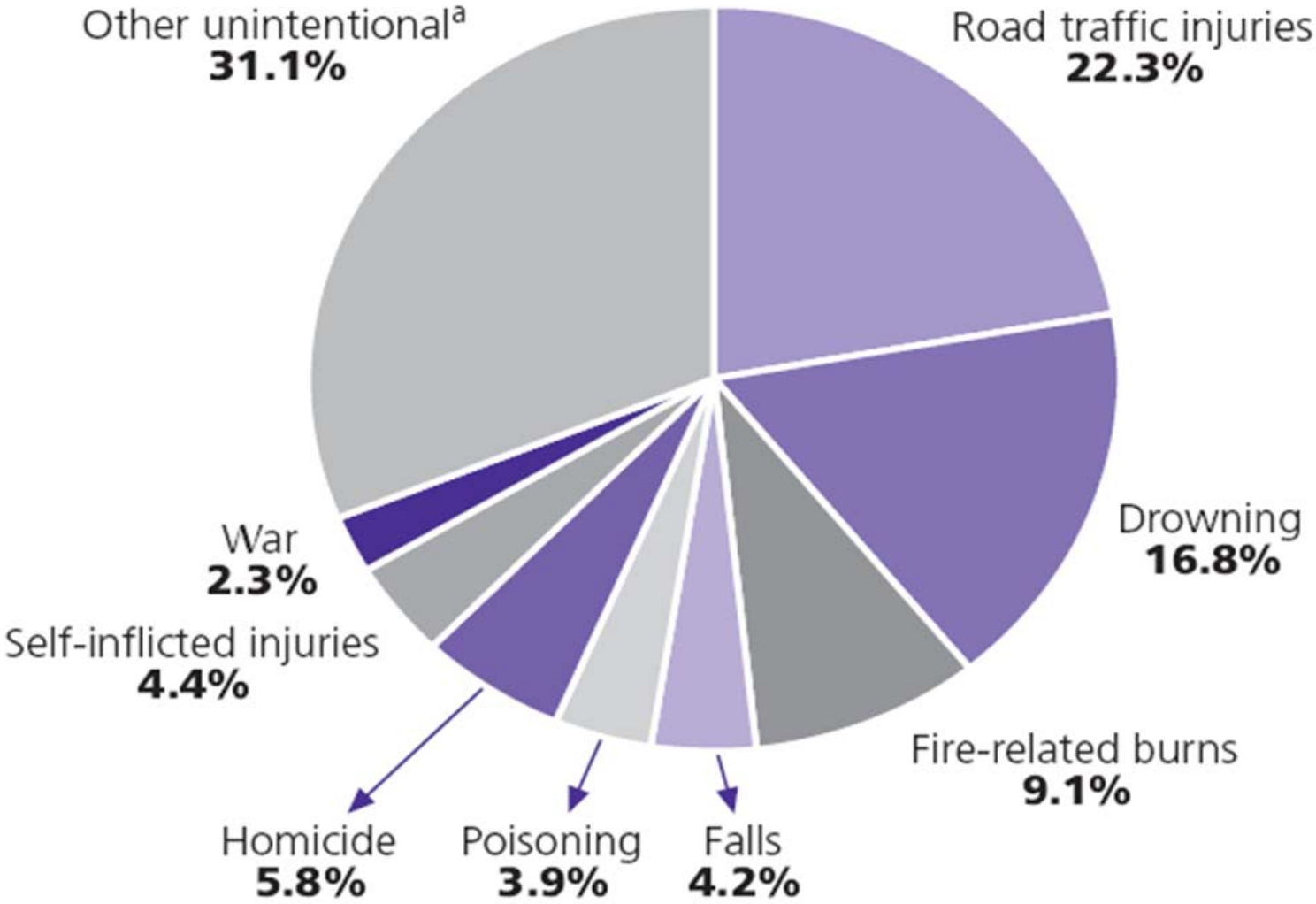
[a] These data refer to those under the age of 20 years.
HIC = High-income countries; LMIC = low-income and middle-income countries.

Source: WHO (2008), Global Burden of Disease: 2004 update.

Rank	Under 1 year	1–4 years	5–9 years	10–14 years	15–19 years	Under 20
1	Perinatal causes	Lower respiratory infections	Lower respiratory infections	Lower respiratory infections	Road traffic injuries	Perinatal causes
2	Diarrhoeal diseases	Diarrhoeal diseases	Road traffic injuries	Road traffic injuries	Self-inflicted injuries	Lower respiratory infections
3	Lower respiratory infections	Measles	Malaria	Drowning	Violence	Diarrhoeal diseases
4	Malaria	Malaria	Diarrhoeal diseases	Malaria	Lower respiratory infections	Malaria
5	Congenital anomalies	HIV/AIDS	Meningitis	Meningitis	Drowning	Measles
6	Pertussis	Congenital anomalies	Drowning	HIV/AIDS	Tuberculosis	Congenital anomalies
7	HIV/AIDS	Protein–energy malnutrition	Protein–energy malnutrition	Tuberculosis	Fire-related burns	HIV/AIDS
8	Tetanus	Drowning	Measles	Diarrhoeal diseases	HIV/AIDS	Road traffic injuries
9	Meningitis	Road traffic injuries	Tuberculosis	Protein–energy malnutrition	Leukaemia	Pertussis
10	Measles	Meningitis	HIV/AIDS	Self-inflicted injuries	Meningitis	Meningitis
11	Protein–energy malnutrition	Fire-related burns	Fire-related burns	Leukaemia	Maternal haemorrhage	Drowning
12	Syphilis	Pertussis	Falls	Fire-related burns	Falls	Protein–energy malnutrition
13	Endocrine disorders	Tuberculosis	Congenital anomalies	War	Poisonings	Tetanus
14	Tuberculosis	Upper respiratory infections	Epilepsy	Violence	Abortion	Tuberculosis
15	Upper respiratory infections	Syphilis	Leukaemia	Trypanosomiasis	Epilepsy	Fire-related burns

Source: WHO (2008), Global Burden of Disease: 2004 update.

