Empowering Africa's Healthcare Systems: Understanding Clinical/Biomedical Engineering and Its Impact






The Pan-Africa CE-BME Leadership Team

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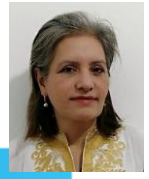
Ethiopia[1], RD Congo[2], South Africa[3], Kenya[4], Chad/DRC[5] & Ghana[6]

With Webinar Facilitation By

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Overview

- What is the Pan-Africa CE-BME team?
  - Encouraged by the Global Clinical – Biomedical Engineering (CE) Community - GCEA & IFMBE CED, this team has been formed in recent years to further develop CE-BME capacity across the WHO AFRO Region (47 countries with English, French, Portuguese and Arabic speakers)
- Who are Clinical Engineers?
  - What do they do?
  - How are they connected globally?
  - Why does this matter to the people of the WHO AFRO & EMRO Regions and their healthcare?
- How can they partner with other healthcare professionals to improve clinical outcomes?
  - What have they done in the WHO AFRO & EMRO Regions?
  - What have they done globally?
- What is the evidence-base for their results?

The Growing Role of Clinical Engineering

- Clinical Engineers and what is the Global CE Community?
  - **Clinical Engineers** (CEs) are ***Biomedical Engineers*** *(BME) who serve at the Point of Care,* typically in healthcare facilities.
    - Designated by World Health Organization (WHO)'s Resolution 60.29 (2007) for *Health Technologies* Management-HTM
    - **The WHO World Health Assemblies in 2020 and 2021** called out the global need for CE-BME to further manage *Health Technologies*: defined by WHO as Medical Devices, PPE, Oxygen Sources & Delivery, and Digital Health Tools
  - **The *Global Clinical Engineering (CE) Community***
    - The Global CE Community Worldwide Footprint
    - Key Activities: The 5th International CE & Health Technology Management Congress; followed by the WHO World Health Innovation Forum in India in 2023; have key leaders on WHO's STAG MEDEV; major role for WHO 5GFMD in 2024
  - **CE-BME *Capacity Building* Framework**
- Stories & Evidence from the Global CE Community
  - Clinical Engineering Global Response to COVID19
  - Global and Regional CE/HT Priorities Identified in 2022 Survey
  - Call for Action[1]
  - Global CE[2] and AFRO CE Stories[3]

1. https://www.nationalacademies.org/news/2022/05/the-growing-role-of-clinical-engineering-merging-technology-at-the-point-of-care
2. https://www.globalce.org/index.php/GlobalCE/article/view/84/48
3. https://8702981.fs1.hubspotusercontent-na1.net/hubfs/8702981/custom-video-thumbnails/Program.pdf

The Global CE Community

The Global Clinical Engineering Community = GCEA & IFMBE CED

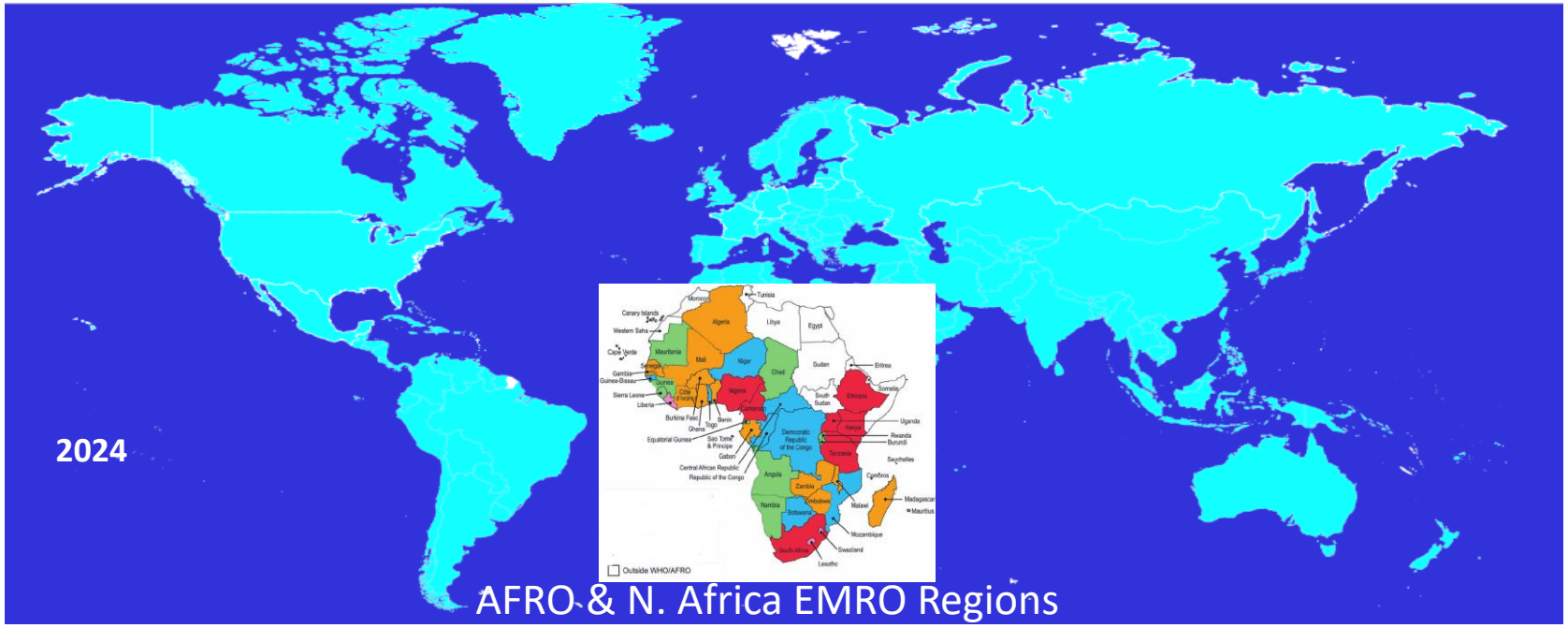
Global Clinical Engineering Alliance https://www.globalcea.org/home
IFMBE Clinical Engineering Division https://ced.ifmbe.org/
Live Streaming for 5th ICEHTMC Nov 10-13, 2023 https://www.globalcea.org/icehtmc-2023;
followed by the World Health Innovation Forum Nov 14-16, 2023: https://www.youtube.com/watch?v=peCZy-_8laU

