Healthcare Technology Management (HTM)

ACCE Advanced Clinical Engineering Workshops

Mario Castañeda
Tom Judd
Tobey Clark
Antonio Hernandez

International Conference Center (CICG)
Geneva, Switzerland.
November 22, 2013
American College of Clinical Engineering - ACCE

- ACCE International Committee

Advanced Clinical Engineering & HTM Workshops

- Outcomes & Sustainability
- Case Studies
  - Peru: Tobey Clark
  - Colombia: Mario Castañeda
  - Brazil: Tom Judd

Q&A
"A Clinical Engineer is a professional who supports and advances patient care by applying engineering and managerial skills to healthcare technology." ACCE Definition, 1992
Founded in 1990 with the goal of enhancing the profession of clinical engineering

Currently with ~500 members in the United States and abroad

International Membership: 26% of ACCE, from all continents (-Antarctica)
Mission of ACCE

- To establish a standard of competence and to promote excellence in clinical engineering practice.

- To promote safe and effective application of science and technology in patient care.

- To define the body of knowledge (BOK) on which the profession is based.

- To represent the professional interests of clinical engineers.
ACCE Structure

- **ACCE Board**
  - Jim P. Keller - President

- **ACCE Executive Committee**

- **Membership Committee**
  - James O. Wear

- **Advocacy Committee**
  - Tom Judd

- **International Committee**
  - Antonio Hernandez

- **Education Committee**
  - Jacob B. Johnson

- **Advertising**
  - David A. Smith

- **Marketing Committee**
  - Jon Blasingame

- **Nominations Committee**
  - Mario Castañeda

- **Secretariat**
  - Suly Chi
Membership Categories

- Individual
- Fellow
- Emeritus
- Honorary
- Associate
- Candidate
- Corporate
- Institutional
ACCE Awards

- Lifetime Achievement
- Marv Shepherd Patient Safety
- Challenge
- Tom O'Dea Advocacy
- Professional Achievement in Management/Managerial Excellence
- Professional Achievement in Technology/Professional Development
- Student Paper Competition
- Antonio Hernandez International Clinical Engineering (individual)
- ACCE/HTF International ACEW (organizational)
The ACCE International Committee (IC) is the body within ACCE charged by its Board to coordinate and facilitate international activities and relationships under the guidance and supervision of ACCE’s Board and President.
Excellence in Clinical Engineering (CE) / Health Technology Management (HTM) is available to all worldwide

- Advocate having every country utilize HTM to improve care delivery in their population

- Ensure that everyone knows what CE is and why important

- Clarify the differences between HTM and CE
Work with in-country partners to facilitate further development of Clinical Engineering & Health Technology Management
IC Objectives

- Identify priority activities within HTM and identify partners we can work with to operationalize these activities

- Share CE/HTM knowledge through training and information exchange according to the local needs (e.g., workshops tailored to local needs with local participation)

- Promote & advocate CE/HTM starting with highest priority countries, then moving on to others on continuum

- Build recognition for the profession of CE/HTM (e.g., help to implement a global approach to CE/HTM certification)
Activities of the IC

- Operations of the International Committee

- Advanced Clinical Engineering Workshops (ACEWs)

- Collaborations with other international organizations and societies.
  - World Health Organization
  - Pan American Health Organization
  - Clinical Engineering Division of the International Federation of Medical and Biomedical Engineering (IFMBE-CED)
  - Regional CE, Biomedical Engineering, and HTM societies
  - CORAL – Latin American Council on Biomedical Engineering
  - IUPESM - International Union for Physical and Engineering Sciences in Medicine

- International Membership Program

- Miscellaneous International Requests
• Listserv Discussion Group on “Health Services Physical Infrastructure & Technology”

• WHO/PAHO Health Services Physical Infrastructure and Technology Discussion Group
  ✓ Created January 1999
  ✓ Owned by PAHO
  ✓ Administered by ACCE through the IC
  ✓ Worldwide coverage
  ✓ Members 290
  ✓ Countries represented 46

• Current Status
  ✓ In transition to a WHO Health Technology Communication Platform
ACCE Products & Services