Distribution of global child injury deaths by cause, 0–17 years, World, 2004

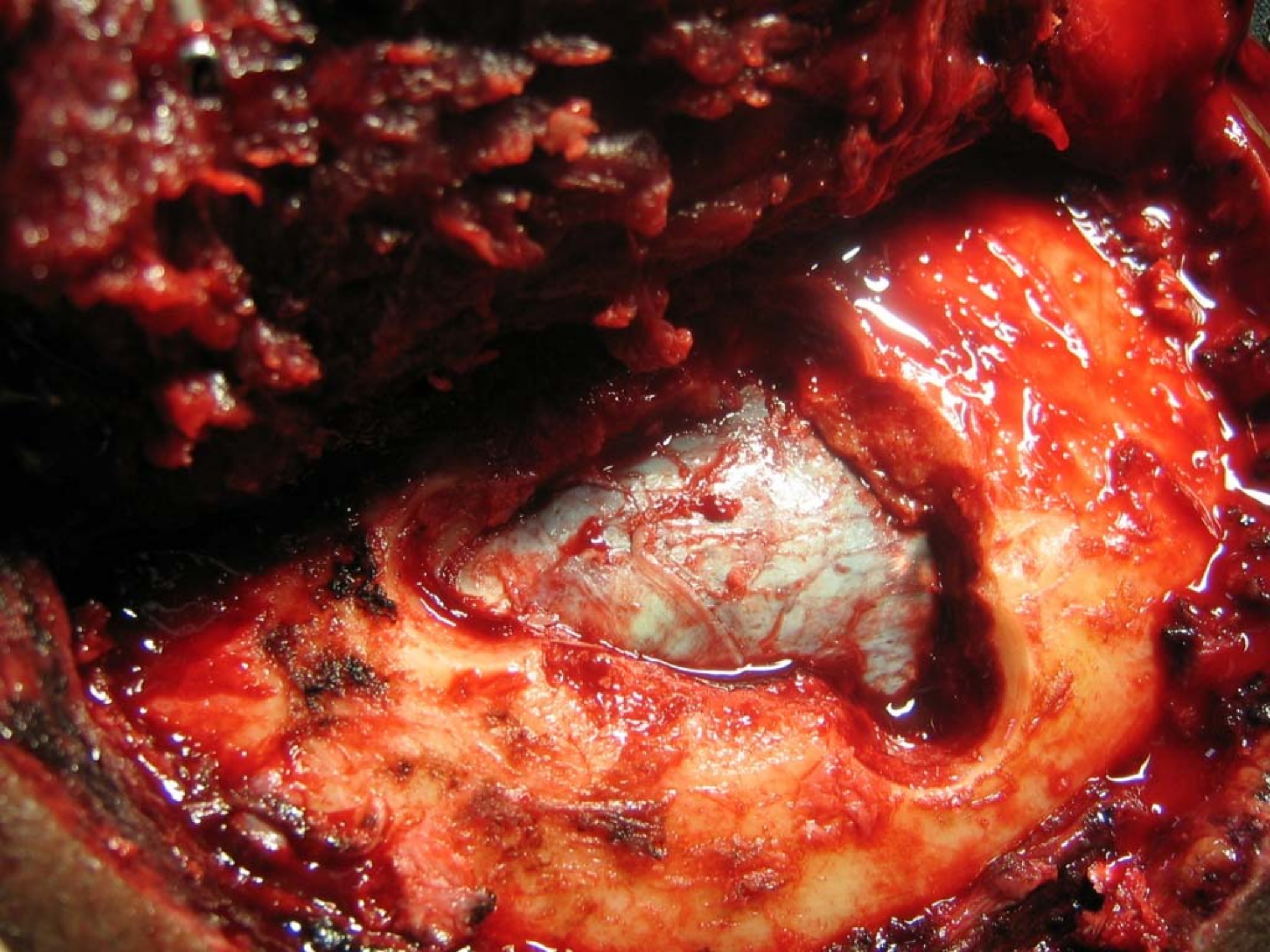


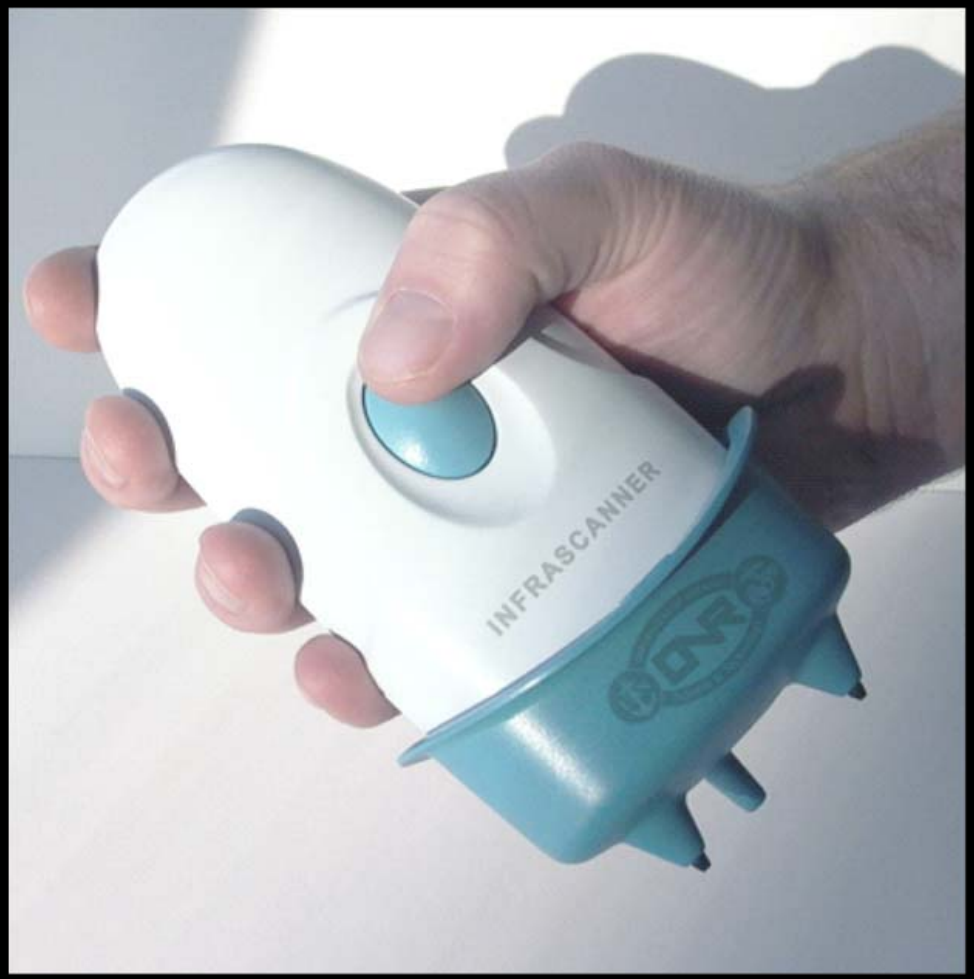
[a] "Other unintentional" includes categories such as smothering, asphyxiation, choking, animal and venomous bites, hypothermia and hyperthermia as well as natural disasters.

Source: WHO (2008), Global Burden of Disease: 2004 update.

