ACCE News

Newsletter of the American College of Clinical Engineering

May—June 2022 Volume 32 Issue 3

In this issue

President's Message

Happy Healthcare Technology Management Week to all of you! On behalf of the ACCE Board, I thank you all for your contributions and commitment to the patient care community. We appreciate your tireless efforts to ensure that patient care and clinical workflow remains uninterrupted.

We started out this month offering two insightful webinars to the ACCE community: effective vulnerability management and contract management. The complementary webinar on effective vulnerability management discussed how organizations can assess cyber risks and prioritize mitigation efforts from a patient and business impact perspective. The webinar on contracts management, complementary to ACCE members, discussed contractual processes, terms and conditions, and key areas that HTM/CEs should focus on.

We started HTM week celebrations with our Education Committee co-chair presenting on CE experiences during COVID-19 response activities to the Japanese Association of Clinical Engineering. These events reinforce the contributions of HTM/CE to the healthcare industry and demonstrate strong commitment towards advancing the profession.

ACCE is thrilled to meet its members at the AAMI Exchange in San Antonio, TX. We have expert panelists speaking at the CE Symposium on June 4th, 7:30-10:15am. Our focus will be on recruitment, retention, and recognition in the field – all of which is essential to maintain great organizational climate and culture within HTM/CE departments. We're excited to recognize 2022 award recipients and socialize with our members at the 32nd ACCE awards reception on June 4th, 7:30-10pm at the Grand Hyatt.

On April 29, 2022, ACCE signed a letter formally opposing H.R.7253 to the House E&C Committee. H.R.7253 was recently introduced with an expanded definition of remanufacturing. The expansion does much more to confuse than clarify the definition and missed outlining patient safety and care delivery implications for competition in the medical device servicing industry. ACCE continues to support the Right to Repair movement and advocates for superior quality of care delivery while reducing overall healthcare costs.

In addition to our industry engagements, ACCE continues to improve internally. We thank the Healthcare Technology Certification Commission (HTCC), Body of Knowledge (BoK) committee, and US and Canadian Board for assisting our auditors to improve the CCE certification process. The auditors continue to interview members to get their feedback on improving the written and oral exams, flexibility to international applicants, and overall quality management of the certification.

Again, I hope you had a great Healthcare Technology Management Week. I am grateful for everyone on the ACCE Board, its committees, and membership for remaining committed to our mission and demonstrating our shared values in the healthcare community!

Priya Upendra, President
American College of Clinical Engineering
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ACCE
AMERICAN COLLEGE OF CLINICAL ENGINEERING

Special Report: Clinical Engineering Body of Knowledge Survey Results and Analysis

Approximately every three years, ACCE conducts a Body of Knowledge Survey to to determine the current scope of practice and knowledge base for Clinical Engineers in their daily work. The survey results will be used by the U.S. Board of Examiners for Clinical Engineering Certification to update the Clinical Engineering Certification exam to ensure the exam closely matches the body of knowledge Clinical Engineers need to perform the duties of their role.

To gather additional data, several questions were added to the 2021 survey to determine how respondents heard about the survey, determine ACCE membership status, assess respondents plans to take the CCE exam, and assess if employers provide an incentive for obtaining certifications. The survey was open for approximately 4 months. Requests to participate in the survey took place primarily through several emails sent out to groups of individuals of the Clinical Engineering and Health Care Technology communities, including all members of ACCE. The survey was also advertised on the ACCE website, LinkedIn, and at AAMI. Like in 2018, participation in the survey was incentivized with three raffle prizes (1 free membership/renewal to ACCE and 2 $30 Amazon gift cards); however, we received significantly less responses than we did in 2018. We received 287 responses to the survey, which is a 46% decrease from 2018. Additionally, not all respondents answered all questions, so the total respondents for each question varies unless it was marked as mandatory.

In this report we categorized the respondents into two sets - CE Only and Non-CE. You can find the breakdown of the categories in the below table. Of the 287 responses, 239 responses were from individuals that identified themselves as Clinical Engineers, Healthcare Technology Managers, or Clinical Systems Engineers.

DEMOGRAPHICS

EMPLOYMENT: Among the respondents that provided their demographic information, 64.7% of respondents live in the United States, and 35.3% respondents live outside the United States, which includes 11.2% from Canada, 5.1% from Brazil, and 2.3% from Lebanon. Out of all respondents, 73.2% work in a hospital, clinic, or health system, and 8.0% work for an Independent Service Organization (ISO), while the rest were spread among other categories (6.3% Consultants, 2.8% Academia, 2.1% student, etc.). Approximately 70.7% described the primary nature of their positions as Healthcare Technology Management. Of the remaining respondents, the top selections were consulting (7.3%), project management (6.2%), and equipment planning (4.6%). About 50.9% described their profession as Clinical Engineers, 30.6% as Healthcare Technology Managers, 8.1% as biomedical technicians, 6.3% as clinical systems engineers, 2.6% as medical equipment planners, and 1.5% as specialists.

CERTIFICATION: Most respondents held either a CCE, CHTM, or CBET certification, with CCE having the highest percentage at 19.1% followed by CHTM at 15.6%, and CBET at 13.2%. 71.6% respondents stated that they are eligible for CCE examination. Conversely, 28.4% of respondents stated that they are not eligible for CCE exam; however, 75.3% of those not eligible are currently in CE positions. Two new questions were added in 2021 to measure the interest in taking the CCE exam and to understand if any incentives are offered for obtaining a

(Continued on page 3)

CE Only	Clinical Engineer Healthcare Technology Manager Clinical Systems Engineer Independent CE Consultants
NON-CE	Biomedical Equipment Technicians Medical Equipment Planner Specialist (Network Medical Systems, Radiology, Laboratory)

Reference Table A

ACCE News

ACCE News is the official newsletter of the American College of Clinical Engineering (ACCE).

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Body of Knowledge continued

(Continued from page 2)

CCE. Of the respondents to the question, 52.3% stated they plan on taking the exam in the future, 25.2% do not plan on taking the exam, and 20.2% already have their CCE. Additionally, 44.3% of respondents do not get an incentive for obtaining a CCE certification, while 29.5% confirmed they do get an incentive, and 26.2% do not know if their employer offers an incentive. Some of the incentives identified through the free text field include bonuses, promotions, salary increases, additional paid time off, and recognition.

EDUCATION AND EXPERIENCE: Of the respondents, 59.9% possess a degree in Engineering. From the 40.1% of respondents that do not have an Engineering degree, only about 30% have an education related to Electronics and Biomedical Technology, and the remaining respondents fall into Business Administration, Project Management, or IT. Additionally, the majority of the respondents have either a 6-year degree (50.8%) or a 4-year degree (31.8%), and less than ten percent (8.1%) of the respondents have only a 2-year degree. Of the respondents for the question regarding years of experience in the Clinical Engineering/HTM field, 19.6% had 0 - 5 years of experience, 35.6% had 20+ years of experience, and the majority (44.6%) had 5 - 20 years of experience in their field.