- Newsletters
- Teleconference Continuing Education Series
- Advanced Clinical Engineering & Health Technology Management Workshops (ACEWs)
- Publications & References
- Whitepapers
- Symposia (at annual AAMI & HIMSS Conferences)
- Web site: http://www.accenet.org
Worldwide Challenges in Developing Countries

- Lack of National Policy for Science & Technology in Health (HTP)
  - Technology dependent countries
- Few Medical Device Regulatory Programs (HTR)
- Limited use of evidence-based information for decision-making (HTA)
- Health Technology Management (HTM)
  - Continuous acquisition of technology
  - Deficient technology and Infrastructure Planning programs
  - Lack of equipment inventories and equipment control systems
  - Average 50% of equipment out of service or not in use
  - Very low Budget; deficient maintenance
  - Deficient after sale support
- Obsolete buildings, highly deteriorated (50%), lack planning (Physical Infrastructure)
- Human Resource Development (HRD)
  - Shortage of professional and technical staff
  - Few universities, technical schools with programs on BME/CE
Advanced Clinical Engineering Workshops

ACEW
To Build and Strengthen Healthcare Technology Management & Clinical Engineering Worldwide
WHO, PAHO, and ACCE

**Partners:**

Healthcare Technology Foundation (HTF)
Health Information and Management System Society (HIMSS)
Integrating the Healthcare Enterprise (IHE)
International Federation for Medical & Biological Engineering (IFMBE/CED)
ECRI Institute
Medical Devices Bureau - Health Canada (MDB)
FDA/Center for Devices and Radiological Health (CDRH)
Association for Advancement of Medical Instrumentation (AAMI)
American Society for Healthcare Engineering (ASHE)
National Center for Excellence on Technology (CENETEC)
Institute of Electrical and Electronic Engineering (IEEE/EMBS)
ORBIS
Pan American Health Care Exchange (PAHCE)
ACEW Syllabus - Standard

- Health Technology Assessment (HTA)
- Healthcare Technology Management (HTM)
  - Maintenance Service Management
  - Computerized Maintenance Management Services (CMMS)
  - Technology Management Shared Services
- Patient Safety, Risk Management & Use Error
- Utility Systems in Healthcare Facilities
- Human Resources Development (HRD)
  - Education
  - Professional Societies & Certification
- Three Level ACEWs
ACEW Syllabus - Advanced

- Leadership and Innovation
- Project Management
- Medical Device Regulation (HTR)

- Human Factors Engineering
- Medical Device Incident Investigation
- Electromagnetic Interference / Electromagnetic Compatibility (EMI/EMC)

- Telemedicine - mHealth – eHealth
- Clinical Engineering - IT Interoperability & Connectivity (CE-IT)
- Electronic Health Record/Electronic Medical Record (EHR/EMR)
- Medical Telemetry Systems/ Wireless Communications
- PACS, RIS, HL7, DICOM Interface Standards

- Donated/Refurbished Medical Equipment
- Reuse of Single-Use Medical Devices
- Training for technical and engineering staff
ACEW Planning

- Health Authorities Invited to Attend an ACEW
  - Country Authorities Invited by WHO or PAHO

- ACCE Contract with Host Institution
  - Team Leader and Faculty Selection (ACEW Roster)
  - Proposed Program
  - Mission to Prepare Program (Second/Third Level ACEW)
  - HTM Survey (Second Level ACEW)
  - Teleconferences (10-15)
  - Presentations and Reference Material

- Selection of Participants (Country Coordinator)
  - Invitation to International Participants

- Travel Logistics for Faculty Members
  - Local support and Logistics
ACEW Implementation

- **Before**
  - Pre-conference Meeting with Organizers
  - Visit to local Hospitals
  - Meetings with Universities and Technical Schools
  - Interviews with Local Health Authorities
  - Healthcare Situation Analysis /Challenges in the Country/Region

- **During**
  - Readings
  - Team Work
  - Forums for Discussions
  - Case Studies Competition
  - Identify Priorities for Improving HTM in the Country
  - Workshop Evaluation by Participants

- **After**
  - ACEW Proceedings
  - ACEW Final Report
  - Follow-up Activities
Florianopolis, Brazil – October 8-10-16, 2013  
Leader: Binseng Wang

