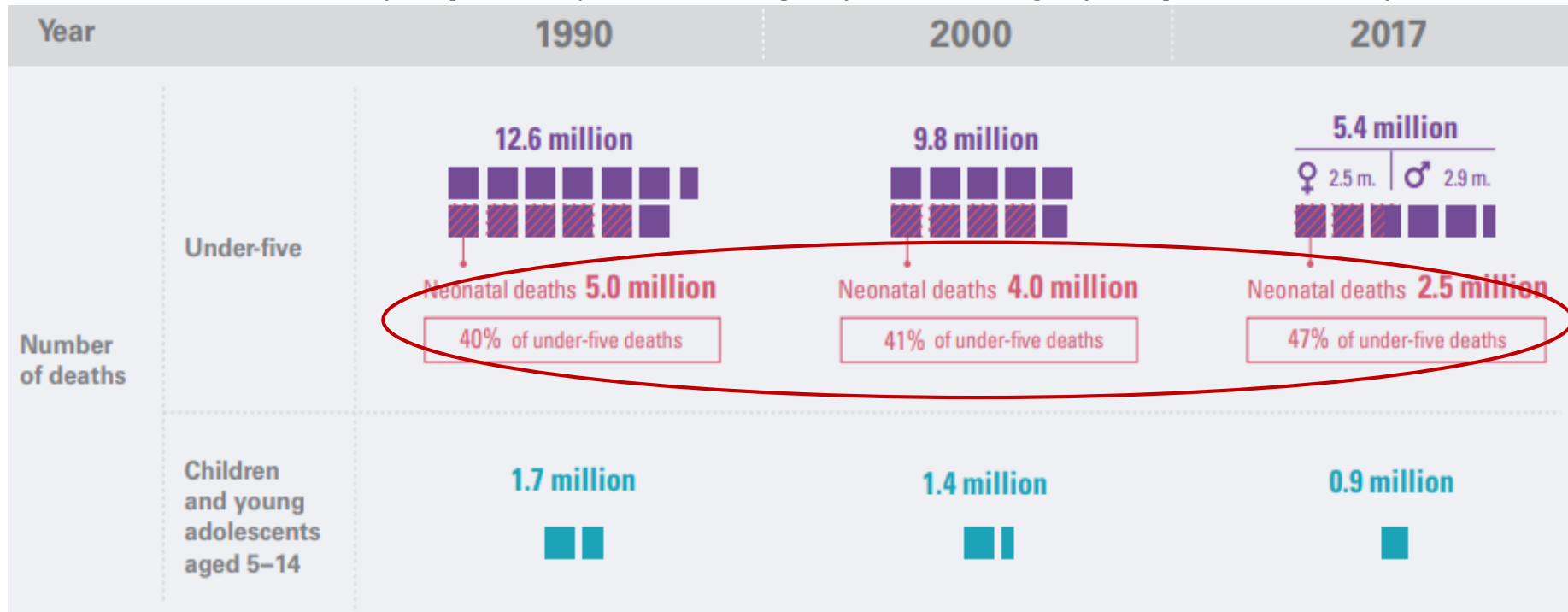


Dynamic clinical algorithms & Point-of-Care Tests to manage children illnesses

AI for Health – Focus Group meeting
2nd September, 2019
Zanzibar, Tanzania

Childhood mortality (global)

Levels & Trends in Child mortality –Report 2018 (Estimates developed by the UN Inter-agency Group for Child Mortality Estimation)



- Probability of dying is inverse proportional to age
- Biggest burden is at SSA and parts of Asia
- IMCI strategy (UNICEF/WHO 1990's) to reduce child morbidity & mortality
 - Limitations: Syndromic management (little integration of confirmatory tests)
 - Pneumonia leading cause of death to <5 (in 2016: 24%, Diarrhea 15%, Malaria 9%)

