Health Technologies Resource

Global Clinical Engineering Summit
Success Stories

http://global.icehtmc.com/
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Global Clinical Engineering Summit
Success Story Resource
Global CE Advisory Board, Dr. Yadin David, Chair, May 1, 2016

Situation
Health Technology (HT) is vital to global health care. The dependence of health, rehabilitation, and wellness programs on technology for the delivery of their services has never been greater. It is therefore essential that health technology be managed in the most optimal way, to better contribute to the response to the burden of disease, to utilize digital care delivery tools, and to confront reemerging and new epidemics like Ebola and Zika.

“The Sixtieth World Health Assembly: recognizing that health technologies (HT) equip health-care providers with tools that are indispensable for effective and efficient prevention, diagnosis, treatment and rehabilitation and attainment of internationally agreed health-related development goals, including those contained in the Millennium Declaration; ... noting the need to expand expertise in the field of HT in particular medical devices; ... urges Member States to formulate as appropriate national strategies and plans for the establishment of systems for the assessment, planning, procurement and management of health technologies.” (WHO 2007 www.who.int/medical_devices/resolution_wha60_29-en1.pdf)

This global collaborative initiative of the International Federation of Medical and Biological Engineering – Clinical Engineering Division (IFMBE – CED, see http://cedglobal.org/) has compiled over 150 success stories from 90 countries demonstrating how HT has improved key health care processes and outcomes since 2007. CED and WHO have partnered in this work for nearly 40 years, leading up to the 2007 Resolution, but have accelerated efforts in the past ten years.

This resource will be presented to the World Health Organization World Health Assembly in May 2016, demonstrating progress over the past 10 years, and seeking developing country Ministries of Health endorsement, recognition, and adoption of these global health technologies’ best practices and methodologies presented in the success stories.

Background
At the 1st International Clinical Engineering and Health Technology Management Congress and Summit held at Hangzhou, China in October 2015 (www.icehtmc.com), a resolution was adopted by the global Clinical Engineering (CE) country participants present to identify and promote the unique qualifications of clinical engineers, and to record the many contributions of these professionals to the improvement of world health and wellness status.

Following this meeting, an action plan was adopted (http://global.icehtmc.com) that led to establishing a group of experts from every global region for this Global Clinical Engineering initiative (http://global.icehtmc.com/aboutus/aboutus_letter). The group has collected success stories that exemplify the outcomes achieved due to the interventions of members of the CE profession.

In the short period of time, between February and April 2016, members of the Global CE Initiative reached out to colleagues on each continent. As a result, over 150 submissions were collected from 90 countries, grouped in six categories of impact. Each category consists of over 10 success stories with health related statistics from the specific region, size of population involved, prominent health system, and details about the success story. The HT success story categories include the following; see glossary for definitions:

Innovation
Through provision of new HT solutions, adaptation of existing, or a combination to address several issues.

Improved Access
Ease in reaching HT-related health services or facilities in terms of location, time, and ease of approach.

Health Systems
Positive impact from more efficient and effective deployment of HT at national or policy level.

Healthcare Technology Management (HTM)
Establishing or improving HTM methodology resulting in improved population health or wellness.

Safety & Quality
HT’s positive impact on health services safety or quality outcomes, or through HT human resource development.

e-Technology
Improvements achieved due to deployment of internet-based health technology tools.
Glossary
Clinical Engineer (CE)
A professional who is qualified by education and/or registration to practice engineering in the health care environment where technology is created, deployed, taught, regulated, managed or maintained related to health services. Other related terms used for the CE role in developing countries includes biomedical engineer, and rehabilitation engineer. (Clinical Engineering Global Summit 2015, http://global.icehtmc.com/)

Efficacy & Effectiveness
Efficacy: The extent to which a specific intervention, procedure, regimen or service, produces the intended result under ideal conditions. Effectiveness: The extent to which a specific intervention, procedure, regimen or service, deployed in the field in routine circumstances, does what it is intended for a specified population. (WHO 2011, Glossary, http://www.who.int/healthsystems/Glossary_January2011.pdf)

Efficiency
The capacity to produce the maximum output for a given input. (WHO 2011, Glossary, ibid)

Health systems
(i) All activities whose purpose is to promote, restore and/or maintain health; (ii) people, institutions, resources, arranged with established policies, to improve the health of the population served, meeting legitimate expectations, and protecting against cost of ill-health through activities whose primary intent is to improve health. (WHO 2011, Glossary, ibid)