KNOWLEDGE

Respondents were asked to assess background knowledge required to successfully complete their work by indicating the level of importance of 34 given subject areas in relation to their position. Importance was deemed a measure of both how *critical* the knowledge is to their job and how *frequently* this knowledge is used during their daily tasks. Respondents were given a range of importance of Minor, Moderate, or High importance for each of the 34 categories. To convert these responses to quantitative data, each Minor, Moderate, or High response was assigned a 1, 2, or 3, respectively. Each of these were then averaged and sorted from highest to lowest, with the highest number being the most important knowledge area overall. These results are shown in Table 1 below.

In both the All-Respondents group and the CE only group, the five most important categories of knowledge in relation to the function of their job were found to be Physiological Monitoring, Project Management, General Medical / Nursing Equipment, Medical Imaging, and Presentation Skills. It is notable that for both groups the knowledge areas are identically ranked, although some have different ranking scores. This may indicate that we had a larger percentage of respondents in the CE grouping than in previous survey years.

All Respondents		CE Only	
Knowledge Area	**Rank**	**Knowledge Area**	**Rank**
Physiological Monitoring	2.7	Physiological Monitoring	2.7
Project Management	2.7	Project Management	2.7
General Medical / Nursing Equipment	2.7	General Medical / Nursing Equipment	2.7
Medical Imaging	2.6	Medical Imaging	2.6
Presentation Skills	2.6	Presentation Skills	2.6

Table 1: Importance of Knowledge data for all respondents and Clinical Engineers only

CATEGORIES OF WORK DATA

Respondents were asked to identify the percentage of time they spent on each of the following major categories of work: Technology Management; Service Delivery Management; Product Development, Testing, Evaluation, and Modification; Information Technology (IT) / Telecommunications; Education of Others; Facilities Management; Risk Management / Safety; General Management; and Other. There was a total of 226 responses to these questions, and of that, 202 were from the CE Only group. The results for All Respondents and for CE Only are shown in Table 2.

All Respondents		CE Only	
Categories of Work	**Time Spent (Avg %)**	**Categories of Work**	**Time Spent (Avg %)**
TECHNOLOGY MANAGEMENT	30.28	TECHNOLOGY MANAGEMENT	30.23
SERVICE DELIVERY MANAGEMENT	17.89	SERVICE DELIVERY MANAGEMENT	15.90
GENERAL MANAGEMENT	11.72	GENERAL MANAGEMENT	12.33
RISK MANAGEMENT / SAFETY	11.45	RISK MANAGEMENT / SAFETY	11.75
EDUCATION OF OTHERS	10.33	EDUCATION OF OTHERS	10.42
INFORMATION TECHNOLOGY (IT) / TELECOMMUNICATIONS	9.94	INFORMATION TECHNOLOGY (IT) / TELECOMMUNICATIONS	10.28
PRODUCT DEVELOPMENT, TESTING, EVALUATION, AND MODIFICATION	6.19	PRODUCT DEVELOPMENT, TESTING, EVALUATION, AND MODIFICATION	6.39
FACILITIES MANAGEMENT	5.49	FACILITIES MANAGEMENT	5.53

Table 2: Percent of time respondents spent in the major categories of work

Looking at the data from most time spent to least time spent, the order of the work categories in both sets of results were almost the same. For All Respondents and CE Only, the greatest amount of time is

(Continued on page 4)

Body of Knowledge continued

(Continued from page 3)

spent in Technology Management (30.3% and 30.2%) and Service Delivery Management (17.9% and 15.9%). Also for both groups, the least amount of time is spent in Product Development and Facilities Management. Additionally, we looked at the percentage of time spent in each category of work for each different profession group. When compared to all other groups, the Biomedical Equipment Technician and the Specialist groups spent a greater amount of time in Service Delivery Management (42.0% and 57.5%) rather than Technology Management (18.7% and 41.7%), whereas all the other professions spent the most time in Technology Management (25.5% - 53.3%). When we filtered the responses by position, we noticed a significant variation in the amount of time spent in the IT

Professional Group	EDUCATION OF OTHERS	FACILITIES MANAGEMENT	RISK MANAGEMENT / SAFETY	GENERAL MANAGEMENT
BIOMEDICAL EQUIPMENT TECHNICIAN	10.43	4.92	9.64	5.23
CLINICAL ENGINEER	10.59	5.37	13.21	9.63
CLINICAL SYSTEMS ENGINEER	12.64	5.46	8.00	4.69
HEALTHCARE TECHNOLOGY MANAGER	9.64	5.84	9.97	18.33
MEDICAL EQUIPMENT PLANNER	8.00	4.67	5.83	6.17
SPECIALIST	5.00	10.00		15.00
Grand Total	**10.33**	**5.49**	**11.45**	**11.72**

Table 3: Percentage of time spent in each category of work for each different profession group

category for the Biomedical Equipment Technician, Clinical Engineer and Clinical Systems Engineer. The Biomedical Equipment Technician spent only 8.0% of their time on IT, whereas the Clinical Engineer spent a little higher at 9.1% and the Clinical Systems Engineer is the highest at 18.9% (2nd ranked category of work for that position). The results are shown in Table 3.

RESPONSIBILITIES DATA

Each category of work was divided into specific topics or skills to identify the types of activities respondents were responsible for performing in each of the categories. Respondents were asked to indicate the level of importance in their job for each topic or skill listed. Importance was defined as the measure of both how *critical* the knowledge is to doing your job and how *frequently* you utilize this knowledge. To convert these responses to quantitative data, each response of No, Minor, Moderate, or High was assigned a 0, 1, 2, or 3, respectively. The scores were averaged for each responsibility to get an overall importance ranking.

All Respondents		
Category	**Knowledge Area**	**Rank**
Technology Management	Technology Assessment	2.5
	Project Management	2.4
Service Delivery Management	Service Contract Management	2.2
	Equipment Acceptance	2.0
	Maintenance Software (CMMS) Administration	2.0
	Equipment Repair and Maintenance	2.0
Product Development	Regulatory Compliance Activities	1.9
	Documentation Development / Management	1.8
Information Technology Management	Integration of Medical Device Data	2.1
	Information Technology (IT) Management	2.0
Education	Engineering Education	2.3
	Technician Education	2.2
Facilities Management	Facility Emergency Preparedness Activities	1.4
	Building Plan Review	1.4
	Emergency Electrical Power	1.3
Risk Management	Patient Safety	2.8
	Product Safety / Hazard Alerts / Recalls	2.6
General Management	Policy/Procedure Management/Development	2.1
	Staff Skills / Competency Assessment	2.1
	Performance Improvement / CQI	2.0
	Budget Development/Execution	2.0
	Staffing	2.0
	Personnel Management/Supervision	2.0

Table 4: Activities of highest Importance in each category of work (ALL RESPONDENTS)

The results of the top two responsibilities (or more, if a tie existed) in each of the work categories are shown for All Respondents (Table 4) and CE Only (Table 5). The difference in responsibilities between these two groups is most evident in the Service Delivery Management Category of Work. In Service Delivery Management, for All Respondents, the top responsibilities are Service Contract Management, Equipment Acceptance, Maintenance Software (CMMS) Administration, and Equipment Repair and Maintenance, in that order. For the CE Only group, however, the two categories more directly related to equipment maintenance (Equipment Acceptance and Equipment Repair and Maintenance) drop down on the list and the top two are only Service Contract Management and CMMS Administration.