Barranquilla, Colombia – August 22-24, 2013  
Leader: Mario Castaneda

Lima, Peru – November 12-16, 2012  
Leader: Tobey Clark

Leader: Matt Baretich

Sao Paulo, Brazil – November 5-7, 2009  
Leader: Frank Painter

Thiruvananthapuram, India – October 5-9, 2009  
Leader: Binseng Wang

Accra, Ghana – March 2-7, 2009  
Leader: Bill Gentles

Bridgetown, Barbados – October 20-24, 2008  
Leader: Elliot Sloane

Bogota, Colombia – April 2-3, 2008  
Leader: Tobey Clark

23 Years - 49 ACEWs

2013

2010

2010 20 Year ACEW Reunion

2009

2008
Atlanta 2010
20 Year ACEW Reunion
Sao Paulo, Brazil – November 5-7, 2007
   Leader: Frank Painter

Lima, Peru – August 13-17, 2007
   Leader: Tom Judd

Havana, Cuba – July 3-4, 2007
   Leader: Steve Grimes

Medellin, Colombia – March 7-11, 2007
   Leader: Tobey Clark

Dhaka, Bangladesh - March 12-15, 2007
   Leader: Nick Noyes

Florianopolis, Brazil – Nov. 27-Dec. 7, 2006
   Leader: Binseng Wang

Mombasa, Kenya – August 9-12, 2006
   Leader: Jennifer McGill

Cape Town, South Africa – May 11-13, 2006
   Leader: Tobey Clark
Buenos Aires, Argentina – April 24-28, 2006  
Leader: Steve Grimes

Leader: Kevin Taylor

Long Beach, CA, USA – January 30-31, 2006  
Leader: Arif Subhan

Cartagena, Colombia – July 11-15, 2005  
Leader: Tobey Clark

Kingston, Jamaica - April 11-15, 2005  
Leader: Tony Easty

Pristine, Kosovo - October 11-15, 2004  
Leader: Tom Judd

San Jose, Costa Rica - May 17-21, 2004  
Leader: Tobey Clark

Managua, Nicaragua - March 15-19, 2004  
Leader: Matt Baretich
Cancun, Mexico - September 17-18, 2003
   Leader: Yadin David

Santiago de Chile, Chile - August 25-29, 2003
   Leader: Frank Painter

Roseau, Dominica - July 14 – 18, 2003
   Leader: Elliot Sloane

Monterrey, Mexico - November 5-9, 2002
   Leader: Yadin David

Guayaquil, Ecuador - September 7-13, 2002
   Leader: Binseng Wang

Lima, Peru - March 18-22, 2002
   Leader: Frank Painter

Coro, Venezuela – March 13-17, 2002
   Leader: Yadin David

San Jose, Costa Rica – February 25 – March 1, 2002
   Leader: Tobey Clark
23 Years - 49 ACEWs

Sao Paulo, Brazil - June 4-6, 2001
   Leader: Binseng Wang

Havana, Cuba - May 20-21, 2001
   Leader: Elliot Sloane

Katmandu, Nepal - April 9-13, 2001
   Leader: Jim Wear

Guayaquil, Ecuador - March 26-30, 2001
   Leader: Frank Painter

Panama City, Panama - November 13-17, 2000
   Leader: Ira Tackel

Vilnius, Lithuania - September 25-29, 2000
   Leader: Alfred Jacknunas

Chicago, USA - July 21-22, 2000
   Leader: Frank Painter

Santo Domingo, Dominican Republic - March 13-17, 2000
   Leader: Frank Painter
<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capetown, South Africa</td>
<td>November 8-12, 1999</td>
<td>Tom Judd</td>
</tr>
<tr>
<td>Moscow, Russia</td>
<td>September 13-18, 1999</td>
<td>Yadin David</td>
</tr>
<tr>
<td>Hartford, USA</td>
<td>June 10-12, 1999</td>
<td>Frank Painter</td>
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<tr>
<td>Mexico City, Mexico</td>
<td>November 2-6, 1998</td>
<td>Frank Painter</td>
</tr>
<tr>
<td>Washington D.C., USA</td>
<td>June 4-7, 1997</td>
<td>Tom Judd</td>
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<tr>
<td>Beijing, China</td>
<td>November 6-10, 1995</td>
<td>Alan Levenson</td>
</tr>
<tr>
<td>Boston, USA</td>
<td>May 12-15, 1993</td>
<td>Yadin David</td>
</tr>
<tr>
<td>Washington D.C., USA</td>
<td>May 11-27, 1991</td>
<td>Tom Judd</td>
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ACEW Host Countries, 1991-2013
ACEW Statistics