A Key Joint 2023 Activity was the 5th ICEHTMC

The Pan-Africa (P-A) CE-BME Team Leaders led a significant input from AFRO for the Congress, by 25 Pan-Africa countries

providing over 36 presentations & 16 posters from 80 P-A co-authors (20% of all)

The Global CE Community Worldwide Footprint



AFRO & N. Africa EMRO Regions

Now over 1100 Collaborators from 210+ Countries

These individuals include current & former Ministers of Health, Physician & Health System leaders, Engineers, Medical Physicists, Technologists, Technicians, Professors, WHO representatives, all religions, all races, and over 1/3 women. Many of these countries are defined by the World Bank as LMIC.

CE-BME *Capacity Building* Framework

Clinical Engineers:

- **Manage** *Health Technologies (HT)* through their lifecycle, according to WHO methodologies
- **Innovate** to create new models and tools for healthcare delivery including Digital Health approaches
- Ensure ***Appropriate*** HT selection and deployment initially & ***Sustainability*** during use
- Work through ***National CE-BME Societies*** to assist ***Capacity Building*** at country and regional levels
- Have measurably improved healthcare ***Safety, Quality*** **and** ***Clinical Outcomes***

Status	Low	Middle	High
KNOWLEDGE			
Education (Academia)	2-4 year Academia	Academia: 4 year undergraduate & graduate	Graduate CE
Training (Academia - CPD, CEU & Industry)	Limited	Ongoing	Ongoing for typical devices plus more for high tech devices
Internships (part of Academic studies or independently in hospitals)	Absent	Limited	Available through different sources
Credentialing (Certification & Registration)	Absent	Limited	<50% Certified
Digital Health & Innovation (Knowledge used to improve devices and clinical & business workflows, etc.)	Absent	Limited	Beginning involvement
INVESTMENT			
Investment Drivers Externally (NGOs, Industry) versus internally (MOH, Universities)	Externally driven	Ministry of Health (MOH) directed	MOH driven, aligned well with University & Industry partners
Device Sources Majority Donations versus Majority Central Health Leader-driven	Majority Donations	MOH-led device planning, selection, & management	Extensive central planning, selection, & management through MOH
CE Department **Staffing**, Facilities & Test Equipment	Limited	Full range for typical devices & growing staff to meet needs	Extensive facilities & wide range of test systems with mature staff size matching needs
Inventory Management Manual versus CMMS	Manual	CMMS	CMMS includes Digital Health & Cybersecurity information, with ability to share data with decision makers & colleagues across hospitals
Added Value: Quality & Safety Measurement, monitoring, improvement, and risk management	Absent	Limited	Extensive
COMPETENCIES			
Scope of CE-HT Management Activities	Minimal set of devices	Full range of typical devices	Typical plus high-tech devices + Digital Health tools & Cyber
Device Preventive Maintenance & Repair	Limited PM & Repair of typical devices	Full range for typical devices	Full range PM & repair typical + high tech specialty devices
Clinician & Healthcare Team Relationships	Absent	Limited	Strong partnerships
National CE / BME Society (Bringing HT colleagues together to share best practices and training)	Absent	Beginning	Mature and able to assist other nearby countries
Leadership Development (Developing & Mentoring CE practitioners/Influencers)	Absent	Limited	Key country CE leaders mentored externally, They train & mentor others; become Influencers
Policy, Regulation, Legislation (Raising HT issues to national level in Political context)	Absent	Limited	Extensive

WHO:

- Measured 800K+ existing CE practitioners in 2018 from 130+ countries; the Global CE community efforts now show **over 1M in 200+ countries**
- Global CE Community 50+ best practice webinars with WHO **were attended by 160 countries** 2020-2023
- The Global CE Community joined a WHO evaluation team in 2020-2022 to create ***WHO's 2021-2022 Compendia of innovative health technologies for low-resource settings***
- WHO Medical Device Unit created the **STAG MEDEV** in 2022 to lead global HT improvement efforts, with many CE-BME on the team

GLOBAL CLINICAL ENGINEERING ALLIANCE

Global Dec. 2022 Body of Knowledge-Body of Practice Survey (n=870 responders)

