

Women in Clinical Engineering Project



STORIES OF WICE

OCTOBER 2024



IFMBE

Clinical Engineering Division

Women in Clinical Engineering Project

Stories of WICE

About the Women in Clinical Engineering Project

By Fabiola Martinez Licona - Samantha Alvarado Jalomo
Mexico

The Clinical Engineering Division (CED) of the International Federation of Medical and Biological Engineering (IFMBE) has 611 collaborators across six regions of the world, as seen in Figure 1, 30.23% of whom are women. Since July 2022, Fabiola Martínez-Licona has represented the IFMBE CED as Board Chair, becoming the first woman and the first Latin American woman in this position. During her term, in 2023, she created the Women in Clinical Engineering (WICE) Project, an initiative supported by 19 collaborators who make up the WICE team, a group committed to overseeing the project by promoting, participating in, and collaborating on WICE activities, as well as proposing and leading actions.

The WICE Project aims to acknowledge, disseminate, and analyze the contributions and achievements of women in the Clinical Engineering field, as well as to encourage girls and young women to pursue careers in this field. With this motivation, in 2023, the WICE team initiated the following activities:

- **WICE: Call for Case Studies and Stories.** An invitation to our female colleagues to contribute with either a case study—a structured investigation that documents how they address a problem using supportive evidence—or a story—a free-form document to share and celebrate experiences and achievements, including challenges faced and how they were overcome.
- **WICE: Publications Repository.** A database to collect contributions to the Clinical Engineering field by women authors, or teams that include at least one female author.
- **WICE: your lens, your story.** A virtual gallery to give Clinical Engineering a global platform, helping others understand the profession and practices worldwide, and acknowledge the importance of women Clinical Engineers' role through their contributions, actions, and efforts.

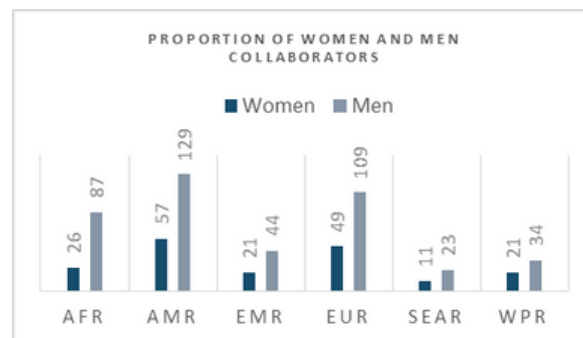


Figure 1. IFMBE-CED Collaborators until October 2024 from: African Region (AFR), Americas Region (AMR), Eastern Mediterranean Region (EMR), European Region (EUR), South-East Asian Region (SEAR) and Western Pacific Region (WPR).



Regarding the initiatives, particularly the **WICE: Call for Case Studies and Stories**, in 2023 we held three consecutive calls to gather contributions from colleagues worldwide throughout the year. As a result, we received 45 contributions—13 case studies and 32 stories—from 21 countries as shown in Figure 2:



Figure 2. Countries from which we received contributions for the Call for Case Studies and Stories in 2023.

Stories of WICE, a name that nods both to our project and to the word “wise”—reflecting the knowledge shared throughout, is a compilation of the 32 stories gathered in 2023.

In the following pages, you will read stories about how the authors discovered the Clinical Engineering profession, how they chose their career paths and started pursuing them. Their day-to-day work activities, the challenges they faced, and their decisions they made. You will read about societal and cultural stereotypes, their resilience, the importance of work-life balance, and the significance of a strong, supportive network. You will also learn about the needs they identified and the strategies they developed to address them, the passion for advocacy, and the unique qualities that make women particularly suited for certain roles.

This anthology of stories reflects the diversity within the global Clinical Engineering profession, yet converges in shared feelings and experiences.

We hope this collection of stories will inspire and encourage women to pursue careers in Clinical Engineering, as well as encourage young Clinical Engineers to advance in their careers. We aim to help women engineers feel seen, to recognize their roles, capabilities, and full potential. To keep dreaming, working toward those dreams, and feeling supported on this journey.