Disease pathogen in febrile children

B Pathogens

No Microorganism
Identified
2.0%

No Microorganism
Identified
2.0%

Virus
81.4%

Virus
alone
9.6%

Virus and
bacteria
65.0%

Bacteria
alone
12.6%

Bacteria
87.1%

Virus, bacteria,
and parasite
6.4%

Virus and
parasite
0.5%

Parasite
10.9%

Bacteria
and
parasite
3.1%

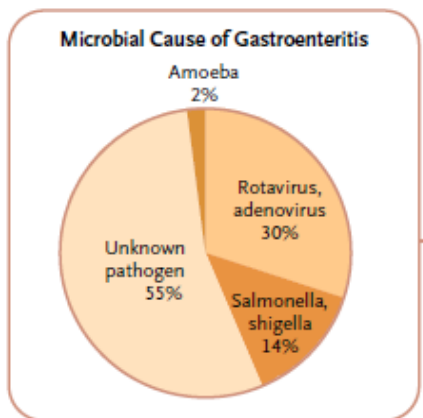
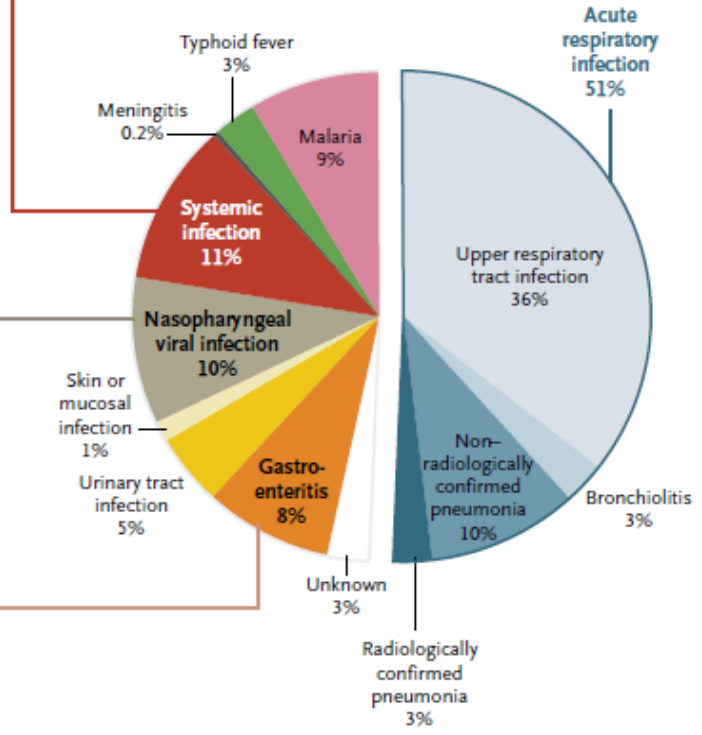
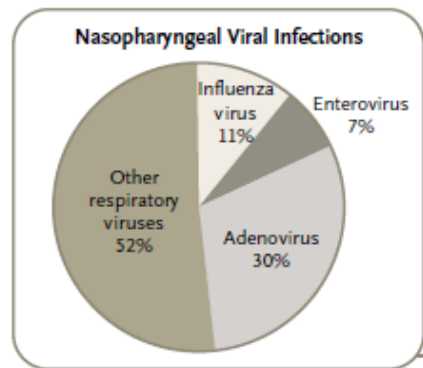
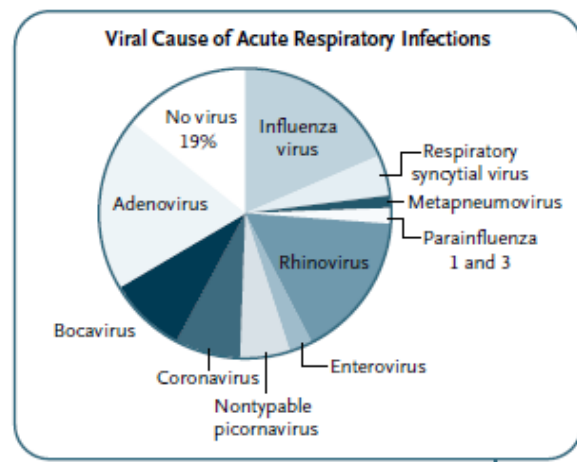
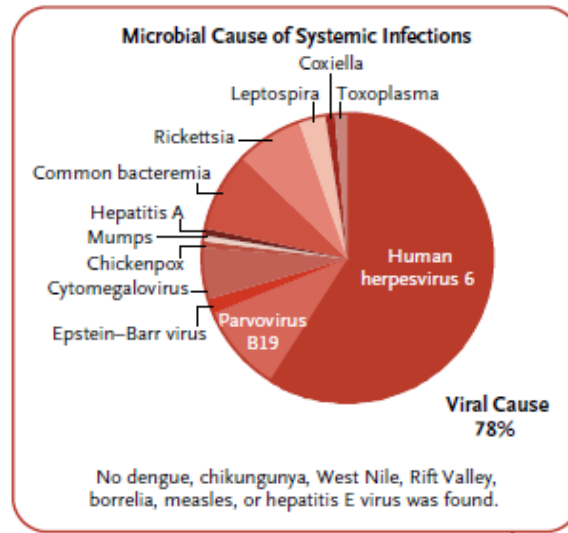
Parasite
alone
0.9%