Americas		Africa		EMRO/MENA		Europe		SEARO		WPRO		
Anguilla	1	Benin	3	Afghanistan	1	Albania	4	Bangladesh	25	Australia	4	
Antigua and Barbuda	1	Botswana	1	Algeria	2	Austria	1	Bhutan	1	Brunei	5	
Argentina	36	Burkina Faso	1	Bahrain	1	Belarus	1	India	18	China	180	
Bahamas	1	Burundi	4	Egypt	4	Bosnia and Herzegovina	3	Indonesia	1	Hong Kong	2	
Barbados	1	Cameroon	1	Kuwait	5	Bulgaria	1	Myanmar	1	Japan	11	
Belize	1	Central Africa Republic	1	Lebanon	3	Croatia	5	Nepal	31	Malaysia	3	
Bolivia	1	Cote d'Ivoire	1	Morocco	1	Cyprus	1	N. Korea (DPRK)	1	Mongolia	2	
Brazil	37	Chad	1	Pakistan	5	Czech Republic	1	Sri Lanka	2	Papua New Guinea	1	
Canada	21	DRC	1	Qatar	2	Estonia	1	Thailand	13	Singapore	1	
Chile	2	Eswatini	1	Saudi Arabia	7	Finland	1			Taiwan	5	
Colombia	9	Ethiopia	3	Somalia	1	France	3					
Costa Rica	3	Ghana	29	Sudan	7	Georgia	1					
Cuba	2	Guinea	1	Syria	1	Germany	1					
Dominica	1	Kenya	73	Tunisia	3	Greece	3					
Dominican Republic	1	Lesotho	1	UAE	3	Iceland	1					
Ecuador	2	Malawi	6	Yemen	2	Ireland	8					
El Salvador	2	Mali	2			Italy	13					
Grenada	1	Mauritius	1			Kosovo	1					
Haiti	2	Mozambique	1			Luxembourg	1					
Honduras	4	Namibia	1			Netherlands	1					
Jamaica	2	Niger	1			Poland	1					
Mexico	26	Nigeria	6			Romania	2					
Nicaragua	3	Rwanda	13			Russia	1					
Paraguay	3	Senegal	1			Scotland	1					
Peru	5	South Africa	40			Serbia	2					
St Vincent & the Grenadines	1	Tanzania	3			Slovenia	1					
Saint Kitts and Nevis	1	Togo	1			Spain	10					
Suriname	1	Uganda	24			Switzerland	1					
Trinidad & Tobago	16	Zambia	12			Turkey	2					
Uruguay	1	Zimbabwe	4			UK	5					
USA	9					Uzbekistan	1					
Venezuela	1											
32		30		16		31		9		10		128
6		27		11		3		8		3		50
	198		237		48		80		93		214	870

Global Survey Observations

1. Young profession globally: 50% under 40 years old
2. Globally 30% women CEs
3. Near 50% of CE practitioners with less than 10 years experience
4. 15% associate degree, 35% undergraduate, Masters 40%
5. 2/3 need Credentialing; 80% of those needing require it
6. Global growth of Digital Health CE involvement last 5 years
7. **237 Africa responses from 30 countries (27% of global total)!**

Countries
LMIC (World Bank designation)
Regional responders

Global CE Community 2022 Global Survey Priorities (From Dec survey)

GCEA-CED 2022	BOK-BOP Survey	Priorities shown:	Scored 85-90% of ...	High & Moderate Importance ...	Aggregate Scores
Global Survey High Priorities	*LA&C Survey High Priority Competencies*	*China Survey High Priorities (WPRO)*	*Africa AFRO Survey High Priorities*	*SEARO Survey High Priorities*	*Europe EURO Survey Priorities*
1. Maintenance Management (medical devices)	1. HTA	1. Regulation	1. Maintenance	1. Maintenance	1. Maintenance
2. Quality (Management)	2. Hospital Engineering	2. Maintenance	2. Quality	2. CE-IT	2. Data & Cybersecurity
3. HTA (Health Technology Assessment)	3. Maintenance	3. Quality	3. Patient Safety / User Training	3. Presentation Skills	3. HTA
4. Risk Management	4. Regulation	4. Data & Cybersecurity	4. CE-IT	4. Engineering Asset Management	4. Engineering Asset Management
5. CE-IT (Computers, Networking, Information Technology)	5. Patient Safety / User Training	5. Risk Management	5. Hospital Engineering	5. HTA	5. Quality
6. Engineering Asset Management	6. Quality	6. CE-IT	6. Leadership/Exec. Skills Coaching	6. Leadership/Executive Skills Coaching	6. Risk Management
7. Data Analysis & Cybersecurity	7. Data & Cybersecurity	Also strongly representative of the WPRO Region of 10 countries' priorities, the other 9 with a total of 34 more responses (total of 214 from all WPRO)	7. Project Management	7. Health Facilities Planning & Design	7. CE-IT
8. Project Management	8. Imaging		8. Regulation	8. Risk	8. Presentation Skills
9. Regulation	Others		9. Risk	9. Project Management	9. Patient Safety / User Training
10. Hospital Engineering	9. Innovation		10. Presentation Skills	10. Patient Safety / User Training	10. Project Management
	10. Digital Health (including CE-IT)		11. Data & Cybersecurity	*EMRO Survey High Priorities*	
				1. HTA	
				2. Hospital Engineering	
				3. Maintenance	
				4. Project Management	
				5. Risk	
				6. Quality	
				7. Procurement Strategies	
				8. CE-IT	
~~Countries~~: 127	LA&C: 30 countries – excluding USA & Canada	China: 21 provinces; WPRO: 10 countries	AFRO: 29 countries' responses	SEARO: 9 countries/EMRO: 16 countries	EURO: 31 countries' responses
Sample Size Respondents: 870	160	180	237	SEARO: 93; EMRO: 48 responses	EURO: 78