Also important to note, the top three ranked responsibilities overall for All Respondents and CE Only are Patient Safety, Product Safety/Hazard Alerts/Recalls, and Technology Assessment. Patient Safety continued to receive the highest score of 2.8 out of 3 for both groups, immediately fol-

(Continued on page 5)

Body of Knowledge continued

(Continued from page 4)

CE Only		
Category	**Knowledge Area**	**Rank**
Technology Management	Technology Assessment	2.6
	Project Management	2.5
Service Delivery Management	Service Contract Management	2.3
	Maintenance Software (CMMS) Administration	2.1
Product Development	Regulatory Compliance Activities	2.0
	Documentation Development / Management	1.9
Information Technology Management	Integration of Medical Device Data	2.2
	Information Technology (IT) Management	2.0
Education	Engineering Education	2.3
	Technician Education	2.2
Facilities	Facility Emergency Preparedness Activities	1.4
	Building Plan Review	1.4
	Emergency Electrical Power	1.4
	Building Design	1.2
Risk Management	Patient Safety	2.8
	Product Safety / Hazard Alerts / Recalls	2.6
General Management	Policy/Procedure Management/Development	2.3
	Staff Skills / Competency Assessment	2.2
	Performance Improvement / CQI	2.2
	Budget Development/Execution	2.2

Table 5: Activities of highest importance in each category of work (CE ONLY)

lowed by Product Safety/Hazard Alerts/ Recalls at 2.6 out of 3, which confirms that in the Healthcare Technology field, patient and equipment safety is paramount.

CONCLUSION

The 2021 ACCE Body of Knowledge Survey has collected a significant amount of information that will bring valuable insight into the practice of the CE profession. In addition, the analysis of the data presented in this report allows us to make several significant conclusions about both the data and the survey process, as well as recommendations for future surveys and activities.

There was a significant drop in the number of survey responses (534 in 2018 to 287 in 2021), and there was a decrease by over half in respondents that identify as a Biomedical Equipment Technician. The 2021 survey did take place during a pandemic in which HTM professionals played a critical support role at hospitals, and which led to the cancellation of several in-person local and international conferences, limiting our options to promote the survey for greater participation. Due to these affects, we believe the COVID pandemic greatly impacted participation in the survey.

The majority of the respondents are eligible for the CCE exam (71.6%) and have an engineering degree (59.9%). There was an 11% increase from 2012 in the number of respondents eligible for the CCE exam. Additionally, 75.3% of those not eligible for the CCE exam are currently in CE positions, and over half of the respondents (52.3%) stated they plan on taking the CCE exam in the future. This could indicate that there are more individuals starting their careers as Clinical Engineers and that they will become eligible for CCE examination in the near future. This data confirms the importance of this survey and interest of the field in the CCE exam.

This survey has collected a substantial amount of data and provided valuable, current information about the scope of practice and knowledge in the HTM community and specifically in the CE profession. The U.S. Board of Examiners for Clinical Engineering Certification will examine these survey results and, if needed, update the scope of the Clinical Engineering Certification exam to better match the attributes of the CE profession today. Thank you to everyone who participated in this survey. Your responses have brought beneficial insight and perspective into what we do in Clinical Engineering/Healthcare Technology Management!

For a more in depth look at all of the data and additional analysis, please visit the ACCE website and view the full 2021 Body of Knowledge Survey Report (link).

Katherine Navarro, CCE
BoK Committee
and
Jennifer Nichols, CCE
BoK Committee Chair
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From the Education Committee Desk

The 2021-2022 ACCE Education Webinar series (free for ACCE and Collaborating members) continued with these 2 additional sessions:

On April 21st speakers Morgan Ayers-Comegys and Binseng Wang, presented "An Objective Capital Equipment Replacement Method" considering 4 sets of variables.

At the May 12th session Samantha Jacques, led a discussion on the purpose and intent of contracts as well as the different types of contracts Clinical Engineering Departments may be involved in.

If you missed either of these live sessions, check out the on-demand recordings at https://accenet.org/publications/Pages/ACCEWebinars.aspx

Register today, so you don't miss the last session of the 2021-2022 Educational webinar series when Izabella Gieras and Tim Zakutney will be sharing their career progression to more senior positions and provide guidance and suggestions on how you too can move up the career ladder.

Pre-registration is required!

ACCE Members, register for free here.

Non ACCE members, pay and register here.

During the summer, the Education Committee will be working to prepare for the 2022-2023 Education Webinar series. If you are interested in joining forces and extend a helping hand to the committee, please complete this volunteering form.

For additional information, go to https://accenet.org/NewsEvents/Pages/Webinars.aspx

Tony Cody & Nader Hammoud
Education Committee co-chairs
educationchair@accenet.org

Suly Chi
Webinar coordinator

International Committee Report

The International Committee (IC) held its third 2022 bimonthly meeting on May 16, 2022. At this meeting, the chair reported that the Board has approved the mutual collaboration and assistance agreement proposed by IC between ACCE and the German CE association (Fachverband Biomedizinische Technik e.V. – FBMT). The agreement has been sent to FBMT for their signature and then will be signed by the ACCE leadership. This agreement represents the 19th agreement that ACCE has established since 2019, thus augmenting the ACCE membership to over 25,000 worldwide by including the members of the collaborating organizations.

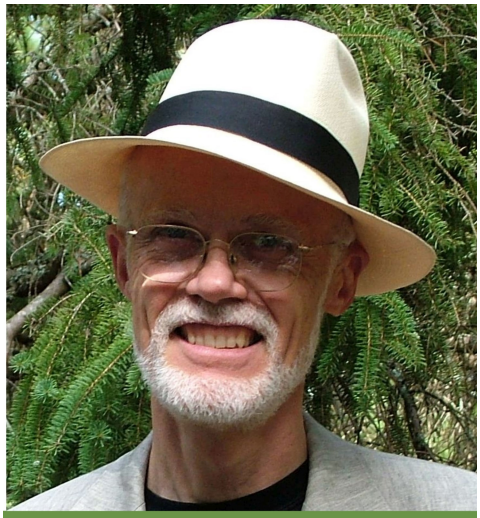
In response to a request for assistance by the Lebanese CE association (HTMA Lebanon), IC is pursuing a discussion with that organization to help mentor university students and young professionals by introducing them to ACCE members willing to provide such guidance. When the details are worked out, IC will reach out to all ACCE members for volunteers. ACCE members who may be interested in offering such guidance should contact Salim Kai or Binseng Wang.