D'Acremont V et al,
NEJM 2014

Analyzed samples
from 1010 children
(DSM & Ifakara)

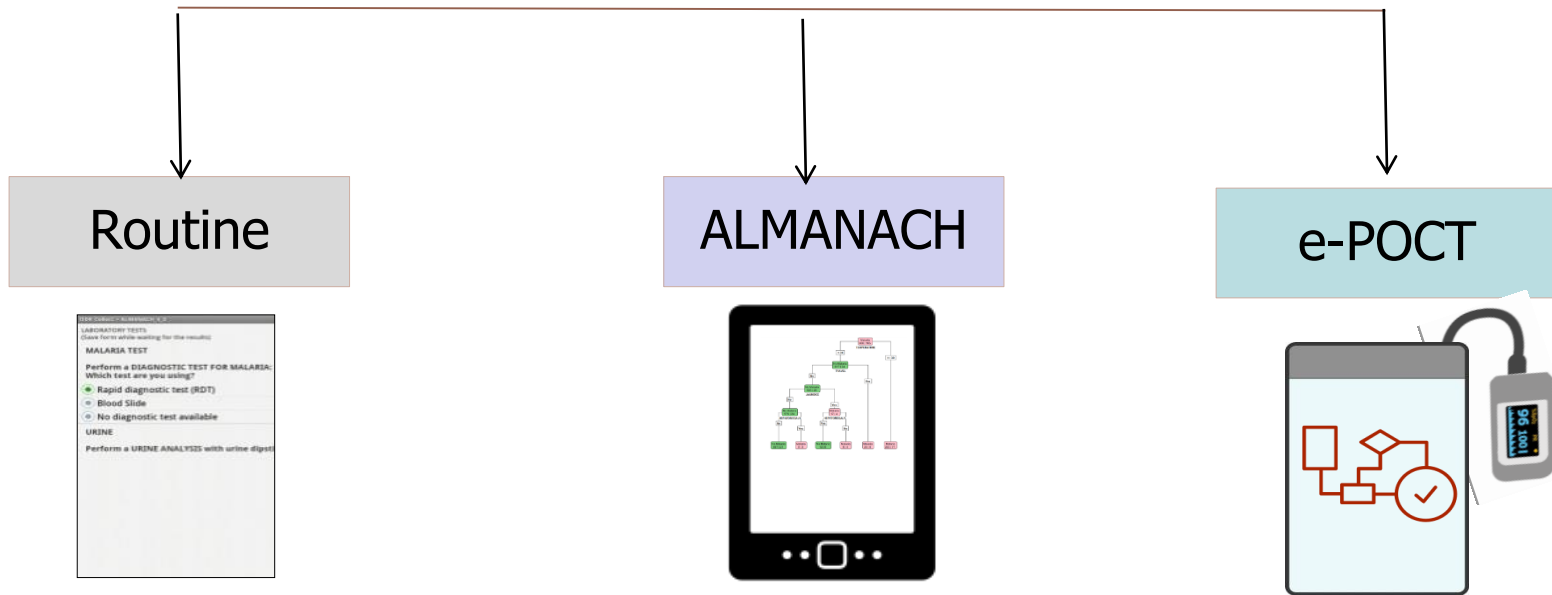
Beyond malaria - other causes of fever

D'Acremont V et al, NEJM 2014



Electronic algorithms (ALMANACH & e-POCT)

- Benefits of electronic algorithm with Point of Care Tests (e-POCT) vs. electronic