Health technology (HT)
Application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures, and systems developed to solve a health problem and improve quality of lives. (WHO 2007, www.who.int/medical_devices/resolution_wha60_29-en1.pdf)

Medical device
An article, instrument, apparatus or machine that is used in the prevention, diagnosis or treatment of illness or disease, or for detecting, measuring, restoring, correcting or modifying the structure or function of the body for some health purpose. Typically, the purpose of a medical device is not achieved by pharmacological, immunological, or metabolic means. (http://www.who.int/medical_devices/definitions/en/)

HT management (HTM)
To ensure access to appropriate medical devices, proper management and use of medical equipment over its life cycle must be considered, beginning with understanding the needs of the country, region, community, or facility and ending with decommissioning. In between, the process consists of good procurement practices, appropriate donation solicitation and provision, logistics of delivery and installation, inventory management, maintenance, safe use and training, and measurement of clinical effectiveness. HTM is conducted alongside HT assessment (HTA) and HT regulatory and performance compliance. (WHO 2016, www.who.int/medical_devices/management_use/en/)

Appropriate health technologies (AHT)
Methods, procedures, techniques & equipment are: (i) scientifically valid; (ii) adapted to local needs; (iii) acceptable to users & recipients; & (iv) maintainable with local resources. (WHO, 1989 www.cugh.org/sites/default/files/9_Appropriate_Health_Technologies_Concepts_Criteria_And_Uses_FINAL.pdf)

Impact
(i) The total, direct and indirect, effects of a program, service, or institution on health status and overall health and socio-economic development. (ii) Positive or negative, long-term or medium-term effects produced by a program or intervention. (iii) Degree of achievement of an ultimate health objective. (WHO 2011, Glossary, ibid)

Innovation
Serves to fill existing gaps in the availability of HT to vulnerable populations through provision of new solutions to health problems, the adaptation of an existing HT to a particular setting or for a new use, and the combination of HT to address several health issues at once. (WHO 2016, http://www.who.int/medical_devices/innovation/en/)

Life Sciences & Digital Health
Life Sciences1 research and biotechnology, includes genetic engineering, synthetic biology, genomics and proteomics leading to specific, personalized biologics and care. (WHO 2016: http://www.who.int/csr/directorat/note//Life_Sciences_Project/en/). Digital Health2: care where you are, enabling efficiency, convenience, and continuous patient engagement. Convergence of capabilities that empower consumers to manage their health on their terms, further defining the patient-caregiver relationship, in all settings of care. (WHO 2015: IFMBE CED Global CE Profile of Biomedical Engineering prepared for WHO’s December 2015 presentation to the International Labour Organization http://www.ilo.org/)

Quality
Care delivery structure, processes, and outcomes meeting established norms through ongoing measurement; quality of care features typically include effectiveness, safety, patient-centeredness, comprehensiveness, continuity, integration.1 Quality of care given by a health professional can be judged by its outcome, the technical performance of the care, and by interpersonal relationships.2 Care quality avoids underuse, misuse, and overuse; service quality is measured by the satisfaction with experience of patients and their family members with their care.3 (WHO 2011, Glossary, ibid; Donabedian 1988 http://post.queensu.ca/~hh11/assets/applets/The_Quality_of_Care___How_Can_It_Be_Assessed___Donabedian.pdf; NCQA 2006 The Essential Guide to Healthcare Quality www.ncqa.org/portals/0/publications/resource%20library/ncqa_primer_web.pdf)

Safety

HT outcome indicators
Technology total life cycle impact can be measured using indicators such as improvements in population health outcomes, health services access, cost per procedure or patient-day, and change in the volume of adverse events. Appropriate life cycle HTM translates to improvement in these indicators and, significantly, in the ability of a health system to provide a high quality and efficient basket of health services. (Dr. Yadin David 2016)
Assessment
Biomedical and clinical engineers (BME-CEs) are qualified and competent to practice in the health and rehabilitation services sector, and to facilitate the achievements of goals as measured by these HT outcome indicators. For example, improved Quality & Safety can be driven by engagement of an adequate number of qualified HT professionals (BME-CEs) in a country. This white paper illustrates many, but certainly not all, of the examples of how BME-CEs have made a significant difference, and thus have improved the role of appropriate, safe, and efficient technology for the population where they practice.