IFMBE

Clinical Engineering Division

Prologue

By Manuela Appendino
Italy

IMAGINATION

Imagine meeting a woman working in a hospital, an operating room, a lab, or a startup. Imagine meeting a woman with her own personal story—a story that would probably amaze you because of what she chose, what clicked in her mind or heart to approach the world of technology for care. One thing humans never lack is the pursuit of love, especially where science unites heart and mind. It is here where insights are born to handle a problem, face an emergency, research the right instructions, verify the severity of an issue, understand the actions to be taken, ensure the continuation of activities, watch a patient leave the operating room, chat with a doctor after surgery, imagine a new scientific study, or hypothesize a code for a life-saving algorithm.

CHOICE

You would be surprised to know that behind the choice of such a profession, behind the pursuit of a non-ordinary path like Biomedical and Clinical Engineering, are the stories of those who have lived or still live with a disability, those who have been or are caregivers, those who have always had a deep love for care, and especially those who, when faced with a challenge, felt the drive to find a solution. The depth with which we give voice to our lives is the key to our evolution. If there is an infinite dimension where we can express various talents, it is in the world of medical devices—a world where about half a million devices coexist, and many technologies need a design renewal. It is a world where we aim to guarantee precision and purpose, but the path is rarely linear. Translating the human body into signals, into mathematical formulas, and identifying clear, precise answers is not always straightforward.

RESPONSIBILITY

How often do we doubt our ability to handle complex situations? And how many times have we thought of backing out? There may be times when we feel invincible, but other times when we are forced to confront the limits of our society—judgments, prejudices, bureaucracy, corruption—all running counter to what we have chosen as our professional life. Even indirectly caring for a patient requires a choice, a choice that defines a responsibility we may feel strongly, or not at all, but which always remains a task to be accomplished. A task that leads us to create change, or even force it. At a certain point in this profession, doubts unravel while new ones arise. At the same time, our capacity for discernment is refined, along with our decision-making, and our lucidity in conducting projects, audits, monitoring phases of a project, and identifying a new team, as an unstoppable flow of energy and potential.



ETHICS

When we consciously choose our field of study, we often have little certainty about what the world will offer us, the experiences we will seek, or the specific environments we will work in. However, one guiding principle in shaping our path is ethics. When we think of ethics, we often focus on individual behavior. But we must take a broader view—ethics compels us to reflect on our actions, helping us realize that biomedical work is uniquely positioned to determine how safe and effective a technology is for patients. Ethics also challenges us as leaders. It offers a vital tool for broadening our perspective and fostering a style of leadership that strengthens the authentic role of the team, embracing diversity across backgrounds. It pushes us to reflect on issues such as gender, ethnicity, religion, age, social class, and underrepresentation, encouraging a more inclusive and equitable approach to leadership.

COURAGE

Considering the colleagues beside us, embracing diversity in design, research, and creating tools and policies that reach girls with fewer opportunities to transform their lives, while deepening our understanding of gender equality and valuing each individual, is my hope for every professional across the world. For those who, at this very moment, are striving to overcome challenges or waking up today to find new solutions, I wish for them to feel like an active part of change. We must remain engaged, even in times when there is little understanding around us, or when we feel excluded. By continuously working on ourselves and our professional energy, moments of profound satisfaction and the courage to move forward will inevitably come.



IMAGINE the future

Make your **CHOICE**

Maintain a sense of **RESPONSIBILITY**

Never leave **ETHICS** behind

Have **COURAGE** in the good times and the dark times

Manuela Appendino

Prologue



Manuela Appendino

Manuela fell in love with the biomedical world during visits to the dentist with her mother. Seeking a broader, related path years later, Biomedical Engineering became the answer to her long-held dreams. She later specialized in designing smart wearables for remote monitoring, 3D mapping systems for cardiac arrhythmias and surgical instruments.

