World Patient Safety Day 2025

'Safe care for every newborn and every child'

Stellenbosch UNIVERSITY IYUNIVESITHI UNIVERSITEIT

Healthcare-associated infections in children

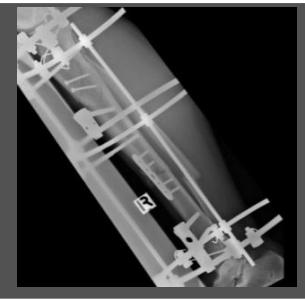
Small patients, big challenges

Prof. Angela Dramowski
Department of Paediatrics and Child Health
Tygerberg Hospital and Stellenbosch University

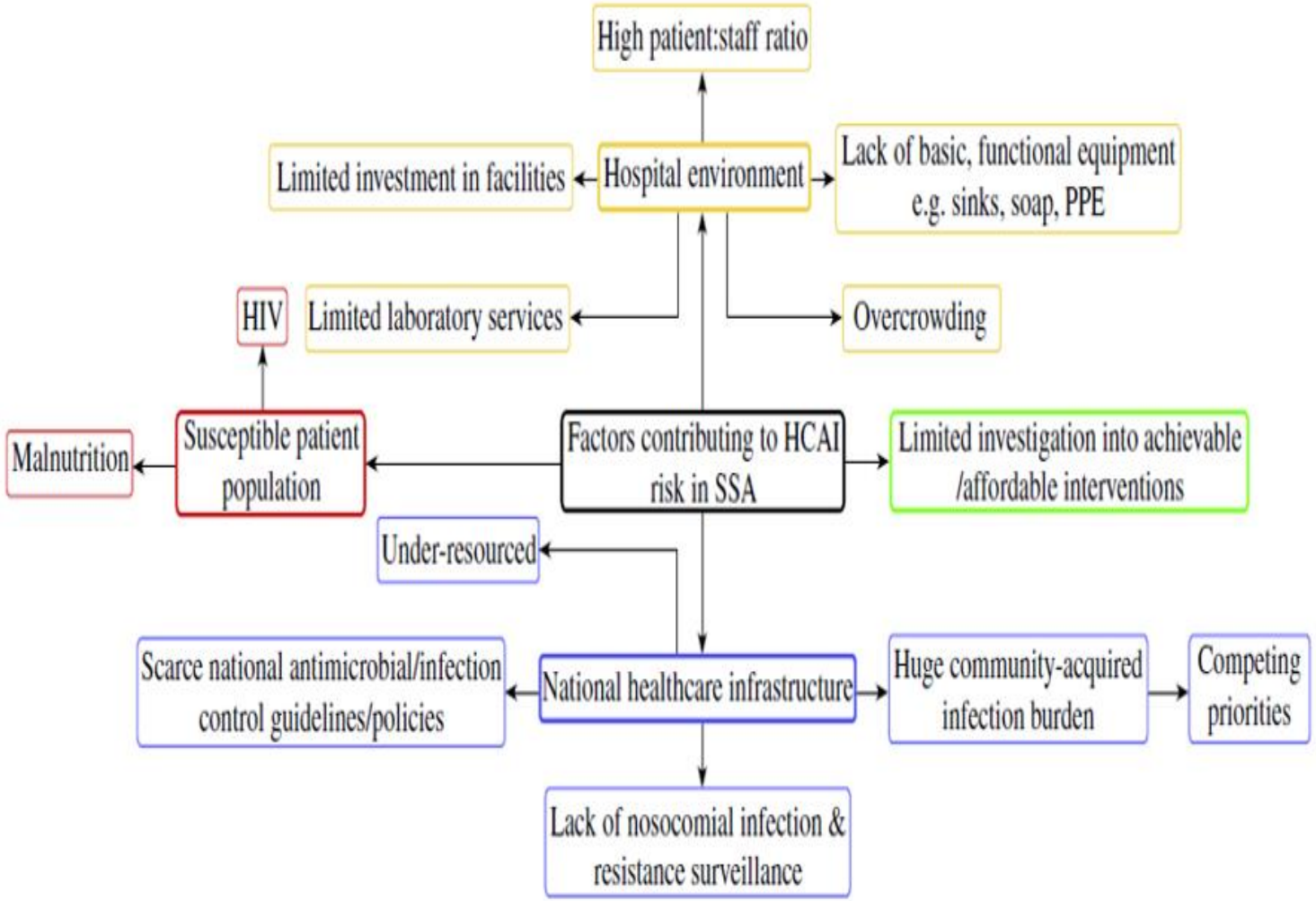
dramowski@sun.ac.za

Healthcare-associated infections (HAI)