Here is a quick summary of compelling evidence from over 60 stories selected below (most with extensive peer-reviewed data available):

- Innovations for existing and emerging disease burden (e.g., Ebola best practice health technologies); also beginning to address Life Sciences & Digital Health
- Access to services for specialty care (e.g., for cancer), chronic disease (e.g., for dialysis and diabetes), and hard-to-reach populations
- Health systems/policy/management stories that demonstrate raising awareness and engagement of decision-makers (e.g., medical device legislation+)
- Financial models of how CE and Health Technology Management strategies are a wise investment for Ministries of Health
- Creative uses of e-Technology for management, Maternal Child Health (MCH) care, electronic health record (EHR) medical device interface, design, training
- Governance, process, policy, and academic approaches for improving Quality & Safety, while reducing risk in care delivery using appropriate HT

Notes:
1. Design and implementation of Medical Device legislation helps in national approach for conformity evaluation, certifications, market surveillance, and for smaller health care facilities. Strategies and plans—without a good legislative framework that obliges the health care providers to follow rules and regulations—often end up by not being used or neglected, especially because of hospital leaders’ focus on other financial and resource challenges.
2. Also includes global stories, e.g., from World Health Organization (WHO), and other sources
3. The Tropical Health & Education Trust (THET) www.thet.org; see Making It Work: Managing medical equipment in low-resource settings, www.youtube.com/watch?v=apfH7zrXhUk&commis=0
4. ICE – Integrated Clinical Environment, see http://www.mdpnp.org/mdice.html, part of the Medical Device Plug and Play Program, Boston MA, USA
6. ICE – Integrating the Healthcare Enterprise, see http://www.thei.net/; an initiative by healthcare professionals and industry to improve the way computer systems (and medical devices) share information.
7. ICT (WHO): e-health is the use of information and communication technologies (ICT) for health. Examples include treating patients, conducting research, educating the health workforce, tracking diseases and monitoring public health; activities increasingly supported and led by clinical engineers. See http://www.who.int/topics/ehealth/en/
Recommendations
For Ministries of Health in WHO Member States

The success stories described should help in the formulation of national strategies and plans for the establishment or enhancement of health technology life-cycle management programs in collaboration with clinical and biomedical engineering professionals. In several countries, this has best been achieved by developing a Health Technology Unit at Ministry of Health level. More story details are available on the Global CE Success Story website - http://global.icehtmc.com.

“Understanding that health technologies - in particular medical devices - represent an economic as well as a technical challenge to the health systems of many Member States, and concerned about the waste of resources resulting from inappropriate investments in health technologies - in particular medical devices - that do not meet high-priority needs, are incompatible with existing infrastructures, are irrationally or incorrectly used, or do not function efficiently.

Acknowledging the need for Member States and donors to contain burgeoning costs by establishing priorities in the selection and acquisition of health technologies in particular medical devices on the basis of their impact on the burden of disease, and to ensure the effective use of resources through proper planning, assessment, acquisition and management;

Noting the need to expand expertise in the field of health technologies in particular medical devices ...” (WHO 2007 http://www.who.int/medical_devices/resolution_wha60_29-en1.pdf?ua=1)

The stories collected, noted above, and included at the website provide clear evidence that health technology is beneficial, yet at times presents complex systems that must be effectively guided and managed for optimal impact to be realized.

Adequate planning is needed to address challenges presented at different levels of desired health services. This document focuses on their dependence on safe, integrated, and sustainable technologies. Requirements of health services’ priorities and support systems vary from one region to another; therefore many success stories are provided to share how diverse situations benefit from life-cycle management from innovation to deployment. In each of the stories attached the early and on-going engagement of biomedical/clinical engineering expertise was a key to achieving success. Three brief closing examples follow:

- A Ministry of Health HT Unit-led project in Albania that effectively doubled available access to critical diagnostic services, e.g., CT Scan, MRI, and angiography, while reducing equipment downtime to zero, and significantly reducing cost.
- Coordination between the multiple stakeholders in the National Public Health Laboratory and its connected laboratories in Colombia, led by Ministry of Health clinical engineers (CEs) who partner with other experts from academia and industry.
- A CE-led 122-hospital Quality & Safety program in the Shanghai region that cooperates with official, industry and academic entities, resulting in improved device user satisfaction, tracking of emerging technologies, and closer partnerships with industry.

We hope that you will find that the sharing of the information collected is beneficial and invite you to direct your inquiries through our website - http://global.icehtmc.com/contactus.

Respectfully submitted,

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