IMCI algorithm (ALMANACH) & routine care has been demonstrated



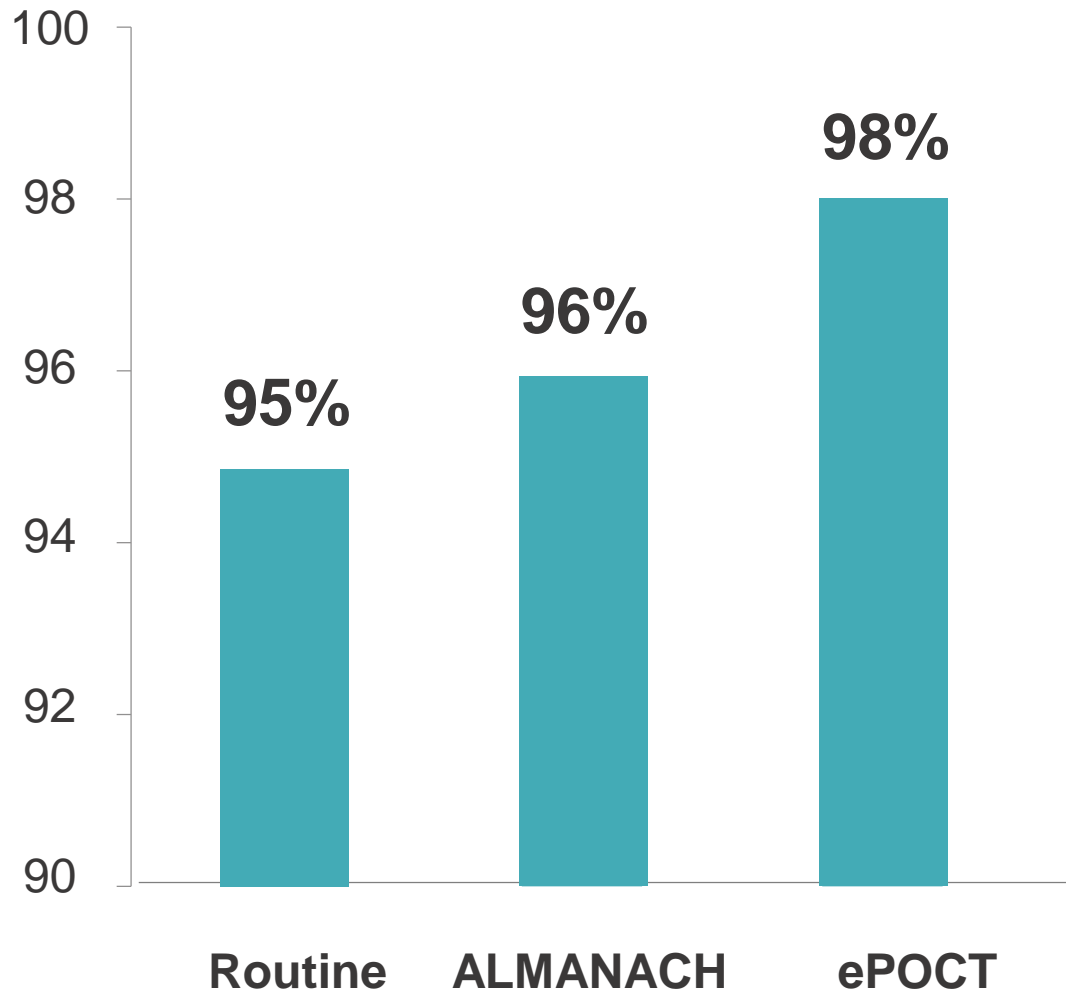
Shao et al, *Plos Medicine* 2015

Keitel et al, *Plos Medicine* 2017

e-POCT led to better clinical outcomes, reduced antibiotic prescriptions

→ Proof of concept established (electronic algorithm & e-POCT)