- Infection onset while in hospital, usually > 48 hours
- Not present or incubating at hospital admission
- The most frequent complication of healthcare

Hospital – acquired pneumonia (HAP)	Bloodstream infection (BSI)	Urinary tract infection (UTI)	Surgical site infection (SSI)	Device-associated infections (CLABSI, VAE)	Skin-Soft tissue ENT Gastroenteritis Bone-Joint infections
					

Health system factors that increase HAI risk



Rothe J Hosp Infect 2013

Population factors that increase HAI risk

Neonates and Children have:

- Immature immunity
- Unique behaviours and incontinence
- Many caregivers, more handling
- Congregate setting exposure
- Rapidly colonisation (with AMR bacteria)
- Frequent respiratory & GIT viral infections

Host factors that increase HAI risk

- presence of underlying conditions
- presence of immune compromise
- prolonged hospital admissions
- disruption of physiological barriers
- Use of invasive devices
- prior antimicrobial therapy

HAI prevalence in High Income Countries = 5%

Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis

Benedetta Allegranzi, Sepideh Bagheri Nejad, Christophe Combescure, Wilco Graafmans, Homa Attar, Liam Donaldson, Didier Pittet

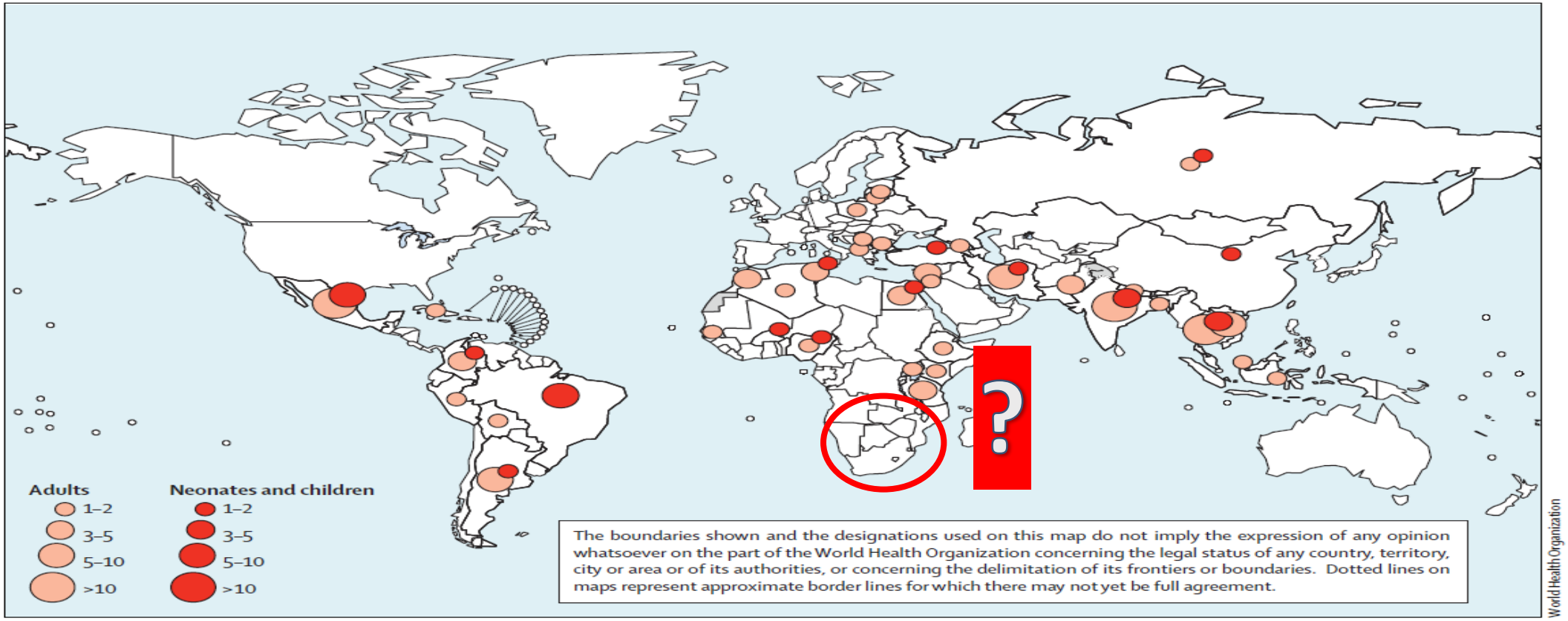


Figure 2: **Number of studies reporting health-care-associated infection in developing countries, 1995–2008**
Size of dots indicates number of studies. Map created with ARCView (version 9.3.1; ESRI, Redlands, CA, USA), using WHO criteria for official borders and disputed borders.