Manuela founded WeWomEngineers, a community dedicated to sharing knowledge and promoting gender equality in STEM. The community has published over 200 blog articles and collaborated with numerous associations, participating in events as both collaborators and speakers.

She also created the Change in BioEngineering project focused on orientation and technical updates, and co-led the editorial project *// Cappello di Paglia*, which highlights the stories of Italian women in Biomedical Engineering.

Manuela holds two master's degrees in bioethics and a European certification in STEM communication. In recent years, she has specialized in gender issues, with a focus on gender design, and has expanded her expertise in biomedical product management, marketing, and post-market surveillance.

She currently works as a freelance consultant, providing technical expertise, training, and organizing biomedical projects and events.





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Clinical Engineering Division

Index

Anguilla

My experience working in the installation of dental units.

By Kenichia Abigail Charles..... 2

Argentina

Training professionals in Clinical Engineering: a success story in Argentina.

By Emilce N. Preisz and Rosa M. Weisz..... 4

Clinical Engineering Department at Hospital de la Baxada.

By María Virginia Peterson..... 10

Bangladesh

Challenges faced by Bengali women pursuing careers in Biomedical Engineering.

By Biomedical Women Engineers in Bangladesh (BMWED)..... 13

Bosnia and Herzegovina

Breaking the glass ceiling in Clinical Engineering.

By Adna Softić..... 16

Bridging two worlds: my journey into Biomedical Engineering.

By Amina Radončić..... 19

Brazil

Challenges and gratitude: reflecting on 10 years in Clinical Engineering.

By Débora Valério..... 22

Building my career: my journey in Clinical Engineering and hospital construction.

By María Carolina Pinto Aguiar..... 25

Canada

The valuable contribution of female colleagues to our Biomedical Engineering Department.

By Adeel Alam..... 29



An all-women Clinical Engineering team.	
By Alice Casagrande Cesconetto.....	31
Perspectives on the role of women in Clinical Engineering.	
By Marie-Ange Janvier.....	34

China

The ten years I have been an Engineer.	
By Chen Jie.....	38
My experience as a woman Clinical Engineer.	
By Jingying Gao.....	42
The “flower” of Clinical Engineering.	
By Wang Xi and Yin Jiao-jiao.....	45

Colombia

Pursuing my professional career in Clinical Engineering.	
By Juliana María Ballesteros Lora.....	50

India

My journey developing a career in Biomedical Engineering in India.	
By Kavi Bharathi.....	54
Self-experiences trigger better actions!	
By Tanima Chinnu Tomi.....	57

Japan

The story of a Clinical Engineer working in Japan.	
By Emiko Asai.....	61

Mexico

A measured evolution: Clinical Engineering from the metrology side.	
By Diana Laura Rojas.....	64
Clinical Engineering sorority is a reality.	
By Fabiola Martínez Licona.....	68
Thank you for all, Lau. A farewell honoring BME Laura López Meneses.	
By Roberto Ayala.....	71



Success stories in Clinical Engineering at the Ministry of Health in Tabasco. By Verónica G. Castillo Sánchez.....	75
--	----

Nigeria

My journey as a Clinical Engineer. By Comfort Seun Ajaelu.....	79
--	----

Peru

Dealing with heavy work as female Engineers. By María Cristina Pérez León Sosa.....	82
A letter to female Clinical Engineers. By Melissa Concha López.....	84
My journey in Clinical Engineering. By Mery Vidal Vidal.....	86

Poland

Being a partner of the medical team. By Ewa Zalewska.....	88
---	----

Saudi Arabia

Witnessing the transformation of Saudi Arabia into a country that actively pursues women's career development. By Sarah K. Albahiti.....	92
--	----

United States of America

My experience as a Clinical Engineer immigrant. By Maria Isabel Alvarez Sisiruca.....	95
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Stories of WICE

My experience working in the installation of dental units

By Kenichia Abigail Charles
Anguilla

The photograph captures the beginning of the installation of one of four operatories at the Dental Unit in the Central Polyclinic in Anguilla. This Dental Suite was added to the Central Polyclinic's facilities to provide additional dental services for clients primarily residing in the central part of the country.