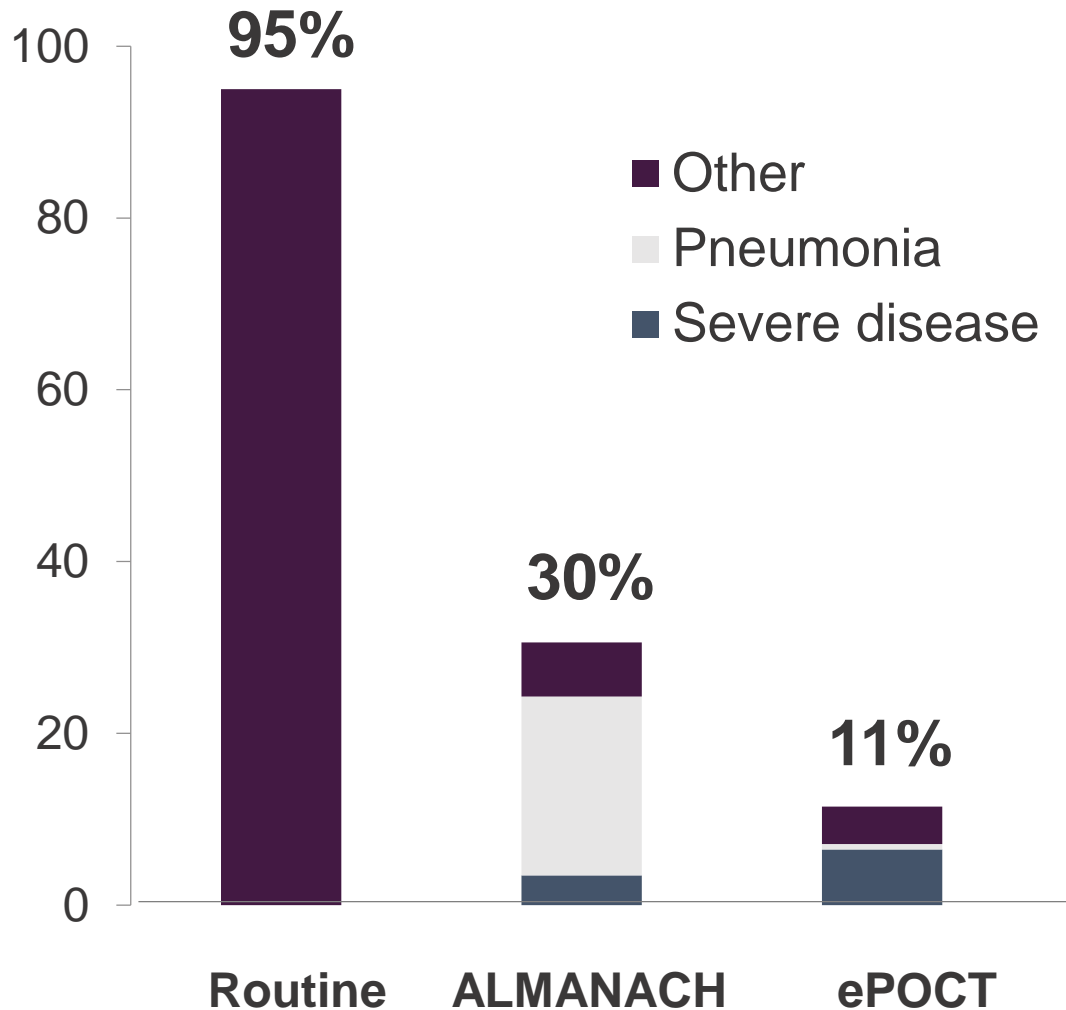
Impact of e-POCT implementation on cure rate