HAI prevalence in African countries is 13% (CI 9-17%)

The burden of hospital-acquired infections (HAI) in sub-Saharan Africa: a systematic review and meta-analysis

Herbert Melariri,[a,b,*] Robert Fraercks,[b,c] Elizabeth van der Merwe,[b,d] Wilma Ten Ham-Baloyi,[e] Opeoluwa Oyedele,[f,g] Richard A. Murphy,[h,i] Clarissa Claasen,[j] Paschal Emeka Etusim,[k] Maureen Okam Achebe,[l] Shadrach Offiah,[m] and Paula E. Melariri[n]

Items	N	n	P (%)	EP	95% CI	p-value
Overall HAI prevalence	223,199	7336	3.3	12.9	8.9–17.4	<0.001
Overall HAI prevalence in Intensive Care Units (ICU)	11,000	1755	16.0	25.0	11.0–42.2	<0.001
Overall HAI prevalence among paediatrics	132,514	1616	1.2	9.5	3.9–17.1	<0.001
Overall HAI mortality	4215	1118	26.5	22.2	14.2–31.4	<0.001
Overall HAI prevalence among neonates	60,205	2735	4.5	13.2	3.9–26.6	<0.001
Region-specific						
HAI Prevalence in West Africa	22,283	2107	9.5	15.5	8.3–24.4	<0.001
HAI Prevalence in Southern Africa	169,424	2963	1.7	6.5	3.3–10.7	<0.001
HAI Prevalence in East Africa	12,212	2142	17.5	19.7	10.8–30.5	<0.001
HAI Prevalence in Central Africa	3403	124	3.6	10.3	1.1–27.0	<0.001
Major types of HAI						
Bloodstream infection, prevalence	4500	2671	59.4	36.8	19.5–56.0	<0.001
Urinary tract infection, prevalence	2514	973	38.7	30.4	22.3–39.1	<0.001
Surgical site infection, prevalence	2437	692	28.4	43.7	25.4–62.9	<0.001
Lower respiratory tract infection, prevalence	1943	332	17.1	24.5	11.0–41.1	<0.001