SAD TALE OF CARNAGE

KERICH TOYOTA
KAV 019K

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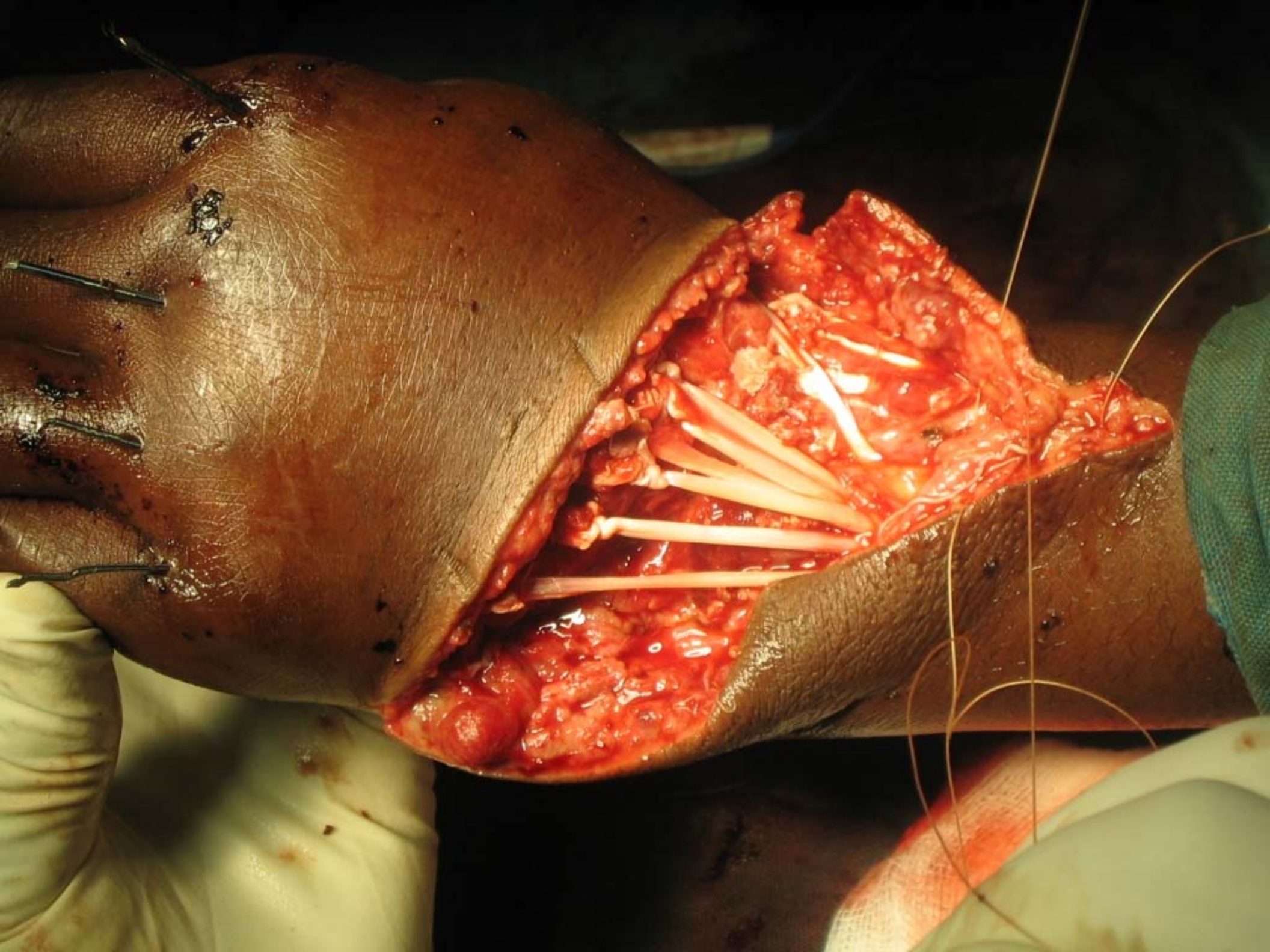


Public Health Reviews

Surgical services for children in developing countries

S.W. Bickler[1] & H. Rode[2]

Abstract There is growing evidence that childhood surgical conditions, especially injuries, are common in developing countries and that poor care results in significant numbers of deaths and cases of disability. Unfortunately, however, surgical care is not considered an essential component of most child health programmes. Strategies for improving paediatric surgical care should be evidence-based and cost-effective and should aim to benefit the largest possible number of children. The most likely way of achieving policy change is to demonstrate that childhood surgical conditions are a significant public health problem. For paediatric purposes, special attention should also be given to defining a cost-effective package of surgical services, improving surgical care at the community level, and strengthening surgical education. Surgical care should be an essential component of child health programmes in developing countries.

Keywords Child health services; Surgery; Pediatrics; Wounds and injuries/epidemiology/surgery; Abnormalities/epidemiology/surgery; Osteomyelitis/epidemiology/surgery; Cost of illness; Disabled children; Health policy; Africa South of the Sahara (*source: MeSH, NLM*).

Mots clés Service santé infantile; Chirurgie; Pédiatrie; Plaies et traumatismes/épidémiologie/chirurgie; Malformations/épidémiologie/chirurgie; Ostéomyélite/épidémiologie/chirurgie; Coût maladie; Enfant handicapé; Politique sanitaire; Afrique subsaharienne (*source: MeSH, INSERM*).

Palabras clave Servicios de salud infantil; Cirugía; Pediatría; Heridas y lesiones/epidemiología/cirugía; Anomalías/epidemiología/cirugía; Osteomielitis/epidemiología/cirugía; Costo de la enfermedad; Niños incapacitados; Política de salud; África del Sur del Sahara (*fuente: DeCS, BIREME*).

Bulletin of the World Health Organization 2002;80:829-835.

Public Health Reviews

Surgical services for children in developing countries

S.W. Bickler[1] & H. Rode[2]

- Burden of childhood surgical diseases
- Consequences of poor surgical care
- Challenges for pediatric surgery
- Improving pediatric surgery in developing countries