Global CE Response to COVID-19

- The Global Clinical Engineering (CE) Community – GCEA and IFMBE CED in partnership with WHO – responded to the global COVID-19 pandemic in many ways – one key way through 90+ global webinars from 2020-2023.
- Many stakeholders have written about the global reliance on health technologies whose innovation, deployment and support continue to improve worldwide healthcare and its delivery. The World Health Organization's-WHO 2007 Resolution WHA60.29 called for the effective use of health technologies (HT), in particular medical devices, through proper planning, assessment, acquisition and management.
- The community of professional clinical engineering (CE) practitioners' pre-COVID-19 stories are captured in various articles in the Global Clinical Engineering Journal (GCEJ) up to 2020. An article in December 2022 shows the reasons for the increased contributions of this community especially during the pandemic.[1] Emerging goals are shown in the USA May 2022 Editorial: *The Growing Role of Clinical Engineering: Merging Technology at the Point of Care.*[2]
- As a result of the CE global performance during the pandemic – both with webinars and other ways, the Community grew from 70 countries attending the 4th ICEHTMC in 2019 to 210+ countries by the end of 2022, with 160+ countries attending our webinars. CEs were able to gather on-line and develop many resources in key professional areas such as Capacity Building, Impact Measurement, Credentialing, and HT Policy Development.

[1] https://www.globalce.org/index.php/GlobalCE/article/view/151

[2] https://www.nationalacademies.org/news/2022/05/the-growing-role-of-clinical-engineering-merging-technology-at-the-point-of-care

Global Reliance on Health Technologies

- The Global CE Journal December 2022 article reviews the evolution of the CE profession since 2020, how it partnered with WHO between 2020-2022 and what lessons were learned in the process.
- It reports future CE priorities to improve country, regional, and global practice expected in 2023 and beyond. This report shared important findings related to patient care support services, and cites results from our 2022 highly successful Body of Knowledge-Body of Practice global survey. It also led to our 2022 Editorial (next page) that is a Call for Action for global CEs.
- GCEA and CED have reached an estimated 5 million+ touches / views globally from 2020-2024 by promoting Clinical Engineering's value through social media and educational platforms.
- One extremely important conclusion from these efforts is the need to partner with other Health Professionals in our joint quest to improve clinical outcomes as a result of our work together.

Call for Action:
How Can CE Roles Transition to meet Emerging Health System Needs

1. **Education of the workforce** to create greater collaboration and resiliency. Collaborative interdisciplinary educational training will ensure the systems skills needed to maximize the benefits of health technologies. With demonstrated competencies and internationally coordinated professional credentialing, **CEs will be prepared to be equal partners with the other members of a healthcare team, participating in new clinical roles and workflows to free physicians and nurses for direct patient care.**

2. **National health technology policy** to address priority national challenges. Pandemic-related impacts necessitated rapid implementation of national health technology policy in many countries. This and experiences with other disasters (e.g., floods, wildfires, earthquakes, power outages) clearly show the need for international coordination of new national guidelines to sustain access to, availability of, and the transfer of critical healthcare technology tools. **Clinical engineers play an important role in informing and implementing such policy.**

3. **National and international alliances and partnerships** to share expertise and lessons learned. Such alliances will coordinate meetings of healthcare stakeholders (e.g., clinicians, administrators, and ministry of health personnel with clinical engineers) to examine areas of concern where CEs can make a difference. For example, the Global Clinical Engineering Alliance has offered webinars, a virtual international congress, and a global CE summit to identify and rank common global challenges. **Such alliances can help those in the health sector, industry, academia, and NGOs drive cost-effective and high-quality innovations in healthcare delivery and manage the performance of the technology used at both point of care and in regional and global populations.**

Clinical Engineering Global Stories

1. **Tazeen Bukhari & Fiza Shaukat, Clinical Engineers, Pakistan**
   - Tazeen beginning service as MOH/WHO consultant during COVID-19
   - Fiza starting an EMR LMIC company after family tragedy

2. **Ministers of Health at the WHO World Health Assembly**
   - During COVID years 2020-2021 had to be virtual for MOHs and government leaders from WHO 194 member states
     - Key issue in 2020: where are the **Ventilators?**
     - Key issue in 2021: where are the **Oxygen sources?**
   - WHO has increased responsibilities of its ***Medical Device Unit*** ***(MDU)***
     - WHO MDU led by colleague CE/BME **Adriana Velazquez Berumen**
     - Scope increased from medical devices to also include PPE, Oxygen sources and delivery tools, & Digital Health tools