- 23 Years
- 49 ACEWS
- 29 Countries Hosted ACEW
  - 16 from Latin America and the Caribbean (LA&C)
- 65 Countries have Participated in ACEW
  - 32 from LA&C
- 4,200 + Attendees
  - 3,420 from LA&C
- 80 Faculty Members of ACCE
  - 24 Former ACEW Attendees
- 1,938 + Hours of Lecture
- 2 Certification Boards on CE created (Brazil & Mexico)
ACEW Distribution
Outcomes

Governance/Strategy
- National Policies in Healthcare Technology (HTP)
- Promoting Heath Technology Assessment (HTA) Agencies
- Organizing Medical Device Regulatory Programs (HTR)
- Organizing National Health Technology Centers (CENETEC, CENGETS)
- HT in WHO and PAHO Agenda (Resolution WHA60.29)
- WHO/PAHO Collaborating Centers on Health Technology
- National IHE in Latin American Countries (to facilitate CE-IT, EHR Interfaces)
- Academia & Engineering Societies Taking Leadership (to address HT issues)

HTM & CE
- HTM Incorporated in National Health Plans
- HTM and HTA are “Institutional Priority”
- Hospital Directors and Administrators involved in HTM
- CE Departments in Hospitals; Clinical Engineering (CE) Widely Promoted

HRD – Human Resource Development
- Universities Organizing CE Programs (HRD)
- Distant Learning Programs (Vermont/USA; CES/Colombia; PUCP/Peru)
- Clinical Engineering Internships (Vermont/Peru/Colombia)
Sustainability

- National Strategic Alliances (Public-Private)
- Coordination with Academic Sector
- Interaction with Scientific and Professional Societies
- Designation of WHO/PAHO Collaborating Centers
- Institutional Capacity Building of HTM
- Networks of
  - Experts
  - Institutions
  - Schools of Engineering
- Links to Global Initiatives
  - Implementation of the resolution WHA 60.R29 on Health Technology
  - WHO Forum for Medical Devices Initiative
  - Health Technology Assessment International (HTAi)
  - Medical Devices Regulation (GHTF/PAHO)
  - Global Alliance for Patient Safety (WHO)
  - e-Health/Telemedicine (PAHO/WHO)
  - Integrating Healthcare Enterprise (IHE) - Patient Care Domain (HIMSS/ACCE)
Resolution WHA60.R29 on Health Technologies

- Exchange info on HT & Medical Devices - to set national priorities
- Develop Strategies & Plans for HTM – within the country
- Establish Regulatory & GMP (HTR) – nationally and or regionally
- Establish National & Regional HT Institutions – partner with Stakeholders
- Collect Info on Med. Devices based on Health Priorities - & related tools
- Request to WHO Director General – assistance for above tools & methods

23 May 2007
Peru: Lima 2012 ACEW
Synopsis

➢ Background
  ✓ 3rd ACEW in November 12-16, 2012
  ✓ Theme: Leadership and Innovation

➢ Structure
  ✓ 4 ACCE faculty, CENETEC Mexico, IFMBE, country leaders
  ✓ 5 days, 35 participants on-site, +20 from 4 other regions of Peru, Paraguay & Guatemala via Internet streaming
  ✓ Ministry of Health, ESSALUD, and private hospital administrators, physicians, and engineers, PUCP faculty and biomedical engineering students

➢ Sponsors/Partners
  ✓ Organized by CENGETS PUCP & ACCE
  ✓ Sponsored by Pontificia Universidad Católica del Peru (PUCP) & IFMBE
  ✓ Supporting organizations - Ministry of Health, PAHO, DIGEMID (regulatory), INMP-Maternity Hospital of Lima, APBIO, CENETEC, CORAL, EMB Peru
Peru: Lima 2012 ACEW
Synopsis