*Potential impact of ePOCT
in children in Tanzania:*

1 million clinical failures
averted per year

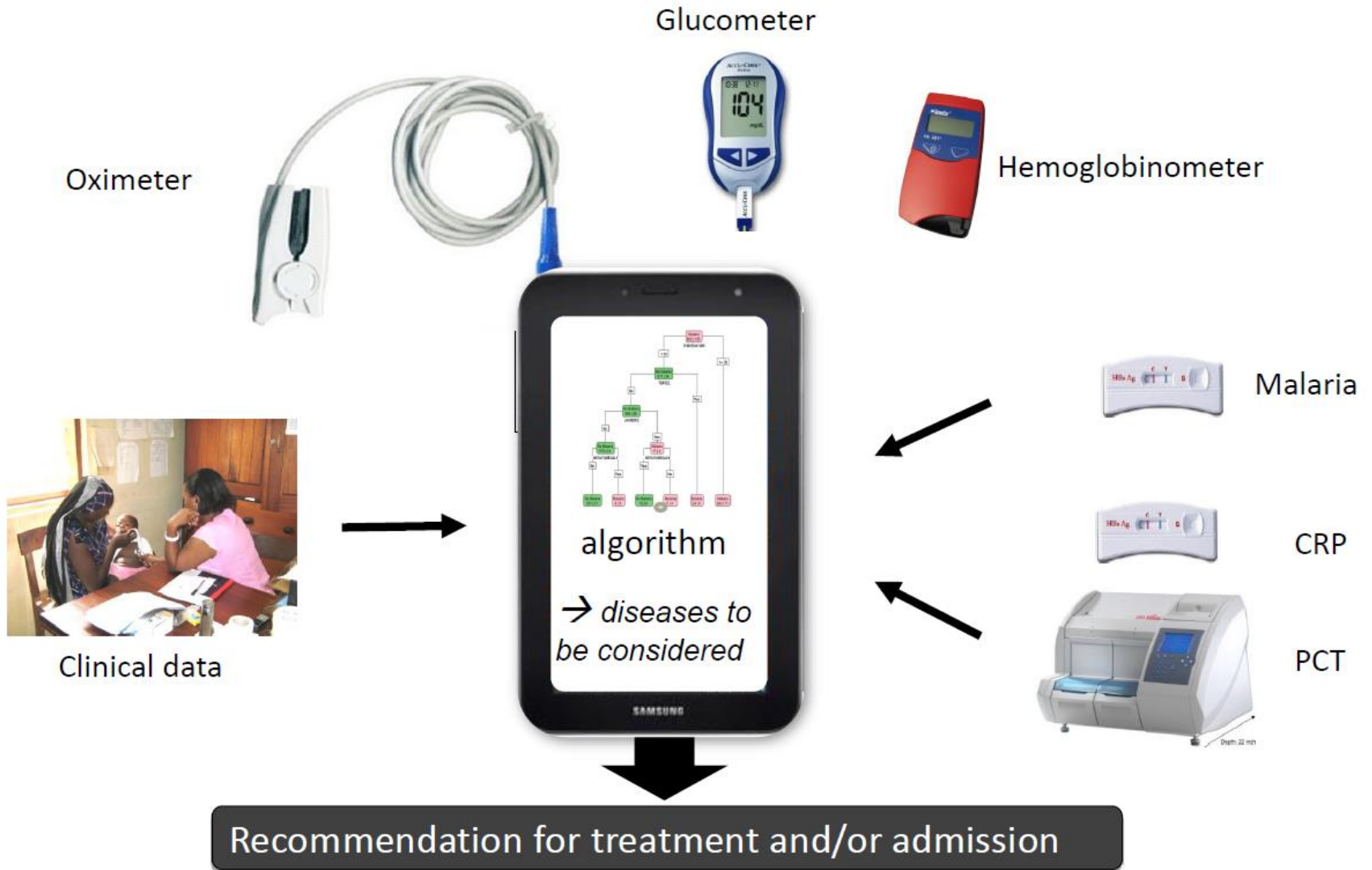
Impact of e-POCT implementation on antibiotic prescriptions