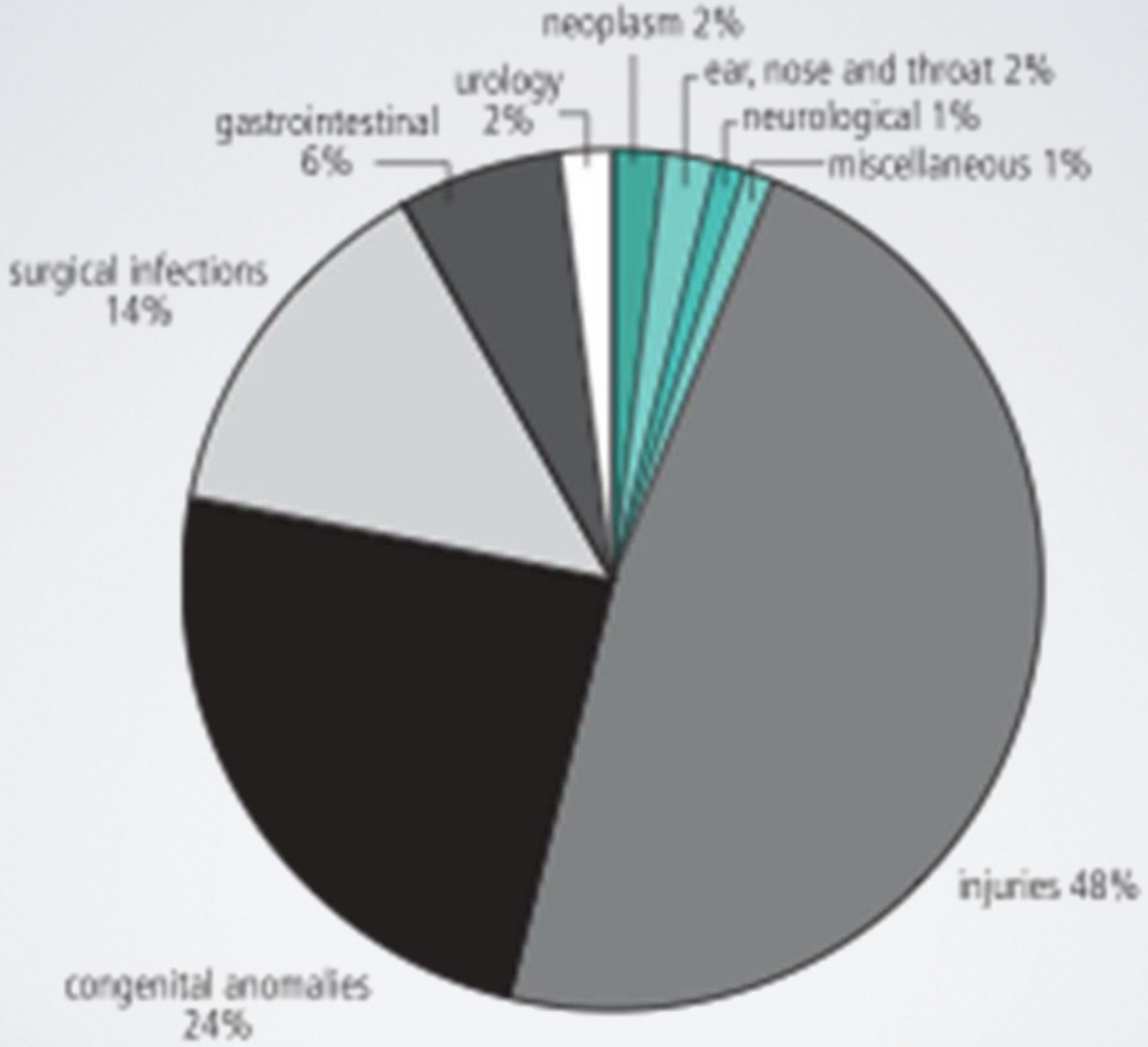
Public Health Reviews

Surgical services for children in developing countries

S.W. Bickler[1] & H. Rode[2]

- Burden of childhood surgical diseases
  - Injuries
  - Congenital abnormalities
  - Surgical infections

Fig. 1. **Paediatric surgical admissions to a government referral hospital in Gambia, January 1996 to May 1998 (*n* = 1726)** (*3*)



WHO 82.170

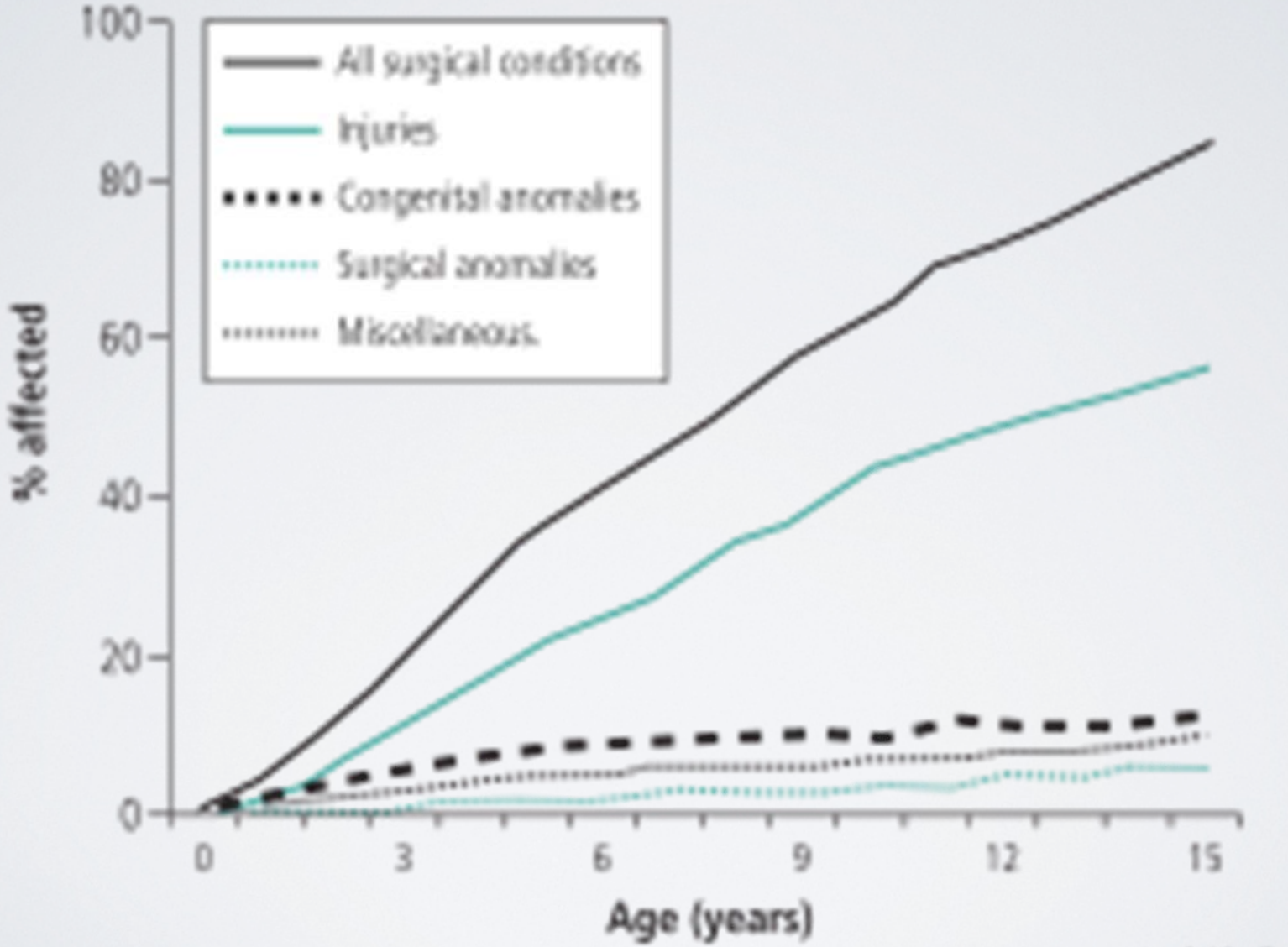
Public Health Reviews

Surgical services for children in developing countries

S.W. Bickler[1] & H. Rode[2]

- Burden of childhood surgical diseases
  - Extent of the problem

Fig. 2. **Estimated risk of requiring surgical care in a paediatric population living in Banjul, Gambia.** Cumulative risk was estimated using age-specific incidences (*20*)



Public Health Reviews

Surgical services for children in developing countries

S.W. Bickler[1] & H. Rode[2]

- Consequences of poor surgical care
  - Death
  - Disability

Public Health Reviews

Surgical services for children in developing countries

S.W. Bickler[1] & H. Rode[2]

- Challenges for pediatric surgery
  - Definition (industrialized vs. developing)
  - Health care policy
  - Delivery of surgical services

Public Health Reviews

Surgical services for children in developing countries

S.W. Bickler[1] & H. Rode[2]

- Improving pediatric surgery in developing countries
  - Demonstrating the need
  - Defining a cost-effective package
  - Improving PS care at the community level
  - Strengthening PS education

World Health Organization

Guide to Anaesthetic Infrastructure and Supplies at Various Levels Of Health Care Facilities Emergency and Essential Surgical Procedures