3. **Dr. Jitendra Sharma, Managing Director at AMTZ, India**
   - Created a MedTech Center to develop and manufacture medical devices in India and have deeply influenced national HT policy
   - An amazing track record serving internally & beyond during COVID-19
   - Host of the 2023 5th ICEHTMC & World Health Innovation Forum; GCEA Member & CED Board Member

Tazeen

Fiza

Adriana

Jitendra

Global Clinical Engineering Journal

Received February 20, 2020, accepted May 8, 2020, date of publication May 19, 2020

A Model for Priority Setting in Health Technology Innovation Policy

By J. Sharma[1,2]; J. Bunders[2]; T. Zuiderent-Jerak[2]; B. Regeer[2]
[1] CEO, AP Med Tech Zone & Executive Director, Kalam Institute of Health Technology, Visakhapatnam, India.
[2] Athena Institute, Vrije Universiteit Amsterdam.

Specific Evidence-Based Data for CE Impact

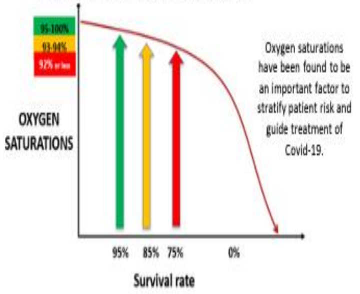
Safety & Quality: UK's Oximetry@Home Initiative, Dan Clark, OBE

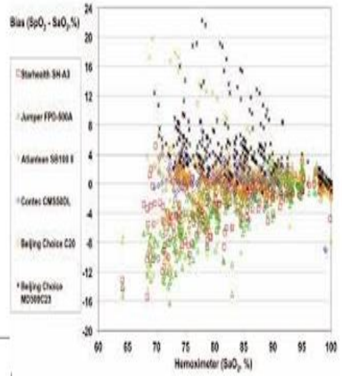
https://www.england.nhs.uk/nhs-at-home/covid-oximetry-at-home/

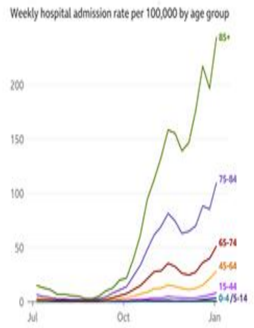
Project Outcomes - *Assessing the safety of home oximetry for Covid-19: A multi-site retrospective observational study* https://doi.org/10.1101/2020.12.16.20248302

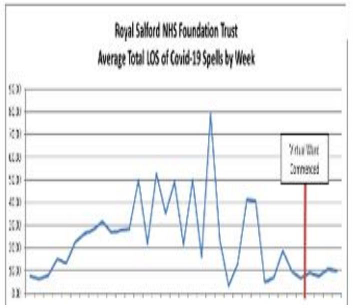
Results: UK's NHS led by Dr. Clark brought all home oximeters under CE oversight, increasing accuracy, resulting in:

- Reduced admissions - in one city alone, over 1,000 admissions avoided in 3-month project period
- Reduced Length of Stay - Average inpatient LoS demonstrated to be reduced from average of 17 pre-project to under 10 with oximetry@home
- Supported early discharge









More information found here:

https://www.dropbox.com/home/CED-GCEA%202020-2022%20Webinars/2021%20Competencies%20and%20WHO%20COVID?preview=Sep+1+2021+COVID+CE+Lessons+Learned.pdf

Digital Health: promote patient centered digital health

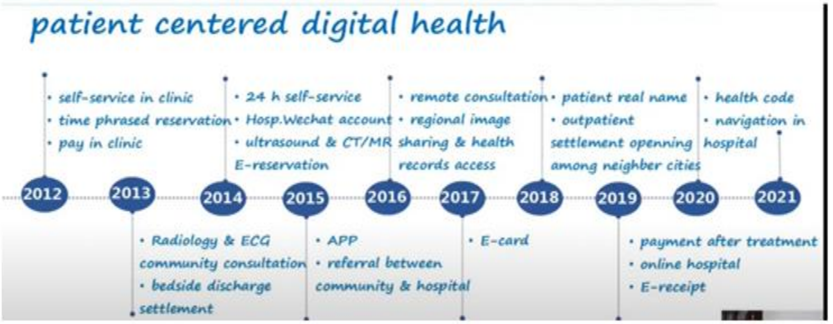
As professor Lou xiaoming from Hangzhou introduced Digital health in 2021.

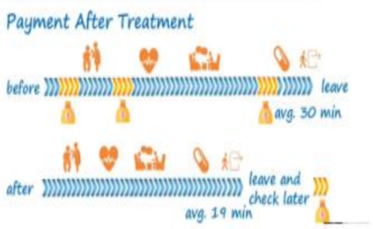
Hangzhou Red Cross Hospital, as the first pilot unit of Hangzhou Intelligent Healthcare, has been continuously optimized since 2012.

They using digital medical technology, patient-centered and information-based means, create hospital navigation based on wechat.

Based on electronic social security card payment for the core of the new outpatient procedures, to achieve the first check-up and combined payment late model.

Greatly improved the efficiency of medical treatment and satisfaction of patient





AFRO-based CE-BME Success Stories

Towards the Recognition of Clinical Engineering (CE) as Health Profession in Ghana: The Role of the Professional Association, George Boadu et al.