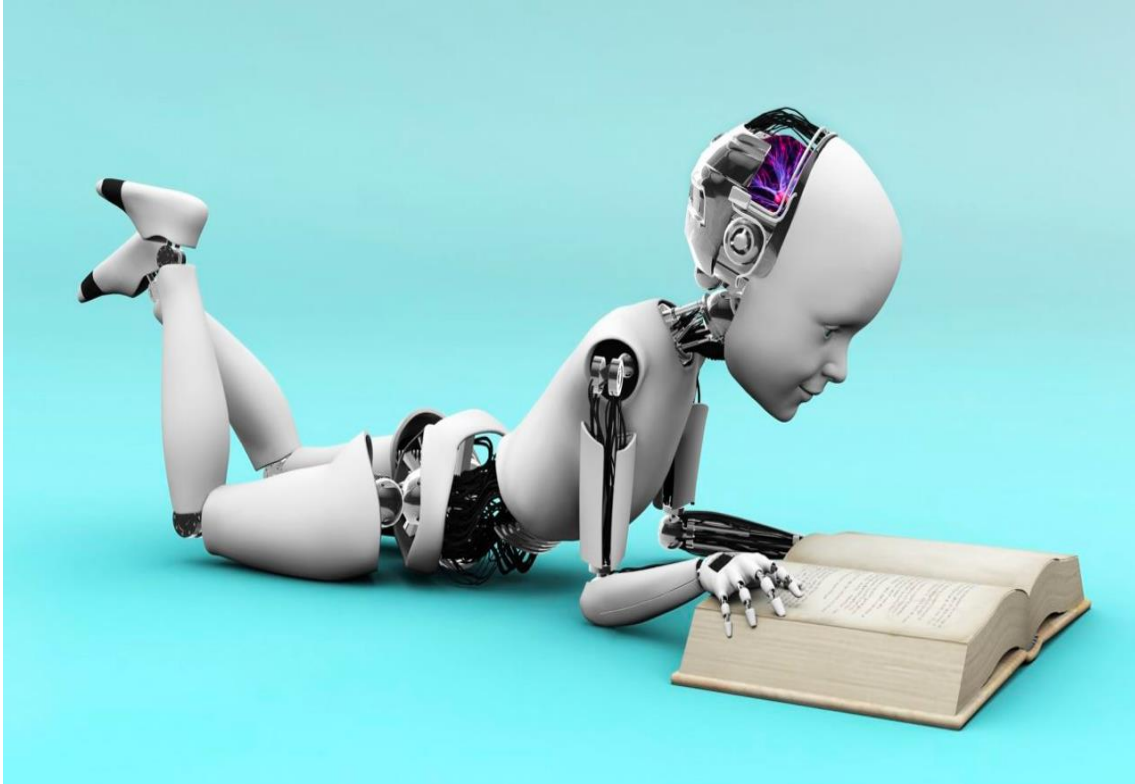
*Potential impact of ePOCT
in children in Tanzania:*