Content

- Public Policy for Health Technology Planning and Management
- Role of public and private organizations in Healthcare Technology Planning
- Healthcare Technology Management-HTM for a modern health system
- Better Access to Health through Telemedicine and eHealth
- Case Studies from Peru and Mexico/Participant Case Study Presentations

Participant Engagement

- Two Discussion Sessions/Day
  - Key points from discussions; Key questions; Input from group – answers to question; Review list and identify top priorities (*model ➔ AAMI Summits*)

- Case Studies
  - Policy & Planning, Safety & Maintenance
Peru: Lima 2012 ACEW
Synopsis

Law/policy

- Raise the awareness of healthcare technology management (HTM)
  - Creating laws mandating every hospital requires a clinical engineering team
  - Reform the health laws so that maintenance and calibration is included in the health laws
- Promote policies that elevate the awareness of HTM

Proposals

- Creation of vice health ministry level healthcare technology assessment (HTA) position
- Streamline and organize national HTM processes
- Combined proposal to MoH from multiple universities; socialize proposals with all relevant entities
- Start fresh with new hospitals. Do it now!
- Peru healthcare catch-up in informatics and digital health
- Planning for equipment by multidisciplinary team
Peru: Lima 2012 ACEW

Synopsis

➢ Education
  √ Educate the population regarding health technology
  √ Training and education in colleges and universities in biomedical and clinical engineering
  √ Research and development in HTM and biomedical and clinical engineering
Peru: Lima 2012 ACEW
Synopsis

Additional Impacts

- National Institute of Health (INS), an agency of the Peruvian Ministry of Health – Ongoing, Active Projects
  - Heavy metal pollution from mining
  - Maternal and child health
  - Development of a healthcare technology division

- Maternity Hospital of Lima (INMP)
  - CENGETS healthcare technology management office
    - INMP directors agree to pay for training costs of CENGETS staff
  - Neonatal ICU
  - Celebration for neonatal ICU graduates
    - Interviews for the Peruvian television
Online Biomedical Equipment Technology courses

• Program stated in 2007
  • Over 1000 students from 28 countries have taken courses
  • English & Spanish versions

• Three online courses plus laboratory course
  – Patient Care Equipment (Basic)
  – Advanced Medical Equipment Systems
  – Healthcare Technology Management
  – Medical Equipment Application 1 week hands-on course

• Course Sequence
  – 12 university credits
  – Link [http://its.uvm.edu/medtech/index.html](http://its.uvm.edu/medtech/index.html)
A collaborative effort

• University of Vermont - UVM (USA)
• Universidad – CES (Colombia)
• Universidad Católica – PUCP (Peru)
University of Vermont (UVM): Clinical Engineering Internship Program

- Five month paid internships
  - One month formal training
  - Four months of clinical engineering assistance to our CE’s and project work
    - Database analysis
    - Device development
    - Simulations
    - Online course development
- Students from UVM, Peru, Colombia and Argentina
University of Vermont (UVM): Clinical Engineering Internship Program

**Purpose** – To provide orientation, training and mentoring of engineering students in the area of clinical engineering to allow them to begin a career in clinical engineering.

**Schedule**

Week 1: Orientation to UVM and the clinical engineering field

Weeks 2-4: Training by Certified Clinical Engineers; readings

Week 5: Oral and written assessment of student learning

Weeks 6-14: Clinical engineering internship

Week 15: Final report, evaluation, and celebration of achievement
University of Vermont (UVM): Clinical Engineering Internship Program
Background

✓ ACEW ...part of a comprehensive package to strengthen the competence of participant organizations in enhancing health care delivery in the North Coast Region of Colombia. Participants required to complete goal oriented project proposal to graduate.

Structure

✓ ACEW: “Health Technology Management and Innovation” was the first of four modules – (other Health Care modules: Operations and Administration, Economics and Finance, and Implementation of Programs and Models)

Sponsorship

✓ Academia, Universidad Simon Bolivar; Government, National Learning Center; Private Sector; Barranquilla Chamber of Commerce
Colombia: Barranquilla ACEW Outcomes

- **Participant Engagement**
  - Highly interactive format in audience of clinical caregivers, clinical engineers, executives and owners of medium and small companies, and academicians
  - Professional volunteer facilitator designed specific program for maximum interaction

- **Participant Feedback**
  - Great enthusiasm about the inclusion of Leadership and innovation subjects among the technical content educational sessions.
  - Using Health Technology knowledge as a foundation for enhancement in health outcomes was well received. Group ready to take challenge of implementing mandated HER systems and providing impactful feedback to impending national health care reform.
  - Project work united the work groups to continue and be a resource beyond the workshop.