(Compiled from WHO manual Surgical Care at the District Hospital 2003)

Level 1 Small hospital / health centre	Level 2 District/provincial hospital	Level 3 Referral hospital
• Rural hospital or health centre with a small number of beds and a sparsely equipped operating room (O.R) for minor procedures • Provides emergency measures in the treatment of 90–95% of trauma and obstetrics cases (excluding caesarean section) • Referral of other patients (for example, obstructed labour, bowel obstruction) for further management at a higher level	• District or provincial hospital with100–300 beds and adequately equipped major and minor operating theatres • Short term treatment of 95–99% of the major life threatening conditions	• A referral hospital of 300–1000 or more beds with basic intensive care facilities. Treatment aims are the same as for Level 2, with the addition of: • Ventilation in O.R and ICU • Prolonged endotracheal intubation • Thoracic trauma care • Haemodynamic and inotropic treatment • Basic ICU patient management and monitoring for up to 1 week : all types of cases, but with limited or no provision for: - Multi-organ system failure - Haemodialysis - Complex neurological and cardiac surgery - Prolonged respiratory failure - Metabolic care or monitoring
Procedures	**Procedures**	**Procedures**
• Normal delivery • Uterine evacuation • Circumcision • Hydrocele reduction, incision and drainage • Wound suturing • Control of haemorrhage with pressure dressings • Debridement and dressing of wounds • Temporary reduction of fractures • Cleaning or stabilization of open and closed fractures • Chest drainage (possibly)	Same as Level 1 with the following additions: • Caesarean section • Laparotomy (usually not for bowel obstruction) • Amputation • Hernia repair • Tubal ligation • Closed fracture treatment and application of plaster of Paris • Eye operations, including cataract extraction • Removal of foreign bodies: e.g. in the airway • Emergency ventilation and airway management for referred patients such as those with chest and head injuries	Same as Level 2 with the following additions: • Facial and intracranial surgery • Bowel surgery • Paediatric and neonatal surgery • Thoracic surgery • Major eye surgery • Major gynaecological surgery, e.g. vesico-vaginal repair
Personnel	**Personnel**	**Personnel**
• Paramedical staff without formal anaesthesia training • Nurse-midwife	• One [two] trained anaesthetists • District medical officers, senior clinical officers, nurses, midwives • Visiting specialists or resident surgeon and/or obstetrician/ gynaecologist	• Clinical officers and specialists in an anaesthesia and surgery
Drugs	Drugs	Drugs
• Ketamine 50 mg/ml injection, 10 ml • Lidocaine 1% or 2% • [Diazepam 5 mg/ml injection, 2 ml]injection • Pethidine 50 mg/ml injection, 2 ml] • [Epinephrine (adrenaline)] 1 mg • [Atropine 0.6 mg/ml]	Same as Level 1, but also: • Thiopental 500 mg/1g powder • Suxamethonium bromide 500 mg powder • Atropine 0.5 mg injection Epinephrine (adrenaline) 1 mg injection • Diazepam 10 mg injection Halothane 250 ml inhalation • [Ether 500 ml inhalation]	Same as Level 2 with the following additions: • Vecuronium 10 mg powder • Pancuronium 4 mg injection] • Neostigmine 2.5 mg injection • Trichloroethylene 500 ml inhalation] • Calcium chloride 10% 10 m injection • Potassium chloride 20% 10 ml injection

	• Lidocaine 5% heavy spinal solution2 ml • Bupivacaine 0.5% heavy or plain, 4 ml] • Pethidine 50 mg injection • [Hydralazine 20 mg injection] • Frusemide 20 mg injection • Dextrose 50% 20 ml injection • Aminophylline 250 mg injection • Ephedrine 30/50 mg ampoules	for infusion
Equipment: capital outlay	Equipment: capital outlay	Equipment: capital outlay
• Adult and paediatric resuscitators • Foot sucker • [Oxygen concentrator]	Complete anaesthesia, resuscitation and airway management system consisting of: - Oxygen source - Vaporizer(s) - Hoses - Valves - Bellows or bag to inflate lungs - Face masks (sizes 00–5) - Work surface and storage Paediatric anaesthesia system - Adult and paediatric resuscitator sets • Pulse oximeter • Laryngoscope Macintosh blades 1-3(4) • Oxygen concentrator[s] [cylinder] • Foot sucker [electric] • IV pressure infusor bag • Adult and paediatric resuscitator sets • Magills forceps (adult and child), intubation stylet and/or bougie	Same as Level 2 with the following additions (one of each per O.R or per ICU bed, except where stated): • Pulse oximeter, spare probes, adult and paediatric* • ECG (electrocardiogram) monitor* • Anaesthesia ventilator, electric power source with manual override • Infusion pumps (2 per bed) • Pressure bag for IVI • Electric sucker • Defibrillator (one per O.R / ICU) • [Automatic B.P. machine*] • Capnograph*] • [Oxygen analyzer*] • Thermometer [temperature probe*] • Electric warming blanket • Electric overhead heater • Infant incubator • Laryngeal mask airways sizes 2, 3, 4 (3 sets per O.R) • intubating bougies, adult and child (1 set per O.R) * It is preferable to buy combined modalities all in one unit
Equipment: disposable	**Equipment: disposable**	**Equipment: disposable**
• IVI equipment • Suction catheters size 16 FG • Examination gloves	• VI equipment (minimum fluids normal saline, Ringer's lactate and dextrose 5%) • Suction catheters size 16 FG • Examination gloves • Sterile gloves sizes 6–8 • Nasogastric tubes sizes 10–16 FG • Oral airways sizes 000–4 • Tracheal tubes sizes 3–8.5 • Spinal needles sizes 22 G and25G • Batteries size C	Same as Level 2 with the following additions: • ECG dots • Ventilator circuits • Yankauer suckers • Giving sets for IVI pumps • Disposables for suction machines • Disposables for capnography, oxygen analyzer, in accordance with manufacturers' specifications: - Sampling lines - Water traps - Connectors - Filters– Fuel cells

Pediatr Surg Int (2003) 19: 128
DOI 10.1007/s00383-003-0951-3

LETTER TO THE EDITOR

Emmanuel A. Ameh

Paediatric surgery in sub-Saharan Africa

Dear Sir,

It was interesting to read the timely article by Bickler et al. [1] on pediatric surgery in sub-Saharan Africa. Their effort in trying to bring to the fore the problems of pediatric surgery in this region is commendable.

Currently, pediatric surgery faces many challenges in sub-Saharan Africa. First and foremost: governments and non-governmental organizations show a lack of interest towards pediatric-surgical care of the children living in this region. The authors point out that it is the responsibility of pediatric surgeons working in these areas to raise awareness by airing their views at relevant forums and by publishing their experiences in international journals. International organizations are unlikely to read the journals published locally in Africa, since many of these are not indexed and also have a limited circulation.