Per invitation by the Japanese CE association (JACE), the IC made arrangements for Nader Hammoud to deliver a presentation on "Clinical engineers involvement facing COVID-19" on May 15th. This presentation was made through a pre-recorded video followed by a live, online Q&A session. Our most recent webinar under a collaboration agreement was delivered by Binseng Wang on May 24th per the request of the South African CE association (CEASA). This presentation was entitled "Fundamental Concepts and Tools for Managing Financial Resources." Additional webinars with other national associations are being planned but have not been scheduled.

The current list of webinars being offered is available on the ACCE's website: https://accenet.org/International/Pages/Webinars.aspx. ACCE members who are not IC members are welcome to consider offering webinars they believe are of potential interest to our foreign colleagues. Interested persons should contact one of the IC members (see list on https://accenet.org/International/Pages/Default.aspx) and provide a short description similar to what is available on the ACCE webpage. Potential presenters are reminded that such activities are strictly voluntary and do not involve any honoraria.

Binseng Wang
IC Chair
International.chair@accenet.org

ACCE 2022 Hall of Fame Inductees



William Gentles, PhD
2022 Inductee

Congratulations to Bill Gentles, PhD, for his induction into the ACCE Clinical engineering Hall of Fame. Bill has been inducted into the Hall of Fame in recognition of his significant contributions to the advancement of the profession in several key areas: He has had a long, impactful career as a clinical engineer for over 50 years, selflessly contributing to and influencing the profession at the local, national, and international levels. Bill obtained his Doctor of Philosophy from the University of Toronto in Biomedical Engineering. Following graduation, he started up the Biomedical Engineering department at Sunnybrook Health Sciences Centre in Toronto, Ontario, Canada as the Director of Biomedical Engineering. For 29 years, he pioneered the engineers' interface with in-hospital medical technology, forging the path for others to follow.

Bill has been a force to reckon with even in retirement, where his passion for innovation, influence and reach has benefited Canada at most, and overall the world, in Clinical Engineering. He has applied his knowledge in many low resource countries, including Mongolia, Nicaragua, Ecuador, Kosovo and Ghana. His consulting work as vice president of BT Medical Technology Consulting in Toronto, Ontario Canada, relates primarily to equipment planning for hospitals, policy development and incident investigations in which medical equipment is involved. Bill is one of the co-authors of the original

Matthew F. Baretich, PhD
2022 Inductee

Congratulations to Matt Baretich, PhD, for his induction into the ACCE Clinical Engineering Hall of Fame. Matt has been inducted into the Hall of Fame in recognition of his contributions to the advancement of the profession in several key areas: He has been one of the most influential pioneers and industry leaders in clinical engineering for the past four decades.

By way of his writings and presentations throughout his long career, Matt's thoughtful and innovative approach has helped shaped today's clinical engineering industry concepts. These concepts include such areas as scaling HTM services to an organization's needs, patient safety, incident investigation, benchmarking, maintenance management, and risk management.

Matt is the author of numerous authoritative guides on topics ranging from electrical safety, to CE benchmarking, to computerized maintenance management systems, to forensic engineering, and alternative maintenance management processes among others. He has served on the editorial review board of clinical engineering, forensic engineering and healthcare engineering publications where he has helped curate and ensure that the best and most relevant content gets to a readership in need of the latest word in their profession.

Matt's reputation and influence have extended well beyond his employment in the U.S. and Canada. He has written and edited clinical engineering material for the World Health Organization (WHO) and has taught at more than a half dozen international ACCE advanced clinical engineering workshops (ACEW). Matt has also helped the clinical engineering community by reaching out and actively working with organizations representing other professionals (e.g., healthcare engineers, risk managers) thereby demonstrating clinical engineering's value to the broader healthcare community. For four decades, Matt has been a caring and valuable colleague to a great many in the CE and HTM community.

Gentles continued

"Clinical Engineering Standards of Practice for Canada". He has worked as a consulting engineer, on coroner reports and as an expert witness, lending his expertise in this niche area of engineering.

Bill's passion and dedication for both humanitarian and clinical engineering (CE) efforts around the world is innovative. He has been the leader of the CMBES's "Tools for Techs" project since 2017, which has provided crowdsourced cash grants to frontline HTM professionals in Ghana, Mongolia, Tanzania, and Rwanda to purchase badly needed tools so they can be more effective in their roles. He also has administered the INFRATECH International Email Discussion Group on CE/HTM sponsored by the World Health Organization and the Pan-American Health Organization for nearly 20 years. He also co-founded Ontario Surplus Hospital Equipment Network (OSHEN) which provides a platform designed to connect healthcare organizations with verified charities or not-for-profit organizations who are looking for usable hospital equipment for donation.

ACCE at AAMI Exchange 2022: San Antonio, TX

ACCE is a Contributing Organization for AAMI Exchange 2022. ACCE members are eligible to register for the conference at discounts off the non-member registration fees. Email this form to receive ACCE members' discounted rate.

Attend these ACCE co-sponsored, can't miss events at AAMI Exchange

Clinical Engineering Symposium – Presented by ACCE

The 3 R's Round Table – Recruitment, Retention, Recognition

Register here

Sponsored by: crothall healthcare, A COMPASS ONE HEALTHCARE COMPANY

Date: Saturday, June 04, 2022, 7:30AM-10:15AM
Location: Henry B. Gonzalez Convention Center, room 006 – San Antonio, TX
Coffee and pastries: starting at 7:15 am
Speakers: Angela Bennett, Perry Kirwan, Nader Hammoud, Codi Nelson

Symposium description: Struggles acquiring and retaining qualified HTM/CE professionals are being felt by everyone around the world. How can we improve recruitment efficiencies, refine strategies for employment retention, and appropriately recognize HTM/CE professionals? Come to share your thoughts, your lessons learned, and your best practices. Make your Voice heard!

Education Session, presented by ACCE: The New Customer Service

Date: Sunday, June 5, 2022, 9:15am – 10:15am
Location: Henry B. Gonzalez Convention Center
Speakers: Eric Aring, Mayo Clinic & Keith Whitby, Mayo Clinic

Session description: With the rise of service automation customers expect speed, communication, and low friction service. While this may be getting easier to deliver it is in direct conflict with making customers feel valued and maintaining the customer connection which is a critical component to customer service and HTM operations. Join us to discuss how changes in technology and expectations have changed how we interact with our customers, discuss how we can use our processes, tools and emotionally intelligence to improve our customer experience.