Becoming familiar with the installation manual and guide for the Adec Performer Dental Chair was essential. This knowledge allowed for the correct and recommended installation of necessary facilities, including the drain, water supply, vacuum, and air supply for the unit. After successfully installing these facilities, which included a Ramvac Bison 3 Vacuum and an AirTechniques Airstar 50 compressor, the chair was mounted to the floor.

The main accessories were then attached to the main assembly. These included the assistant's instrumentation, delivery system, dental light, and

support system. Basic tools such as wrenches, Allen keys, screwdrivers, and wire strippers were used for the installation procedure.

Following the installation, the unit underwent an incoming inspection and performance verification to ensure it was fully operational. Once confirmed, users were trained on its operation, and any concerns were addressed. The operatory was then considered fully commissioned and added to the inventory of the medical device assets of the Health Authority of Anguilla.



Photo taken at Central Polyclinic, Health Authority of Anguilla. January 24, 2022.

“Becoming familiar with the installation manual and guide was essential.”



My experience working in the installation of dental units



**Kenichia
Abigail
Charles**

Kenichia Charles is a Healthcare Technology Management professional with over seven years of experience across the Caribbean, including St. Vincent and the Grenadines, Trinidad, and Anguilla, as well as a six-month tenure as a Clinical Engineer at the University of Vermont. She has been instrumental in managing medical technology to improve patient outcomes and equipment efficiency.

At the University of Vermont, Kenichia gained valuable experience with advanced medical devices, which gave her insights into integrating cutting-edge technologies within Caribbean healthcare systems. In Anguilla, where she is currently employed as a Biomedical Engineer, she has modernized medical equipment infrastructure, implemented preventative maintenance programs, and trained local staff to ensure sustainable healthcare operations.

Kenichia emphasizes collaborative leadership, working closely with technicians, IT professionals, and service providers. She holds CBET certification and is pursuing CHTM certification, staying active in Caribbean Healthcare Technology networks and regional conferences. Her goal is to continue advancing healthcare technology in the Caribbean, ensuring access to reliable, high-quality medical equipment for both patients and providers.



Training professionals in Clinical Engineering: a success story in Argentina

By Emilce N. Preisz and Rosa M. Weisz
Argentina

Years ago, we were newly graduated Bioengineers from the Faculty of Engineering of the National University of Entre Ríos (FI-UNER, by its Spanish acronym) in Argentina—taking our first steps into the professional field by performing Clinical Engineering-related tasks in hospitals. Our experience gained in the hospital environment allowed us to understand patients' and healthcare professionals' necessities and the role of health technology in the improvement of healthcare. Moreover, this experience helped us observe the need for continuing professional training to enhance the benefits of health technology and thus, provide the best healthcare possible to the Argentinian population.

However, at that time, we knew very little about this branch of Bioengineering, which motivated us to begin searching for Clinical Engineering training programs. We discovered that another university had recently started

offering a postgraduate degree in this specialty (intended for engineers in general), and that is how we began our training in this field.

Afterwards, there was a growing demand for training in Clinical Engineering by graduates of the FI-UNER. Given this situation, the faculty authorities invited us to work on a proposal for the creation of a program designed specifically for Bioengineers and Biomedical Engineers interested in developing a career in Clinical Engineering. Of course, we agreed to work on it: we consider it an invaluable opportunity to contribute to developing this specialty in Argentina and the region.

Thus, in 2015, the first cohort of the Specialization in Clinical Engineering taught by the FI-UNER began. This program aims to train professionals capable of understanding the specific problems of different areas of medical



The Specialization in Clinical Engineering offered by FI-UNER is a two-year program that includes 8 theoretical-practical courses and additional experience in healthcare centers.