In sub-Saharan Africa, the workload in pediatric surgery is even greater in rural areas [2]. As reported by Bicker et al. [1], this region has few trained pediatric surgeons, mainly at large centers. Currently, there are about 25 trained and practicing pediatric surgeons in Nigeria, serving a population of approx. 120 million, of which 40–60% are children and adolescents. Therefore, in many cases, surgical care for children is provided by general surgeons and less trained personnel, especially at primary and secondary health levels. Sometimes even the tertiary centers have no trained pediatric surgeons, and hospitals for children are rare. Hence, efforts are needed to intensify the training of pediatric surgeons. The West African College of Surgeons presently has a well-organized training programme in pediatric surgery, but the enrolment is very poor. Pediatric surgeons in this region, by themselves acting as role models and mentors, have the responsiblity of encouraging younger doctors to train in pediatric surgery.

Another problem currently faced by pediatric surgeons working in these areas [3] is the lack of relevant facilities and supporting personnel, especially in neonatal surgery, thus making it quite a challenge to practice pediatric surgery. Lack of other pediatric subspecialities like plastic surgery, neurosurgery etc. means that a pediatric surgeon is left to handle all the problems on a regular basis, thereby increasing an already high workload.

Pediatric surgical research gets little or no funding from both governments and non-governmental organizations, due to a widely held belief that the majority of the childhood problems in this region are due to infectious diseases and malnutrition. It is high time these organizations realized that surgical problems contribute significantly to childhood morbidity and mortality. Collaboration needs to be encouraged amongst pediatric surgeons involved in important research, so that together we can raise awarness, find local solutions to local problems, and advance the surgical care of these children.

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Guidelines for essential trauma care

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ISBN 92 4 154640 9

World Health Organization

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Research article

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Health impact assessment and short-term medical missions: A methods study to evaluate quality of care

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Abstract

Background: Short-term medical missions (STMMs) are a well-established means of providing health care to the developing world. Despite over 250 million dollars and thousands of volunteer hours dedicated to STMMs, there is a lack of standardized evaluation to assess patient safety, quality control, and mission impact. The objective of this project is to design and implement an assessment tool that defines objective parameters of quality of care as identified by STMMs.

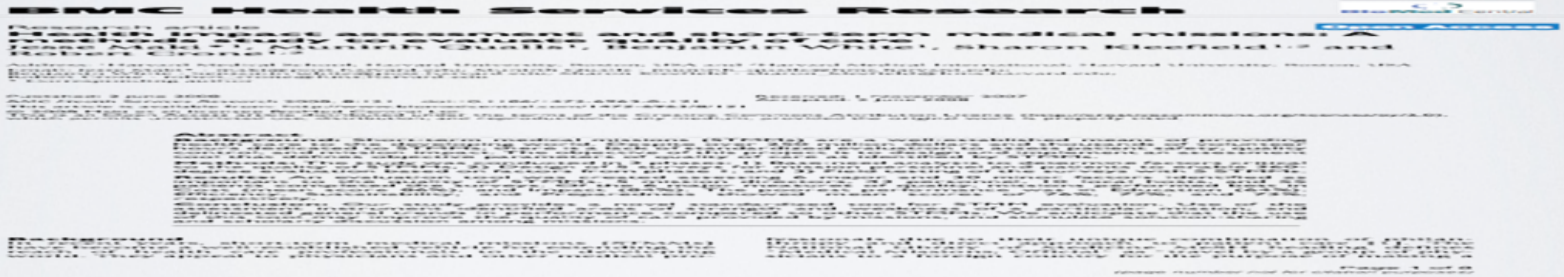
Methods: The study was conducted in 3 phases: 1) Base-need analysis to determine factors critical to the quality of STMMs, 2) Design of 5 surveys for mission personnel and patients to enable 360-degree evaluation based on factors from phase 1, and 3) Field testing of the surveys with 5 STMMs.

Results: An evaluation tool was created assessing 6 major and 30 minor factors identified as important to the quality of STMMs. 5 mission directors, 43 personnel, 10 local hosts, and 55 patients completed the surveys. Of the 6 major measures of quality, missions performed best in Cost (mean score 86%), and Impact (84%). The poorest performance was in Education (64%). Efficiency, Sustainability, and Preparedness showed mean scores of 76%, 77%, and 73%, respectively.

Conclusion: Our study provides a novel standardized tool for STMM evaluation. Use of the assessment instrument identified areas of strength and weakness of a particular mission, and delineated general trends in performance compared to other STMMs. We anticipate that the use of this tool may improve the quality of care provided by missions, and stimulate solution-sharing and scholarly discussion among missions.

Background

In recent years, short-term medical missions (STMMs) have become a well-established vehicle for extending the reach of health care professionals to the developing world. They appeal to physicians and other medical professionals due to their unique combination of philanthropy and direct approach to patient care [1]. The National Library of Medicine MeSH heading defines "Medical Missions, Official" as "travel by a group of physicians to a foreign country for the purpose of making a



An estimation of the global volume of surgery: a modelling strategy based on available data

Thomas G Weiser, Scott E Regenbogen, Katherine D Thompson, Alex B Haynes, Stuart R Lipsitz, William R Berry, Atul A Gawande

Summary

Background Little is known about the amount and availability of surgical care globally. We estimated the number of major operations undertaken worldwide, described their distribution, and assessed the importance of surgical care in global public-health policy.

Methods We gathered demographic, health, and economic data for 192 member states of WHO. Data for the rate of surgery were sought from several sources including governmental agencies, statistical and epidemiological organisations, published studies, and individuals involved in surgical policy initiatives. We also obtained per-head total expenditure on health from analyses done in 2004. Major surgery was defined as any intervention occurring in a hospital operating theatre involving the incision, excision, manipulation, or suturing of tissue, usually requiring regional or general anaesthesia or sedation. We created a model to estimate rates of major surgery for countries for which such data were unavailable, then used demographic information to calculate the total worldwide volume of surgery.

Findings We obtained surgical data for 56 (29%) of 192 WHO member states. We estimated that 234·2 (95% CI 187·2–281·2) million major surgical procedures are undertaken every year worldwide. Countries spending US$100 or less per head on health care have an estimated mean rate of major surgery of 295 (SE 53) procedures per 100 000 population per year, whereas those spending more than $1000 have a mean rate of 11 110 (SE 1300; p<0·0001). Middle-expenditure ($401–1000) and high-expenditure (>$1000) countries, accounting for 30·2% of the world's population, provided 73·6% (172·3 million) of operations worldwide in 2004, whereas poor-expenditure (≤$100) countries account for 34·8% of the global population yet undertook only 3·5% (8·1 million) of all surgical procedures in 2004.

Interpretation Worldwide volume of surgery is large. In view of the high death and complication rates of major surgical procedures, surgical safety should now be a substantial global public-health concern. The disproportionate scarcity of surgical access in low-income settings suggests a large unaddressed disease burden worldwide. Public-health efforts and surveillance in surgery should be established.