Results

- CEs were re-categorized as clinical staff
- Salaries of CE professionals were re-aligned and placed on the same level with nurses and allied health professionals by Ghana's Fair Wages and Salaries Commission (FWSC)
- **CE gained recognition as a health profession by FWSC directive**
- CE-BME Regulation in Ghana – work in progress
    - Engineering Council?
    - Allied Health Professions Council?
    - Regulation by both Councils?

IMPACT OF NEST360 ON NEWBORN HEALTH TECHNOLOGY MANAGEMENT (HTM) IN NEST360 COUNTRIES, Millicent Alooh et al.

(KENYA, TANZANIA, NIGERIA AND MALAWI)

Results

- Streamlined education ecosystem that has enabled both biomedical and clinicians to be able to confidently use the devices to deliver care. This has led to reduction in breakdown and zero graveyard for NEST360 devices
- Has enhanced collaboration between clinicians and biomedical engineering practitioners (BME) as most of the trainings are combined.
- A separate series of BME technical trainings has led to improved implementation of planned preventive maintenance (PM) across the four countries and beyond
- The provision of BME working tools and test equipment has played a major role in ensuring the implementation of PM. Still need working space.
- NEST360 is also very much cognisant of equipment quality assurance and hence the provision of test equipment like oxygen analyzers and photo therapy light meters ensure the equipment doesn't deviate from the original specifications
- Introduction of KPIs to monitor has motivated the BMEs to work extra mile to achieve the target, as the saying goes what doesn't get measured isn't done.
- Employment opportunities for BME as some governments have management to increase the BME workforce due to the NEST360 program
- **Increased accessibility to newborn devices with optimum device uptime hence improved access to care leading to reduced mortality**.

Functionality of Oxygen Concentrators in DRC Hospitals during COVID-19, and Oxygen Needs Being Met in Chad, Maombi Edison, MD, PhD, WHO, et al.

Results

DRC

A descriptive cross-sectional survey of managerial and maintenance personnel and the parameters of oxygen concentrators from 31 hospitals handling Covid19 cases in North Kivu.

- The oxygen concentrators (OC) were of 28 different brands, 2/3 5-liter used in 70% of cases in 4 departments (ICU, operating room, emergency room, internal medicine).
- Donated 2/3 without accessory equipment and often without training of maintenance tech.
- 2/3 OC not functional (n=225), with impaired volume flow.

Conclusions: Low functionality of OC increases patient risk and shows the need to implement a provincial strategy for the HTM and integration into regional health development plan.

- **Properly maintained oxygen concentrators can provide a highly effective low-cost easy-to-use solution for health facilities in developing countries.**

Chad

- Chad's health system has demonstrated resilience in terms of the availability of medical oxygen with the help of its partners, notably WHO which coordinated the response.
- **Several measures have been implemented, including the installation of new oxygen production plants and the repair of broken oxygen concentrators (OC) with CE-BME and hospital maintenance professionals trained.**
    - A total of 103 service technicians from 23 provinces around the country underwent practical training on repairing OCs, and 54 of the 94 oxygen concentrators were repaired.
    - From the two oxygen production plants initially installed in Ndjamena, the predictions indicate that 13 oxygen production units with a total capacity of more than 385.6 m3/ hour will be established within the country by 2024.

Biomedical Engineering and the Innovation Landscape in Africa: An Exploratory Study of Five Anglophone West African Countries, Akofa Bart-Plange (Ghana) et al.

Ghana, Nigeria, Liberia, Sierra Leone and ***the Gambia***

Conclusions

- CE-BME appears to still be in its nascent stages in anglophone West Africa
- Medical Device innovation landscape is not well-developed
- There has to be multi-stakeholder engagement to chart a sustainable way forward
- **Professional CE-BME associations appear to have a vital "connecting" role in bringing about improvements**
- There should be ways of learning best practices from regional blocks such as East Africa, South Africa, North Africa, Francophone West Africa, and so on to improve the situation

Conclusions

- The 1st Regional Meeting Africa in Nairobi 2023
  - Hear from Attenders in English
  - Key Conclusions
- French speaking Africa Benin 2023 meeting
  - Hear from Attenders in French
  - Key Conclusions
- Portuguese speaking Africa oversight through Fiocruz https://portal.fiocruz.br/en
  - Hear from Augusto Paulo Silva (Brazil) – Coordinator Fiocruz for Africa
  - Network of 6 countries
- EMRO Countries
  - Hear from North Africa country reps in Arabic (or English) as they choose to do so

Special Issue

As a dedication and promotion of this webinar event the **Global CE Journal** is opening a **Call for Papers** for the Special Issue focusing on Pan-Africa program! For more information contact us at: info@Globalce.org

GLOBAL CLINICAL ENGINEERING ALLIANCE™

Thank you!