- **Key Indicators**
  - **HTM**: Awareness of WHA60.R29 and readiness to advocate at local and national level
  - **HTA**: Principles made real during the evaluation of technology at the additional modules
  - **HTR**: Reviewed at workshop and contextualized in following modules
  - **HRD**: Specific projects proposed.
  - **CE-IT**: Colombia became the first country in Latin America to be a EHI National Committee
Colombia: Barranquilla ACEW
Secondary Outcomes

- **New Sponsor/funding model** -- Private sector, Academia, Government funded this activity. In this model the funded was split and comfortable for everyone.

- **Specific outcome requested** -- 11 projects that will benefit the stakeholders came out of this exercise. e.g. Diabetics prevention programs, expansion of a Hospitals, design of a needle to easily access deep veins, Creation of pain management clinic, etc.

- **Single point of information for HTA/ HTM/ HRD** -- Formally places the Universities as coordinator and funded incubator for research and development of projects.

- **Fully stake holder engagement** -- Developed methodology for group process to fully engage the brain trust of participants and faculty so the outcome includes projects with funding -- or great potential of funding -- to subsequently address the country's (region) health issues.

- **Visible CE direct impact on Health outcomes** – ACEW is the foundation module that speaks to health care administrators, physicians, investors, public health, and academicians.

- **Promoting Economic development** – Opportunities for CE consultants, vendors, and others to bid on projects.
Brazil: ‘Floripa’ ACEW Snapshot

**Background**

- 5th ACEW in October 2013; “Advanced” CE focus (versus health leader focus)
- 2 major national MS CE university programs for 20-30 years (key contributors)
- Many CEs in HT Advisor roles to regional Secretary of Health/ national MoH

**Structure**

- 3 ACCE faculty: HTA, HTR, HTM, HRD, Safety-Risk, Human Factors, CE-IT
- 3 days, 70 participants on-site, +10 from 4 other countries via Internet streaming
- CE/BME leaders from Brazil, Mexico, Argentina, Chile, Peru, PAHO presented

**Sponsors/Partners**

- Organized by IEB/UFSC (Florianopolis), ACCE, & PAHO/WHO
- Funded by Brazilian MoH & local “Floripa” Foundation (related to IEB/UFSC)
- Contributors: IEEE/EMBS; CORAL (Latin American Regional Council on BME of IFMBE)
Brazil: ‘Floripa’ ACEW Outcomes

- **Participant Engagement**
  - 1st ACEW focused on “Experience Exchange” (between CEs)
  - 2 break-out sessions where participant groups formulated & shared plans to address key HTM issues, e.g., Equipment Management & Safety-Risk approaches

- **Participant Feedback**
  - Brazil MoH representatives want more ACEWs for those unable to attend, as did participants from other Latin American (LA&C) countries. *PAHO offered to provide Internet training opportunities.*
  - Participants agreed that higher level health authorities need to be involved and engaged to enable better HTM, HTA, HTR, & HRD. *Cooperation between LA&C countries & North America needed.*
  - Although some countries in Region more advanced, all fall short of 2007 WHO HT Resolution goal. To ensure safe, efficient care, and equitable access, *must continue momentum enabled by ACEWs.*

- **Key Indicators**
  - **HTM:** Explored differences in all participating country approaches; deep dive led by Binseng Wang
  - **HTA:** PAHO reviewed ‘HTA & Priority Setting for the Americas’
  - **HTR:** PAHO reviewed “*HTR in the Americas*” & ‘Intl. Basic Safety Stds. for Medical Applications’
  - **HRD:** Well attended by academia, with several country presentations and recommendations
  - **CE-IT:** CEs encouraged to continue HTM work, while getting increasingly involved in e/m-Health
“Technology appropriately deployed and used is a contributive factor to equity in health”

A. Hernández - 2004
Thank You

Mahalo

Kiitos

Toda

Grazie

Obrigado

Takk

Gracias

Merci