250 000 cases reported
50% of all cases in children
26% mortality

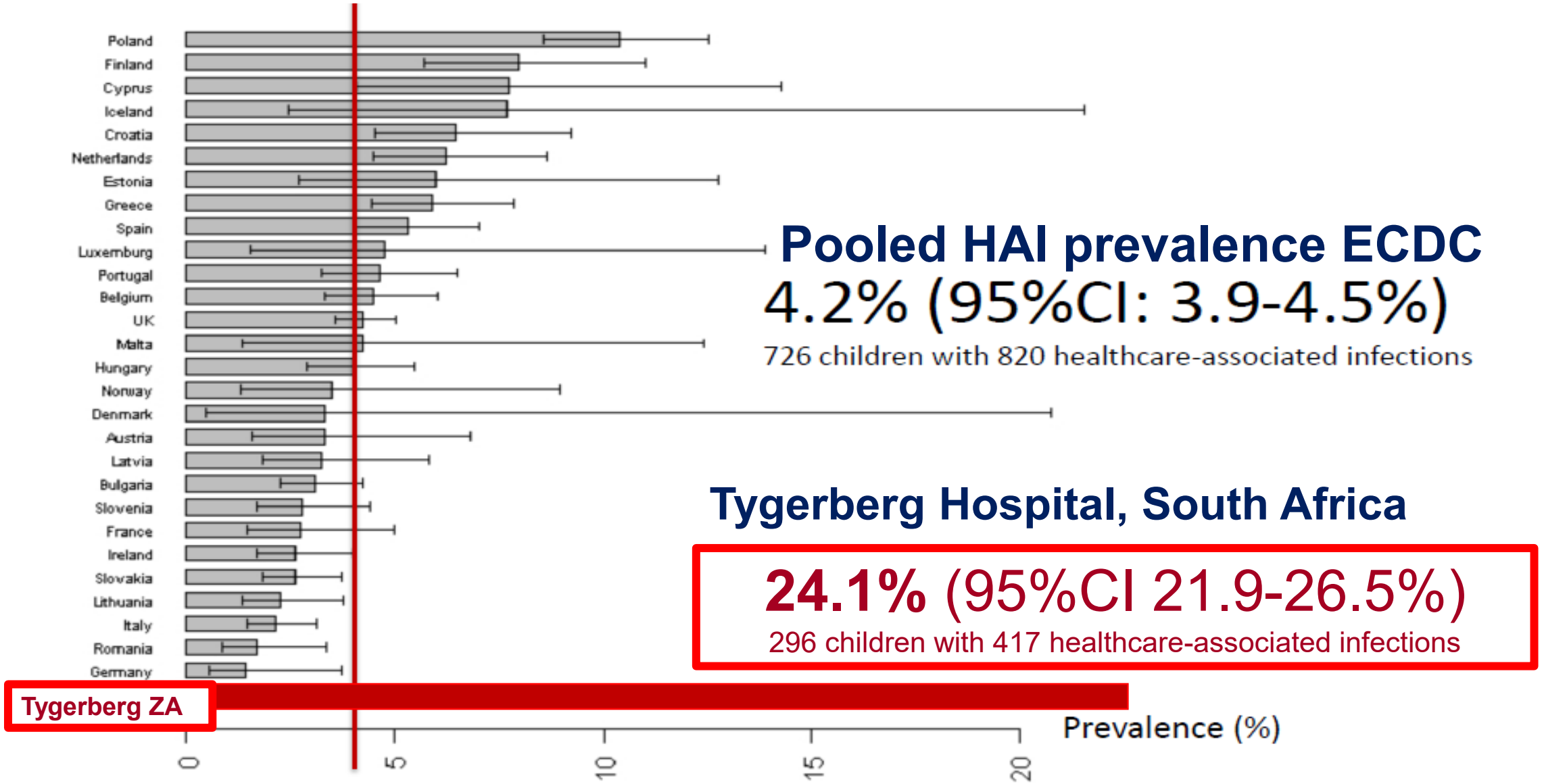
Highest prevalence in:
Intensive care units
Neonates and Children

Most common HA infections:
- Bloodstream
- Urinary tract
- Surgical site
- HA pneumonia

Melariri at al. E Clinical Medicine, 2024

Photo: TCH Trust

Paediatric HAI prevalence Europe vs South Africa



Pooled HAI prevalence ECDC

4.2% (95%CI: 3.9-4.5%)

726 children with 820 healthcare-associated infections

Tygerberg Hospital, South Africa

24.1% (95%CI 21.9-26.5%)

296 children with 417 healthcare-associated infections

Zingg, Lancet ID, 2017
Dramowski, SAMJ, 2016

Prospective study of paediatric HAI

Prospective clinical surveillance

applying CDC HAI definitions

Tygerberg Hospital
Cape Town

Total admission episodes >= 48hrs (n =1347)

Patient demographics
Admissions history
Laboratory investigations
Antimicrobial prescriptions
Information on any HAI event/s

24% HAI prevalence (95%CI 22-27%)

296 children with 417 healthcare-associated infections

Hospital-acquired pneumonia
Presumed HAI
Urinary tract infection
HA-bloodstream infection
Surgical site infection

75%

Clinical predictors of HAI in children

- HIV status (infected and exposed)
- Any Paediatric ICU stay
- Transfer in from another facility
- Severe acute malnutrition
- Co-morbidities
- Indwelling device/s