ACCE at AAMI Exchange 2022: San Antonio, Tx

ACCE's 32nd Members Meeting and Awards Reception

Saturday, June 04, 2022, 7:30PM-10PM
Grand Hyatt San Antonio
600 E Market St, San Antonio, TX 78205
Room: Texas A
RSVP here

Join us for an evening of networking with your peers and to congratulate the 2022 Advocacy Awards winners and the Clinical Engineering Hall of Fame inductees

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2022 CCE Oral Exam

ACCE Healthcare Technology Certification Commission

June 2-3, 2022

Location: Grand Hyatt San Antonio, 600 E. Market St, San Antonio
Rooms: Travis A, Travis B, Travis C, Travis D

Please confirm your Oral exam schedule with HTCC Secretariat certification@accenet.org

Student Paper and Scholarship Winners

Congratulations to the 2022 Student Paper Competition winner, Christopher Gray, University of Ottawa, Canada, in the US/Canada Master Division, for his paper, "Building a clinical engineering department: A novel metric-based approach to staffing and workload balancing" https://accenet.org/about/Pages/StudentPaperCompetition.aspx.

Congratulations to the 2022 ACCE Student Scholarship winner, Charlotte Cooperman, University of Connecticut and Clinical Engineering Intern at Yale New Haven Health System in New Haven, CT.

Welcome New ACCE Members

We welcome our newest members, approved by the Membership Committee, and supported by the Board of Directors:

Name	Class	Job Title	Organization	Country
Sooraj Lohithakshan	Individual	Medical Equipment Planner	Hamad Medical Corporation	DOHA/QATAR
Fernando Brito Bispo	Student	Graduate Student	UNFRJ	RJ/Brazil
Scott Skinner	Corporate/Individual	Sr. Project Officer	SODEXO HTM	PA/USA
Jermaine Abapo	Individual	Biomedical Engineer	Stanford Health Care	CA/USA
Marion Wilcox	Corporate/Associate	Sourcing Manager	ISS Solutions, Inc.	PA/USA
Kim DeMark	Corporate/Associate	Contract Analyst	ISS Solutions, Inc.	PA/USA

And congratulations goes to the following member who was upgraded to Individual Level:

Michael Sarabian, Sr. Clinical Systems Engineer at Kaiser Permanente, California

CCE Exam Prep: CMMS

In this column we are providing sample questions and information regarding preparation for the CCE exam. The sample questions are based on topics from the ACCE Body of Knowledge survey and the CCE Study Guide, version 10. Note that the instructors for the ACCE CCE Prep courses, and the writers for this column, do NOT have any affiliation with the CCE Board of Examiners and have no access to the actual exam questions. If you have specific topics you would like us cover please contact editor@accenet.org.

Computerized Maintenance Management Systems (CMMSs) are used by Clinical Engineering (CE) departments to maintain a computerized medical equipment inventory and collect, store and analyze data on the repair and maintenance and other activities (e.g., network integration) for the devices and systems on that inventory. This data is used for CE department, equipment selection, scheduled and unscheduled work order control, cost control, regulatory compliance, and overall HTM program quality control. CMMSs are typically networked and usually available to all CE staff, sometimes including including interfaces to test equipment and applications on mobile devices (e.g., smart phones, laptops). CMMSs may also include many other features that assist the CE department such a RTLS, recalls and alerts, network information for connected devices, and much more.

Question 1: A. Your CMMS shows you have an inventory of 56,400 medical devices for year 2021. During FY 2021 you took over service on 25 anesthesia machines. You currently have on staff 30 technicians with a calculated staff available device hour of 1,428. How many FTE will you need to add to your department in 2021 to service your inventory for the upcoming year?

A. No Increase Needed
B. 2.2 FTE
C. Reduction of .08 FTE
D. 1 FTE

Correct Answer: A

Explanation: One method for determining staffing full time equivalent (FTE) is dividing the number of medical devices by the staff available hours. Staff available hours should account for holidays, vacation, sick leave, and breaks:

Work hours in a year (40 hour work week): 2080
Holidays @ 1 day per month = -96
Vacation @ 1 day per month= -96
Sick Leave @ 1 day per month= -96

Available Hours = 1792

Breaks @ (2) 15 min breaks per day= -112

Available Productive Hours @ 85% = 1428 hours per tech per year

Based on this model and prior to adding the new devices, it required (56,400) / (1,428) = 39.49 FTE (rounded to 39.5 FTE). When 25 devices are added to the existing 56,400 devices, this results in 56,425 devices for the department. (56,425) / (1,428 available hours) = 39.51 FTE (rounded to 39.5 FTE). Therefore, this would result in no additional staffing for the department. Other common methods for considering FTE are:

- Number of Beds per FTE
- Number of Equipment Pieces per FTE
- Total Acquisition Cost per FTE
- FTE Calculator, FTE = (number of pieces of medical equipment) x (time needed for maintenance, service, repair per device) / (hours available per FTE)

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https://accenet.org/publications/Downloads/Reference%20Materials/PMandot_Biomedical%20Engineering%20Dept%20Staff%20productivity%20Analysis.pdf, Accessed 5/13/2022

Question 2: Your CMMS data shows your facilities medical equipment acquisition cost is $200,000,000 and the department has a COSR of 6%. What is the Total Cost of Service?

A. $120,000,000
B. $10,200,000
C. $12,000,000
D. None of the above

Correct Answer: C

Explanation: The cost to maintain medical equipment is important. As hospitals vary in size and complexity, the maintenance cost of medical equipment can vary. To compare how Healthcare Technology Management (HTM) programs are functioning and find ways to achieve cost savings, cost of service ratio was developed. The cost of service ratio (COSR) calculation is as follows:

COSR = Σ (Annual Cost of Maintenance) / Σ (Acquisition Costs of the Assets)

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In Memoriam: George Johnston, Clinical Engineering Pioneer

George I. Johnston, M.S., PE, CCE, FACCE, clinical engineering pioneer, passed away on May 12, 2022, at the age of 92. George was one of the "founding fathers" of the clinical engineering profession. His career spanned more than 60 years, starting at Johns Hopkins and the National Institute of Health (NIH), moving to University of Oregon Medical School and Hospital for 30 years, and then the latter part of his clinical engineering career consulting, and teaching throughout the world.

Early career

Just six months out of high school, in 1948, George's career began at Johns Hopkins School of Medicine where he started as a "medical electronics technician" in one of Hopkins numerous, small, research-focused shops building customized electronic research devices. George worked for Hopkins until 1955 on many different projects including stimulators for nerve-muscle response studies on patients with myasthenia gravis.

While at Hopkins, George attended night school at Hopkins Homewood campus pursuing a degree in electrical engineering. He graduated in June of 1955 and obtained a job at the National Institute of Health (which also satisfied his military obligation of that time - Korean War) in what was to become the Biomedical Engineering Development Branch. The work consisted of about fifty percent repair and fifty percent design and fabrication of new original instrumentation for the various institutes' researchers.