28 million unnecessary
antibiotics saved per year

Second generation ePOCT



Machine Learning in DYNAMIC



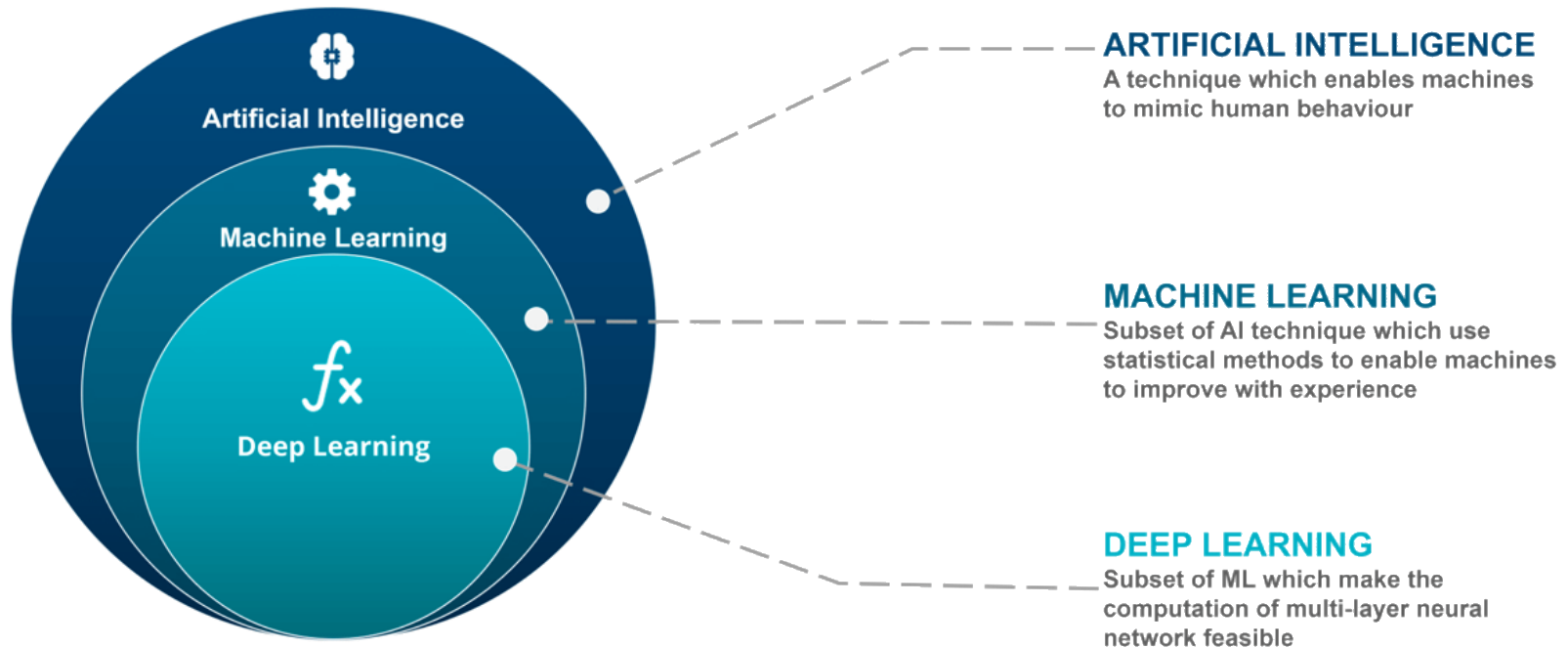
DYNAMIC program will extend assessment to:

- Wider age group (0-12 years),
- Wider demographic variations,
- Different geographical locations,
- Variation in disease profile

* Adequate training dataset

Use Machine Learning to identify children at greatest risk of algorithm inaccuracy (e-POCT+)

Why Machine Learning: AI, ML & DL



- Machine-learning has been the most successful type of AI in recent years.
- ML allows systems to discover patterns and derive its own rules when it is presented with data and new experiences

DYNAMIC Program – in summary



- ePOCT:**
- extended medical content
 - new software
 - full connection to biosensors and rapid tests
 - Improved clinical care of children

Validation of IMCI guidelines:

70 health facilities



Beneficiaries:

Sick children attending primary care facilities (& family)

Dynamic algorithm:
Through machine-learning and artificial intelligence

Health system:
Enhanced M&E, disease surveillance, epidemic detection

Data sciences:
High number and variability of data





Swiss TPH



fondation
BOTNAR



EPFL

unisanté

Centre universitaire de médecine générale
et santé publique • Lausanne