Outcome and impact of HAI in children

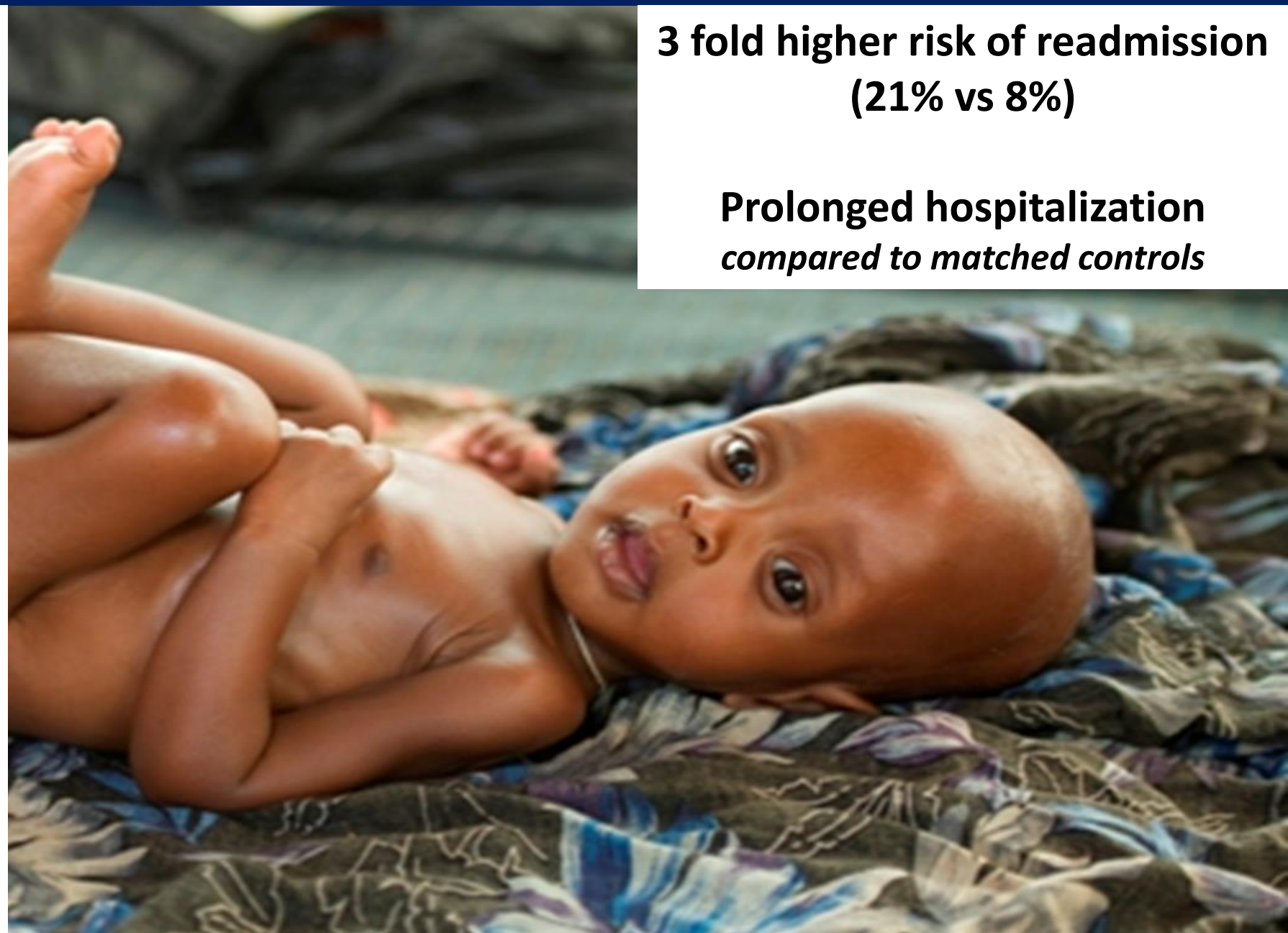
7% Crude mortality (7 fold higher than those without HAI)

Death at 4 days from HAI onset

Leading causes of death

HA pneumonia:
Adenovirus, RSV, Influenza

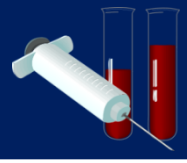
HA bloodstream infections:
K. pneumoniae,
***o*ther gram negatives,**
Candida spp



3 fold higher risk of readmission (21% vs 8%)

Prolonged hospitalization
compared to matched controls

Health system impact of HAI

Direct costs*	Hospitalization days	Antimicrobial use	Laboratory tests
			
HAP, BSI, UTI, SSI = R5.6 million	2275 excess days	2365 excess Rx days	3575 excess tests
Extrapolation to all paediatric wards annually = R60 million	overcrowding inability to admit pathogen reservoir	95% of HAI events had new antimicrobials prescribed >60% carbapenems	

*Cost calculation = # HAI events x excess stay x unit cost per patient day

Approach to paediatric HAI prevention

SAMJ IN PRACTICE

CLINICAL UPDATE

A framework for preventing healthcare-associated infection in neonates and children in South Africa

Policies & guidelines

Education & training

Patient safety climate

Provisions & infrastructure

HAI surveillance & research

HAI surveillance data in South Africa

The true HAI burden in South Africa is yet to be documented!

HAI

YOU CANNOT MANAGE WHAT YOU CANNOT MEASURE.

TYGERBERG HOSPITAL CHILDREN'S TRUST united for a healthy future

Stellenbosch UNIVERSITY IYUNIVESITHI UNIVERSITEIT

Western Cape Government FOR YOU