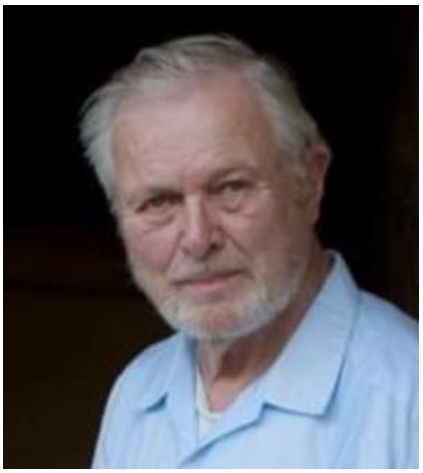
One of the first projects George became involved with was the evaluation of an extracorporeal pump for open heart surgery. They had acquired a pump manufactured in England that employed paddles that squeezed the tubing carrying the blood in a manner which produced a pulsatile flow much like that of normal heart activity. The question being asked at the time was whether pulsatile flow was necessary or would continuous flow from a much simpler rotary pump be just as effective? The department engineers proceeded to design a rotary pump to be fabricated in the machine shop and employed in a comparison study. The rotary pump was found physiologically satisfactory, much simpler to fabricate and operate, and thus became the standard design for all future heart-lung machines.

During George's three years at NIH he gained enormous experience in instrument design at a time when new technologies including transistor technology were blooming. He had already acquired considerable experience servicing many battery powered medical devices and considerable vacuum tube and semiconductor technology experience. This work resulted in one of his first of many published journal articles with a paper published on electronic circuits with zener diodes to eliminate batteries in the Journal of Applied Physiology in 1958. (George went on to publish over 40 peer-reviewed manuscripts and articles throughout his career and countless presentations).

At NIH, George did a considerable amount of work with Chinese neurophysiologist. Dr. Cho Lu Li. They made some small passive radio frequency receivers implanted in the abdomens of primates with leads extending up to electrodes placed on motor cortex areas. Then, with the primate strapped in a chair, they would beam an rf signal at him to observe the muscular response. Later at NIH, George was involved in the design of a system to scan for thyroid tumors using a photomultiplier tube and gold collimators.

Oregon University Hospital and Medical School

While vacationing in Oregon in the summer of 1957, George visited the University of Oregon Medical School in Portland. He had learned a former NIH researcher was now on the faculty there and decided to look him up. It was at a time when the Medical School research faculty had an interest in establishing an in-house instrument support facility. His years at Johns Hopkins convinced him to stay in the academic (university) field and his years at NIH helped him decide he wanted to stay in the yet-to-be named profession of biomedical engineering. The University had been receiving some support service from a few local technical artisans and from local industry, but most repair work for commercial instruments had to be shipped out, often as far as San Francisco or Chicago. With George's experiences at Hopkins and NIH, and his credentials as an electronics and "biomedical" engineer, he was promptly offered a faculty position to establish an instrument support operation at the University, which he accepted and started in 1958. By 1962 he had grown his department to six staff and a new 2,200 square foot shop in a new Research Building.



George I. Johnston
May 29, 1929—May 12, 2022

Their department was kept busy with repairs and original instrument development. One R&D example was in 1959 when George was approached by a cardiac surgeon experimenting with artificial heart valves. Dr. Albert Starr and a local engineer, Lowell Edwards, were experimenting with a mitral valve replacement in dogs. But none of the dogs survived for more than two hours. The valve consisted of two hinged flaps and the problem was that blood pooling around the hinge clotted and eventually blocked that valve action. George suggested to Starr that they use a caged ball valve like that developed by Hufnagel at NIH. Dr. Starr asked that George's department build him one and they did. After he implanted that one he came down to delightedly report that the dog had survived for eight hours! And at that point Edwards started making ball valves, which eventually were marketed as the Starr-Edwards mitral valve replacement. By 1965 staffing in George's department had grown to twenty technicians and engi-

(Continued on page 13)

George Johnston continued

(Continued from page 12)

neers. Business, mainly from the researchers, and a little from the hospital, was booming.

During the 1960s while George continued to grow his department there, the University also supported his efforts to present and publish some of his, and his department's, work at various professional meetings. At these meetings, George met many colleagues who were doing similar work at other universities throughout the US. These meetings eventually evolved into the development of IEEE's Alliance for Engineering in Medicine and Biology, and the Association for the Advancement of Medical Instrumentation (AAMI).

In the late 1960s, government funding for basic research lagged and funding was more focused on clinical applications. Electronic instrumentation was proliferating throughout the hospital, particularly in intensive care units and the operating room. In 1970, Ralph Nader prompted the electrical safety "scare" claiming patients were being electrocuted by leakage currents from unsafe medical devices. All, these changes prompted a push to add technical resources into hospitals, and eventually, recognize the engineering specialty of clinical engineering. Also, eventually, these changes prompted the development of a clinical engineering certification process, started by AAMI, and currently managed by ACCE.

At the annual IEEE Alliance, and later AAMI, meetings George became acquainted with a growing number of biomedical engineers and technicians and many were now referring to themselves as "clinical" engineers. A core group began to share experiences and management strategies to improve their hospital departmental operations. And in1975 a publication devoted to our profession, the Journal of Clinical Engineering began publishing. By 1983, more than 90% of George's department's business came from the University Hospital and their department became part of the hospital and moved into the basement of the hospital, like most other clinical engineering shops in the country.

In 1985 Manny Furst pulled together a small group for the first Biomedical Engineering Conference on Cost-Effective and Productivity at the Massachusetts General Hospital in Boston. Thus began a new collaboration venue for clinical engineers. A few years later (1988), George retired from the University of Oregon Hospital, but that hardly meant that he was retired. He went on to a long next-career traveling the world consulting and teaching Clinical Engineering.

CE throughout the World

George then seriously became involved in international Clinical/Biomedical Engineering with one month assignments for Project Hope in Jamaica and Poland. George continued his international CE activities with projects in Saudi Arabia, teaching biomedical engineering for one year in China for Project Hope, and other projects in China including managing the organization and conduction of the first (1989) and second (1990) "Annual Conference on Biomedical Engineering Training and Education in China". In 1992, George did a one-year biomedical engineering education and training project for an NGO in Guyana, and subsequently participated in workshops and short term assignments in Egypt, Kuala Lumpur, Singapore, Belize Kosovo, Kenya, India, Tanzania and Ecuador for a variety of organizations.

A few more stories

George was full of stories. One story, published in the ACCE website blog (link) regarded an early catheter. " … Charlie Dotter, professor and head of the University of Oregon) Medical School's radiology department, was a hyper guy full of ideas. He had a patient with a lower limb blockage and had the idea that 'if we could just insert something in that vessel with an auger to break through that blockage." So my shop gave it a try with a speedometer cable and a hand formed augur welded on the end. And it worked!' …".

The following are some stories about George from a few of the contributors to this article:

From Kevin Taylor in Canada's Northwest Territories: In 2005 I needed to have someone cover the Biomed shop up here for 3 months. George and Arlene were all in on the idea of coming up here for the summer. Sadly the work visa fell through! The Government forced me to do a job interview so I got a kick out of getting to interview a nervous George Johnston since he confessed he hadn't done a job interview in 50 years. It was also wild having someone answer technical questions with statements like "well when I helped design the first ….". Getting to do that job interview is one of the highlights of my career!"