To put names and contact info for Webinars presenters here

GCEA Addressing CE-HTM Needs of Africa

Africa AFRO 2022 Survey High Priorities

1. Maintenance
2. Quality
3. Patient Safety / User Training
4. CE-IT (Digital Health)
5. Hospital Engineering
6. Leadership/Executive Skills Coaching
7. Project Management
8. Regulation
9. Risk
10. Presentation Skills
11. Data & Cybersecurity (Digital Health)
12. Credentialing (Certification & Licensing)

GCEA Webinars (2020-2023)

- Risk Management
- Procurement
- Certification (2)
- Award: Outstanding Technician
- HTM Education & Training
- Imaging: PET, Ultrasound, CT, MRI (use & maintenance)
- Oxygen Concentrators (use & maintenance)
- Quality & Safety
- Award: Multi-National CE-HTM Collaboration
- Regulation & Standards (during COVID)
- Digital Health
- Project Management
- Facilitated est. 20 webinars with WHO & CED re COVID issues (GCEA & CED)
- 10 Top Identified CE Competencies (GCEA & CED) in 2020

What Is the Evidence for CE-BME Impact?

Example Data-Driven Presentations from 2023 CE-BME Global Congress

Presentations in Red from Pan-Africa CE-BME team members

- Impact of NEST360 program on newborn HTM in NEST360 Africa Countries, M. Alooh
- Effect of Advanced Medical Device Technology in Africa 2023, Ashenafi Hussein, Ethiopia
- Global Healthcare Disparities Can Be Eliminated 'Technology Transfer through Cardiovascular Surgery in Zambia'
- Justification for Policy Change in HTM and Maintenance in South Africa: Insights from Stakeholder Interviews in the Western Cape, Mladen Poluta et al
- Medical device regulations – the Zambian overview
- Maintaining momentum on improving access to Medical Oxygen Therapy for Newborn Care beyond Covid19 Pandemic through Nest360 Program, Millicent Alooh, Kenya
- Functionality of Oxygen Concentrators in DRC Hospitals during COVID- 19, and Oxygen Needs Being Met in Chad, Maombi Edison MD, WHO
- How to dramatically increase local production of medical oxygen: Case study of Rwanda
- The development of a maintenance and training strategy as part of the response to the COVID-19 pandemic
- Building capacity to strengthen medical oxygen security
- Embracing Appropriate Health Technology for Affordable Healthcare
- The case for HTM and public procurement policy alignment in Senegal and Indonesia
- Multi-sectoral maintenance strategy as a key enabler of Community Wellness in Less-Resourced Settings: A leadership opportunity for global Clinical Engineering, M. Poluta
- Improving quality of services through setting up CE departments and proper maintenance workshops in hospitals
- Building HRcapacity for Zimbabwe medical device maintenance management
- A Smart AI-Based UTI Detection System, Agabus Atumanya et al, Uganda
- CE in South Sudan Humanitarian Crisis
- Importance and Challenges of Medical Imaging in Africa
- HTM knowledge gap among healthcare leaders in Africa as a contributor to increased equipment downtime, Martha Tusabe, RD Congo, WHO
- Optimization of biomedical maintenance in the main hospitals of the Kara Region
- Current development within the Gambia ministry of health biomedical engineering unit
- Setting up sustainable maintenance departments in some state-owned healthcare facilities in Cameroon
- Implementation of a decentralised maintenance model with measurable impact on functionality and availability of medical equipment in health care facilities in Burundi
- Design and development of a sensory feedback system for transradial amputees using body powered prostheses
- Biomedical Engineering and the Innovation Landscape in Africa: An Exploratory Study of Five Anglophone West African Countries: Ghana, Nigeria, Liberia, Sierra Leone & Gambia
- Addressing the biggest challenge faced by biomedical personnel in East African health facilities, accepting the Status Quo.
- The pathomorphology of an arthritic hip joint with femoroacetabular impingement – bone to bone contact predictive analysis using a numerical method
- Ensuring Electrical Safety Systems in an MOH Hospital in Mali
- Breaking the Diagnostic Barrier in Tuberculosis Diagnosis using an Innovative Cough Aerosol Sampling Device for Individuals with Minimal Sputum Yield
- Equipment Decontamination: A missed opportunity in Healthcare Equipment Maintenance in LMICs, Martha Tusabe, RD Congo, WHO
- Shared management of biomedical waste in the Dassa-Glazoue health zone
- Women's resilience in fighting against covid19 pandemic – Women in clinical engineering and technology in Rwanda
- Knowledge, attitudes, challenges of female BMEs in LMICs. Uganda, Shalom Katusiime et al
- Uplifting the role of women in biomedical engineering
- CEASA: South Africa 2023 Global Clinical Engineering Day Competition
- GSBE: Towards the Recognition of Clinical Engineering as Health Profession in Ghana: The Role of the Professional Association, George Boadu
- Innovative approach to strengthen MD maintenance capacities in the DRC

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HTM and Emerging Technologies Post Covid-19 Pandemic on Africa and Beyond