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See Comment page 90

See Perspectives page 107

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The burden of surgical conditions and access to surgical care in low- and middle-income countries

Doruk Ozgediz,[a] Dean Jamison,[b] Meena Cherian[c] & Kelly McQueen[c]

Bulletin of the World Health Organization | August 2008, 86 (8)

World J Surg
DOI 10.1007/s00268-008-9799-y

World Journal of Surgery

Population Health Metrics for Surgery: Effective Coverage of Surgical Services in Low-Income and Middle-Income Countries

Doruk Ozgediz · Renee Hsia · Thomas Weiser · Richard Gosselin · David Spiegel · Stephen Bickler · Peter Dunbar · Kelly McQueen

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Partnerships for developing pediatric surgical care in low-income countries

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The Future of Simulation in Paediatric Surgery

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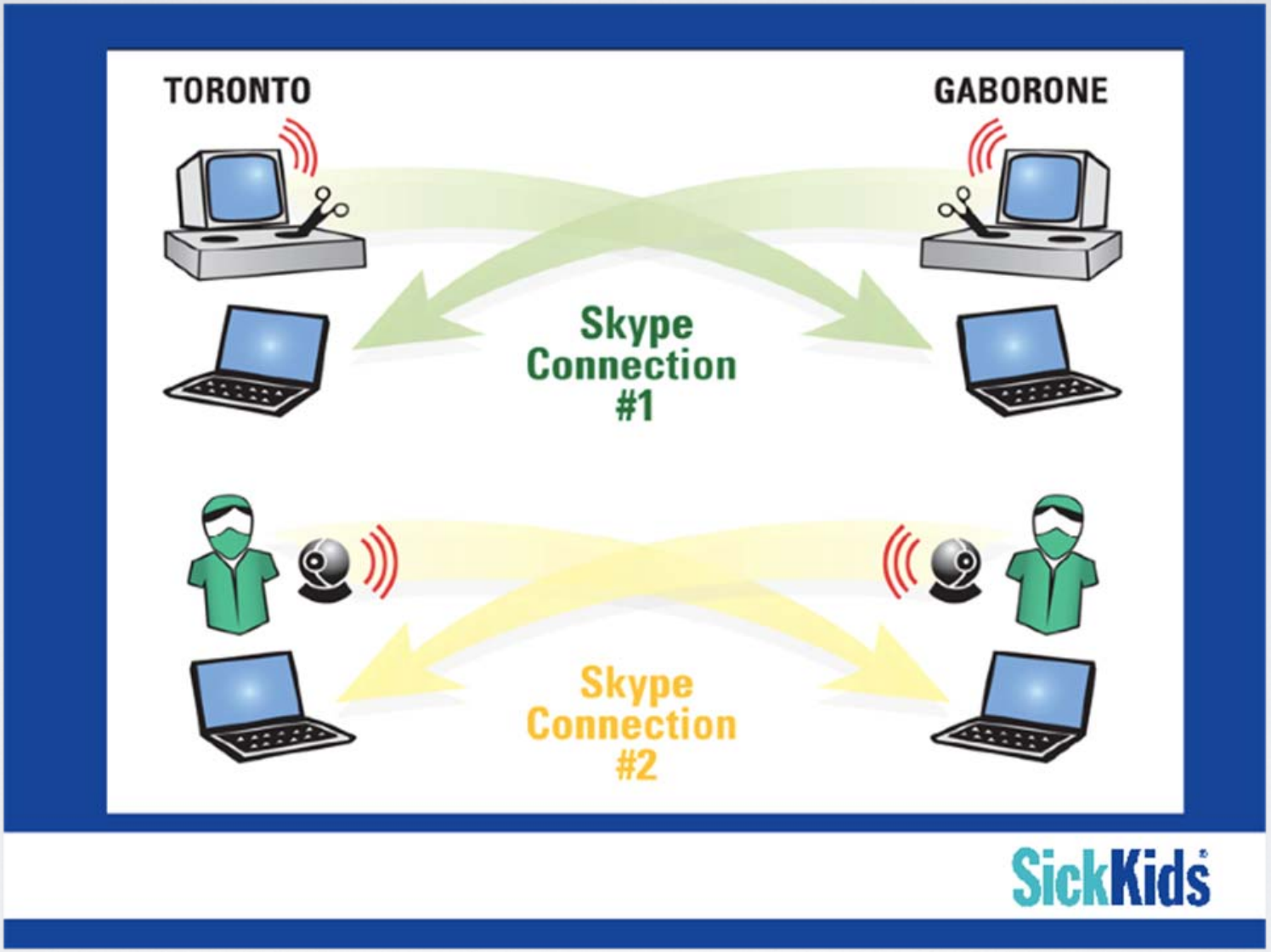
SickKids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#2
SickKids

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World Health Organization

Health action in crises

Trauma management and comprehensive emergency obstetric surgery training

Video about training sessions in life-saving procedures for health workers in Somalia

Authors:
WHO

Publication details

Publication date: 2010
Languages: English

Downloads

Stream video - duration 03:12 mins [wmv]

Overview

As a result of the ongoing fighting, Somali hospitals see large numbers of wounded and people affected by the conflict. Health workers face increased challenges ranging from hazardous working environments to a lack of qualified health personnel when delivering much needed care.

Newly graduated Somali medical students are the health service providers of tomorrow, but they often lack expertise and practice. To strengthen the ability of Somali health workers and medical students in responding to the challenges and needs, WHO conducts trainings in critical life-saving surgical techniques.

This video shows that with support from the Humanitarian Response Fund in 2010, WHO was able to provide health workers with training sessions in life-saving procedures including first aid, trauma management and emergency obstetric care.

Global Pædiatric Surgery Network

Working together to unite the volunteer efforts of paediatric surgeons worldwide

Texts

Paediatric Surgery: A Comprehensive Text for Africa, Edited by Emmanuel Ameh, Stephen Bickler, Kokila Lakhoo, Ben Nwomeh, and Dan Poenaru. Published in 2010, this comprehensive online text covers classic pediatric surgical problems, but it is unique because the authorship is shared by surgeons in Africa who address problems unique to their continent and offer practical solutions that are available there. Though written for surgeons in Africa, it will prove useful to surgeons elsewhere who are practicing in resource-constrained environments. Published by Global HELP (global-help.org/people/people_pedsurgeryafrica.html)

Surgical Care for Children: A Guide for Primary Referral Hospitals, by Stephen Bickler and Emmanuel Ameh (to be published 2010). This text is intended to be used by doctors at the primary referral hospital, even if they do not have formal training in pediatric surgery, so that care can be quicker and more cost-effective.