From Antonio Hernandez: In Octo ber 2000 George traveled to Belize for a three-month assignment with PAHO, and he and Arlene got stranded in Cancun for a week because of Hurricane Keith. He wanted to start his work as soon as possible knowing that Belize 's hospitals were hit hard. He once said about the experience: "Arlene and I were delayed a week getting to Belize because of Hurricane Keith. However, we were stranded for that week in Cancun, which wasn't all bad, but a little boring after the first five days. Believe it or not, neither of us enjoys five-star hotel living for very long".

From Yadin David: When Bob Morris wrote in 1985 a lecture outline for teaching troubleshooting methods, George edited it and inserted a section he called "Don't add to your problems." When I expressed my amazement, in the summer of 2014, of the magnitude of the material pertinency after about 30 years George responded, " Yadin, it is mostly fundamentals and fundamentals don't go out of date." Just like his daughter Kimberly wrote so beautifully (link), "I feel blessed to have met such a special man, engineer, scientist, teacher, husband, father, and good friend. He will be greatly missed."

Our condolences and prayers to his family. We'll all miss you George!

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Editor's note: Thank you to all who contributed to this article including Suly Chi, Yadin David, Tom Judd, Malcolm Ridgway, Kevin Taylor, Antonio Hernandez, and of course, George Johnston, since much of this material is from his own writings.

Reference: The information from the start of George's career through his retirement from OHSU in 1988 was excerpted from "Personal recollections of the evolution of the profession" - by George I. Johnston, Accessed on 5/21/22.

AAMI Update: New Documents for HTM and RM

AAMI recently published two new documents that clinical engineers, healthcare technology management professionals, and medical device manufacturers will want to explore.

Medical Device Work Order Types Standardized

Following an early first success with the standardization of healthcare technology management (HTM) failure codes, a new white paper from the AAMI-sponsored CMMS Collaborative project has been published to create a standard categorization for all work activities carried out by HTM personnel.

Up until now, there has not been a standard approach for using the "work order type" field that is found in most computerized maintenance management system (CMMS) software.

"The HTM community has been rather inconsistent in how they configure them, what data they associate with them, and what is done with the data," the white paper reads. "It was agreed that the types and data associated with them could not readily drive management decision-making because of these inconsistencies."

On a high level, the new white paper outlines best practices for differentiating between maintenance and non-maintenance activities in most CMMS databases. This can help managers optimize their maintenance schedules or craft Alternative Equipment Maintenance (AEM) programs as needed.

"What makes this effort different is that we've got the suppliers who build the tools that use these codes agreeing to this standardization," said Matt Baretich, one of the white paper's authors. "Their customers are looking for best practice for using these deeply customizable management systems, and now there is one."

Standardizing the data that HTM departments collect "also opens the door for CMMS data to be of value to the larger organization as well," added Carol Davis-Smith, vice chair of clinical engineering of the AAMI Board of Directors and principal of Carol Davis-Smith & Associates.

Davis-Smith, who worked with Baretich to make this second white paper a reality, explained that consistent data from HTM departments will enable the setting of benchmarks for comparing program success between health system locations and service providers. Additionally, a long-term goal for the project team is better informed policy. With robust data, the HTM community and CMMS suppliers can work with regulators in a more proactive manner than is currently possible.

The new white paper Optimizing the CMMS Work Order Type Field was sponsored by the Association for the Advancement of Medical Instrumentation (AAMI) and represents the insights of a CMMS Collaborative made up of experts from Accruent, EQ2, MediMizer, Nuvolo, Phoenix Data Systems, and TMA Systems. It can be downloaded at aami.org

MedTech Guidance on Risk Management for AI, Machine Learning

The second document is a consensus report (CR) for identifying, evaluating, and managing risk for healthcare technology that incorporates artificial intelligence (AI) or machine learning (ML).

AAMI CR34971:2022, Guidance on the Application of ISO 14971 to Artificial Intelligence and Machine Learning, responds to an urgent, immediate need. Existing standards for regulated medical devices do not yet adequately address the potential risks of emerging AI and ML applications, which "could jeopardize patient health and safety, increase inequalities and inefficiencies, undermine trust in healthcare, and adversely impact the management of healthcare," the CR states.

For those familiar with the widely used international standard, ISO 14971:2019, Medical devices—Application of risk management to medical devices, AAMI's CR is a must-have companion for risk management of AI- or ML-enabled medical systems and devices.

"We intentionally structured the CR to be easy for people that know 14971 to use," said Pat Baird, co-chair of the AAMI Artificial Intelligence Committee and senior regulatory specialist at Philips. "Readers are probably aware of the existing companion document, 24971, which provides guidance on how to use 14971. We modeled the structure of 34971 to be similar to a section in 24971 about risk management for in vitro diagnostics. The idea is that the risk management process is the same, and here are a few new ways that this particular technology can fail that you might not have thought about."

Baird is part of a small task force of the AAMI Artificial Intelligence Committee that developed CR34971, which was reviewed by the full committee and by risk analysis experts at the British Standards Institute (BSI). The committee then approved the consensus-driven report. AAMI and BSI plan to use this CR as the basis for an AAMI technical report and a British Standard.

"We hope to complete the AAMI technical report and the BSI standard sometime this year," said Joe Lewelling, senior advisor on content and strategy at AAMI. "The AAMI committee," which includes clinical, manufacturing, regulatory, information technology, and risk management expertise, "is working hand in hand with a similarly focused BSI committee on these documents."

Longer term, AAMI and BSI expect to propose these resources to the International Standards Organization as guidance, informative, or annex documents to ISO 14971 or ISO 24971.

Learning from Other Industries

To develop the CR, "we conducted a literature review for ML failures in multiple industries, in an attempt to learn from others that have gone before us," Baird said.

Additionally, the task force reviewed prepublication documents from ISO/IEC JTC 1 / SC 42, a subcommittee of a joint technical committee on artificial intelligence that is developing a series of horizontal (cross-sector) standards that address such issues as bias management.

The CR offers insights into how risk management systems and processes

(Continued on page 15)

ECRI Perspectives: McLaren wins ECRI's Health Technology Excellence Award

It's been too long! Hello from your engineering friends at ECRI, where we're packing our bags for San Antonio and the AAMI Exchange as I write this. As we wade through False Spring, Second Winter, Almost Spring, Unreasonably Summerlike, Third Winter, and Mud Season here in scenic Plymouth Meeting, we've got the following on our minds:

We have a winner! McLaren Northern Michigan has been named the winner of ECRI's 2022 Health Technology Excellence Award (formerly Health Devices Achievement Award) for their innovative integration of patient-care technologies into new hospital construction.