62 Data-Driven Presentations from over 200 participants & 20 countries

1. Phillip Anyango Amoko-sustainable laboratory equipment quality assurance in Kenya.
2. David Malombe-Safety based FMEA decision support for maintenance of critical medical equipment.
3. Brian Matovu-Systems and processes of regulation.
4. Dolrose Ogina-Quality assurance, safety and risk.
5. Dr. Robert Ssekitoleko-Building BME beyond hospital service provision: Makerere University
6. Namata Mirembe Jovia-Role of biomedical engineer in post Covid-19 pandemic.
7. Kworekwa Paula-Containing medical device design: Innovating an invented space.
8. Julius Magaga-Increasing access to keyhole surgery in LRS: Exploring options to manufacture in Uganda.
9. Keith Richard-Portable diagnostic tool for early stroke detection through acoustic signal analysis.
10. Seth Adamas Wafula-Infant incubator model with an in-built weighing scale, O2 concentrator, CPAP, VSM.
11. Kenyatta University-Low-cost laparoscopy module for low resource setting.
12. Mulero Zeblon-Research and design of ultrasonic walking stick for the blind.
13. Atumanya Agabus-A regression tool for antibiotic resistance using a smart AI based UTI detection system.
14. Isaac Bua-Deep learning computer-aided design tool for lung cancer tumor classification in chest CT
15. George Boadu-Government medical equipment procurement and maintenance mismatch.
16. Vincent Otieno Ochieng-Health technology management: Improving documentation for impact.
17. Millan Amunze-Research on health technology assessment & technology.
18. Dr. Davide Plaggio-Sustainability across the medical device lifecycle.
19. Eng. Joseph Abu-Health facility planning and design in Ghana.
20. Douglas Kigenyi-User knowledge, attitude, practices of SOPs for essential laboratory equipment Uganda
21. Joseph Kibet Rugut-Oxygen therapy technologies, reticulating systems for healthcare facilities.
22. Timothy Senyonjo-Innovative O2 monitoring system for enhanced patient safety
23. Katusiime Shalom-Addressing oxygen shortages in remote Uganda in the post Covid era
24. Devine Catherine Nagle-Building capacity for sustainable management of medical oxygen technologies
25. Devine Catherine Nagle-Clinical planning guidelines for low-resource settings.
26. Millicent Alooh- Impact of Nest 360 program on newborn HTM in Kenya, Tanzania, Nigeria, Malawi
27. Dr Davide Plaggio-Best practices for health emergencies preparedness & governance: A scoping preview
28. Rebecca Kaaya-Using locally made low-cost silos to improve gastroschisis management in Uganda.
29. Marc Nyssen-CMMS in low resource settings: lessons learned.
30. Jasper Nyamwaya Ayaye-Application of AI in BME& emerging threats of ransomware on medical devices.
31. Wadidi Jonah-Developing a user centered mobile application for medical eq user & engineers in Uganda.
32. Asingya Lilian-An organ & blood donation mobile.
33. Akshay Rajagopal-Making it work: how an appropriate medical eq label will improve healthcare service delivery.
34. Innocent Shema-Current status of safety and effectiveness of medical devices at healthy facility in Uganda.
35. Brian Matovu-Review of investigational medical devices' clinical trials and regulations, benchmark for innovations.
36. George Banda- Designing an adaptable newborn HTM technical course for low resource settings.
37. Christine Kibet-Women, engineering and politics.
38. Jean Luc Mpamije-Biomedical Engineering in Liberia.
39. George Boadu-Digitizing malaria case management protocol in Ghana.
40. Tom Judd-Global clinical engineering initiatives: A GCEA perspective.
41. Dr. Mercy Adusei-Curriculum development & training for BME: The way forward for tertiary institutions in Ghana.
42. Daniel Atwine-Harmonization of biomedical engineering education across African universities.
43. Kevin BME recognition of prior learning (RPL) with continuous professional development (CPD) points.
44. Mladen Poluta-Towards an integrated curriculum for engineering in support of Universal Health-related coverage.
45. Faith Norah-Role of Biomedical Engineer in post Covid-19 pandemic.
46. Dr. Kenneth Iloka-Solution of healthcare technical solutions through 3D printing.
47. Ann Nyokabi-Digital health & telemedicine systems.
48. Kalule Mugaga-Assessing the skills & knowledge of BME for management of oncology & nuclear medicine eq.
49. Kenyana Ruth-Use of assistive technology for the death in Ugandan hospitals.
50. Samuel Opolot Otekat-Utilization of electronic health records in blood transfusion in East Africa.
51. Bazil Masabo-Evidence based research to improve alarm hygiene.
52. Tyaso Mussa-Basics of medical equipment.
53. Wanzi Su-A smartphone-based eye tracking algorithm for ophthalm. & neurological research: manual validation.
54. Bousso Niang-In vitro diagnostics: pooling of molecular biology platforms.
55. Krinoslav Jurcic-Towards more accurate detection of human falls.
56. Gumisiriza John Bannet-Biomedical engineering & medical device innovation.
57. Kibirige David-Design of photovoltaic biomass hybrid energy power system, rural health facilities in Uganda.
58. Fred Tigasitwa-An improvement of a low cost refrigerated centrifuge for low & middle income countries.
59. Dominic Kwesiga-Designing a device to improve hand hygiene compliance & monitor healthcare workers.
60. Hannington Kolokolo- Effectively powering a heath facility with a small capacity generating set.
61. C.C Osuagwu et al-Smart infusion-syringe pump for small and sick babies in a low and middle income country.
62. C.C. Osuagwu and O. Odedere-The impact of newborn essential solutions and technologies (NEST) 360 in-service Biomedical Engineering Training on Small and Sick Newborn Care-A case study in Nigeria.

Presentations in Red from Pan-Africa CE-BME team members

Note: there was also a French-speaking CE-BME Regional Conference in Benin in 2023 led by HUMATEM!

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