- Global Health movement
  - Infectious Disease
  - Medicine
  - Surgery

- Alliance for Surgery and Anesthesia Presence Today (ASAP Today)
  - Formerly Global Burden of Surgical Disease Working Group
- Vanderbilt
  - Institute for Global Health
- Harvard
  - Partners in Health (PIH)
  - Global Surgery Fellowship

ASAP

Alliance for Surgery and Anesthesia Presence *Today*

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4th Annual ASAP Meeting

November 9-11, 2011

University of California, San Diego

Advisory Board

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The College of Surgeons of East, Central & Southern Africa

WACS: The West African College of Surgeons

Pan African Pediatric Surgical Association

PAPSA

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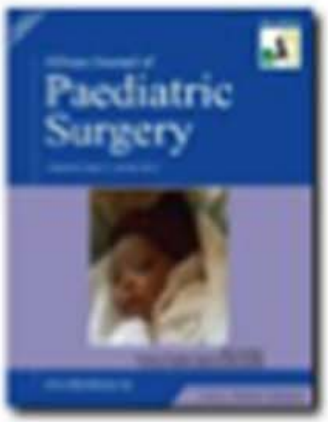
African Journal of Paediatric Surgery



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Goals

- Differences in Trauma Care (Subsaharan Africa)
- How You Can Help (Examples)

TENWEK
WE TREAT
HOSPITAL
JESUS HEALS

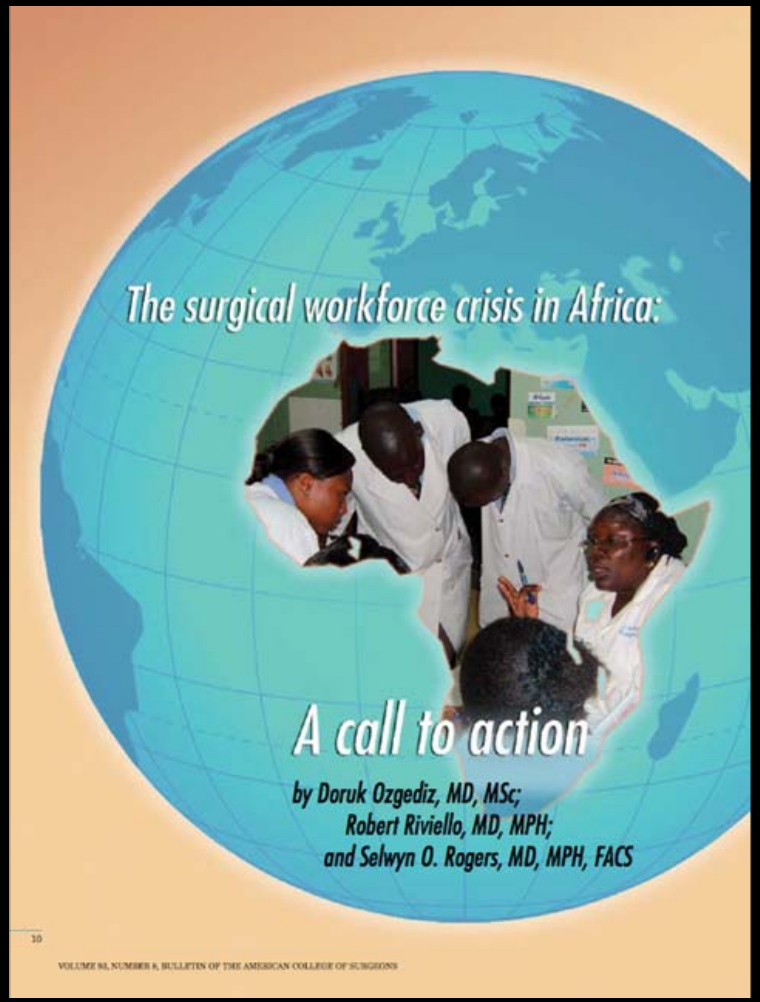
CASUALTY
ADMINISTRATION
DENTAL CLINIC
MCH SERVICES
REGISTRATION
OUT PATIENT
EYE CLINIC

ICU/RR
BED #1
HUMIDIFIER

CROWN GLOVE
MADE IN MALAYSIA

KITCHEN

Surgical Training



Surgical Training In Kenya

Population: 35 million
Growth Rate: 4%
Rural:Urban Ratio: 6:1
Doctors: 5,000
Surgeons: 500
(1:70,000)

AT LEAST 20 SURGEONS

smiths

Avelox I.V.

gang
n technology

When A Black & White Striped Animal Isn’t A Zebra

Gerald Angira, MD

Brown Medical School

PG3 Surgical Residents
1 or 2 each Spring
13 in 8 years
75-100 major cases
40-50 endoscopy cases
$100,000 endowment
Faith-based/Expectations

EDUCATION

An International Volunteer Program for General Surgery Residents at Brown Medical School: The Tenwek Hospital Africa Experience

Daniel D Klaristenfeld, MD, Michael Chupp, MD, FACS, William G Cioffi, MD, FACS, Russell E White, MD, MPH, FACS

Surgical training programs provide the structure for young physicians to become thoughtful, responsible, and aware attending surgeons; aware not only of the latest operative techniques and equipment, but also of the profound societal responsibility that comes with surgical training. For many years, opportunities have existed for general surgery residents to participate in medical volunteer work in America and abroad. In the past, complaints of time constraints, cost, lack of volunteer site supervision, concerns for resident safety, and institutional resident coverage issues were cited as barriers to such participation. Now, there is a growing call for surgical residents to volunteer in developing communities, not only because it benefits the community, but also because it enriches the residents' learning experience.[1,2]

The Brown Medical School Department of Surgery has offered the Africa/Tenwek Hospital surgical elective to one or two third-year residents annually for the past 8 years, with 13 total resident participants. The option of participating in the Tenwek rotation is presented to second-year categorical residents, with detailed information about the rotation available. Generally, three or four of the five residents express an interest in the rotation. Those not desiring to participate usually cite personal or family issues as the reason for not wanting to spend time in Africa. The final decision on selection of two residents is left to the discretion of the residency program director. Resident travel and living expenses are covered by the interest earned on a $100,000 trust fund established by the Brown Medical School Department of Surgery at the inception of the Tenwek Hospital rotation. While at Tenwek Hospital, the residents are integral members of the hospital community and interact with the Kenyan staff in all areas of patient care.

Established in 1935, Tenwek Hospital is a 300-bed, church-affiliated, mission hospital in Bomet, Kenya. The hospital provides primary health care for a population of approximately 750,000 people, but functions as a tertiary referral center for a much larger population in southwestern Kenya. Additionally, Tenwek serves as a teaching facility for Kenyan medical students, interns, and residents. Before enrolling in the Tenwek Hospital rotation, Brown Medical School surgery residents are given a thorough orientation of day-to-day life at Tenwek Hospital, and they understand that they will function alongside their Kenyan counterparts. The surgical amenities include five major and four minor operating rooms, a dedicated recovery room, an intensive care unit, and a video endoscopy suite.

Brown residents are directly supervised by one of three full-time board certified general surgeons. One of these surgeons (RW) developed and coordinates the rotation and also carries an appointment as a clinical associate professor of surgery at Brown Medical School. The residents work with a wide variety of visiting surgeons from Kenya and abroad and are exposed to a broad range of general surgery and surgical subspecialty patients. Past residents have been involved in large and small bowel resections, thyroidectomies, esophagectomies, gastrectomies, peptic ulcer disease management, hernia repairs, appendectomies, hepatobiliary operations, limb amputations, parasitic disease management, burn operations, laparoscopic operations, and endoscopic procedures. Because the general surgery department is also responsible for all surgical subspecialties, residents also take care of thoracic, trauma, obstetric, gynecologic, urologic, pediatric surgery, plastic surgery, otolaryngology, orthopaedic, and neurosurgical patients. During a typical 4-week rotation, a resident will perform, under supervision, approximately 75 to 100 major operations and 40 to 50 endoscopic procedures.

METHODS

During a 1-month period in 2006, comprehensive questionnaires were distributed to the 11 past program participants (participants), all of the current general surgery res-

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