McLaren facilitated collaboration among a wide range of vendors, including companies that provide high-quality solutions within specific areas of expertise, namely nurse call, patient monitoring, staff communications, electronic medical record (EMR), real-time locating system (RTLS), patient safety, virtual nursing, patient education, Internet Protocol television (IPTV), and patient interaction and entertainment. "We put considerable thought into which technologies would be used in those spaces, how those technologies would interact with one another, and what implementation measures would be required to ensure that the technologies functioned well together," said Rich Reamer, regional manager of clinical engineering at McLaren Health Care.

To succeed with their clinician/patient-centric vision, McLaren needed to select product solutions that used an open architecture as well as vendors who would collaborate in connecting different systems. The initial meeting with vendors was a critical first step. Together, they developed an integrated system offering nine total systems working in either total integration, or in support of safety and quality outcomes for the hospital's patients.

"In many aspects, creating a healing environment is just as important as treating and caring for our patients," said Chad Grant, chief operating officer at McLaren Health Care. "The innovation and follow-through displayed by the McLaren Northern Michigan team to develop and implement these technologies were truly remarkable and deserving of this recognition, and it affirms our forwarding-thinking mentality in developing a patient-centric experience at our facilities."

This year, ECRI received award entries from hospitals in the United States, as well as internationally, including from Columbia, India, Pakistan, New Zealand, and Canada.

We have (another) winner on-staff! We are so proud of Senior Project Engineer Priyanka Shah for winning both the ACCE/HTF 2022 Marv Shepherd Patient Safety Award and also the AAMI Young Professional Award. Priyanka was recognized for her substantial contributions to patient safety and for her exemplary professional accomplishments and commitment to the healthcare profession. She is our lead subject matter expert on physiologic patient monitoring, alarm management, EHR usability, and telehealth, and can be found performing medical device evaluations, investigating system failures, developing practical guidance for healthcare facilities, conducting accident investigations, and consulting with healthcare facilities on pre-purchase selection, and appropriate use of medical equipment and health IT systems. If you're heading to the AAMI Exchange, please join us in congratulating Priyanka and wishing her well.

Is your facility sending consumer-grade blood pressure monitors home with patients or receiving data from them? MIR eHealth and uHealth just published a summary of ECRI's systematic review of consumer devices for patient-generated health data where we analyzed 49 studies utilizing 41 different types of consumer-oriented BP monitors for managing hypertension. In general, use of these monitors offered small benefits in terms of BP reduction with fairly high ease of use and satisfaction ratings, however, adherence ranged widely.

I hope we're able to connect in person this year! But, in the meantime, wash your hands, keep on excelling, and, as always, tell us what you're seeing.

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AAMI continued

(Continued from page 14)

can be adapted for AI and ML medical devices. It also details safety-related characteristics and considerations in five areas:

- Data management
- Bias
- Data storage, security, privacy
- The dangers of overtrust in AI
- Adaptive systems

The CR includes informative annexes covering the risk management process, risk management examples, considerations for autonomous systems, and personnel qualifications.

For example, personnel qualifications apply to people developing AI- or ML-enabled products. "One of the things we noticed in the literature about ML systems is that many times failures occurred because, although the development team had data, they didn't have knowledge," Baird said. "Developers had logical assumptions regarding the use of their product, but the reality was different, leading to failure. To be successful, we really need to understand the context of use and leverage the wisdom around us. We felt it was important to stress this point when discussing risk management."

AAMI staff

IFMBE Clinical Engineering Division (CED)

Supporting the growth and sharing of best practices in Clinical Engineering in LMICs

The following is an excerpt from "Biomedical engineering in low- and middle-income settings: analysis of current state, challenges and best practices", Health Technology. (2022). https://doi.org/10.1007/s12553-022-00657-8

Supporting the growth and sharing of best practices in Biomedical Engineering (BME) and Clinical Engineering (CE) can constitute a transformative strategy towards better health, through universal health coverage and more equitable and accessible medical technologies, especially in limited resource settings.

Best practices can be drivers of change – accelerating progress and inspiring role models – and may involve multiple dimensions including scientific-technological issues, hedonomics, learning/teaching approaches, management of physical and human resources, and implementation of relevant regulations.

Thanks to the support of the UBORA community and the IFMBE and IFMBE Clinical Engineering Division (CED) global community, a questionnaire was designed to assess the current state-of-the-art of BME and CE in LMICs through the perceived impact, maturity and implementation challenges of its multifaceted dimensions (mature and forthcoming technologies, design methodologies, education, regulations, and policy making). The questionnaire was administered to professionals with recognized experience in the field of BME/CE and its application to LMI settings, thanks to the contribution of IFMBE, IFMBE CED , EAMBES, E4C and ABEC.

Considering perceived relevance, maturity, and feasibility in LMI settings, a pragmatic agenda can be drafted including i) medical technologies for child/maternal health and for sterilization; ii) e-health and m-health; iii) sharing e-platforms for co-design with engineers and healthcare professionals; iv) open educational resources and capacity building for educators; v) standards addressing the new co-design methodologies and the specificity of LMI settings; and vi) cross border actions both in monitoring health issues and the potential of new technologies.

This agenda reflects some of the best practices currently in action in different low resources settings, but also reflect the common underestimation of a clinical need, such as mental health, or the obstacles to local production of safe medical technologies, or the difficulty for local training PhD students and transformative professional profiles.

Full paper available here: https://link.springer.com/article/10.1007/s12553-022-00657-8

Reference: De Maria, C., Díaz Lantada, A., Jämsä, T. *et al.* Biomedical engineering in low- and middle-income settings: analysis of current state, challenges and best practices. *Health Technol.* (2022). https://doi.org/10.1007/s12553-022-00657-8

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The vision of the Journal is to become the preferred international forum for facilitating the exchange, knowledge sharing, and engagement of practitioners across the globe. We will achieve that vision through a diverse range of high quality contributions of professionals from across the domains of clinical engineering, health-related technology, informatics and patient-care outcomes.

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ACCE CALENDAR

https://accenet.org/NewsEvents/Pages/Calendar.aspx

2 June 2022: CCE Oral Exam, by appointment only

3-6 June 2022: AAMI Exchange 2022, San Antonio TX

4 June 2022: Clinical Engineering Symposium by ACCE @AAMI Exchange 2022. Please reserve your spot: https://www.surveymonkey.com/r/2022CESymposium

4 June 2022: 32nd ACCE members meeting/awards reception, in San Antonio, TX

5-23 July: ACCE Board election

12 –17 June 2022: IUPESM World Congress 2022, Singapore

16 June 2022: 12:00 PM-1:00 PM Session 10: Climbing the Clinical Engineering Career Ladder - Value of certifications and keys to gain management experience. Location: Online

30 June 2022: Last day to renew 2022 CCE

8 September 2022: 2022-2023 Educational Webinar Series, session 1

17 April 2023-21 April 2023: HIMSS 2023. McCormick Place, Chicago, IL

16-19 June, 2023: AAMI Exchange 2023, Long Beach ,CA

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