Figure 1. Activities conducted within the framework of the program.

care and developing skills to properly manage technological, economic, and human resources through which technical assistance is provided to achieve safe, effective, and cost-effective care. The program consists of a two-year curriculum, including eight theoretical-practical courses and additional practical activities in hospitals and health care centers.

Among the main challenges and obstacles encountered during the development of the Specialization in Clinical Engineering, we mainly highlight the following:

- the shortage of postgraduate-trained teachers specialized in Clinical Engineering, and
- the long distances students have to travel to attend the courses since this program has raised much interest in students from different regions of Argentina and Latin America.

To overcome these challenges, we turned to the collaboration of national and international experts.

So far, the Specialization in Clinical Engineering has had five cohorts, during which 74 teachers have been involved as course instructors, visiting professors, or laboratory assistants—27% of whom are women. It is important to point out that the last two cohorts were developed online, which led to an increase in the participation of professionals. As shown in Figure 2, we have had 119 enrollees to date (31% of whom are women) across five cohorts, and 146 professionals have completed one or more courses in the program (52% of them are women).

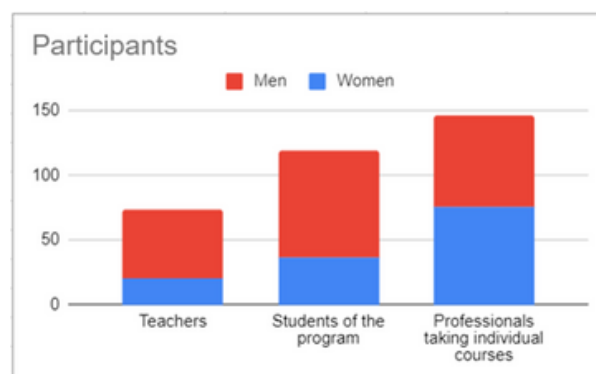


Figure 2. Professionals who have participated in the academic program.

The results obtained from surveys conducted with the students showed a high level of satisfaction with the training received, especially underlining the participation of experts and referents in the different topics addressed. Another notable result of their enrollment in the Specialization program is the creation of professional networks (which, as shown in Figure 2, includes over 300 Clinical Engineers), connections that were extremely useful during the COVID-19 pandemic.



Figure 3. Argentinian students' cities of origin.



Figure 4. Students' countries of origin.

Argentina is an extensive country, having over 3,600 kilometers of distance between the southernmost city (Ushuaia) and the northernmost (La Quiaca), hence these networks have allowed professionals from all over the country to connect. Figure 3 shows the cities in Argentina where local students reside, those marked in red completed or are completing the entire program, while those in blue completed one or more courses.

Furthermore, these networks are not limited to Argentina, since professionals from other Latin American countries have participated as students in our academic program, as shown in Figure 4. The diversity of students has enriched our program with the exchange of knowledge and regional practices, as well as the creation of solid professional networks.

As a result, we are proud to highlight the significant contributions made by the faculty, alumni, and students of the program, who actively participate in the Clinical Engineering chapter of the Argentine Society of Bioengineering (SABI). This society, along with the Clinical Engineering Association - Bangladesh (CEAB), won the CED Award in 2022 for their teamwork, as shown in Figure 5.

Another important outcome, which we attribute to the growing number of well-trained Clinical Engineers, is that in the province of Entre Ríos, where our university is located, we have had, so far, four Bioengineers serve as hospital directors (two of whom are former students of the program and one is a professor in the program). Similarly, at the end of 2023, Law 26,906 was enacted (with contributions from pro-



fessionals from SABI and the Ministry of Health), and national guidelines were approved, requiring health institutions in Argentina to establish Clinical Engineering Services.

In conclusion, to contribute to the improvement of the quality of healthcare in developing countries, we consider it essential to invest in postgraduate training in Clinical Engi-

neering. Thereby, it will be possible to create generations of specialized professionals with the skills and knowledge necessary to make a significant impact on the management of medical technologies and, therefore, on healthcare. Hence, the academic training proposal of FI-UNER is relevant and fundamental, especially in our region.

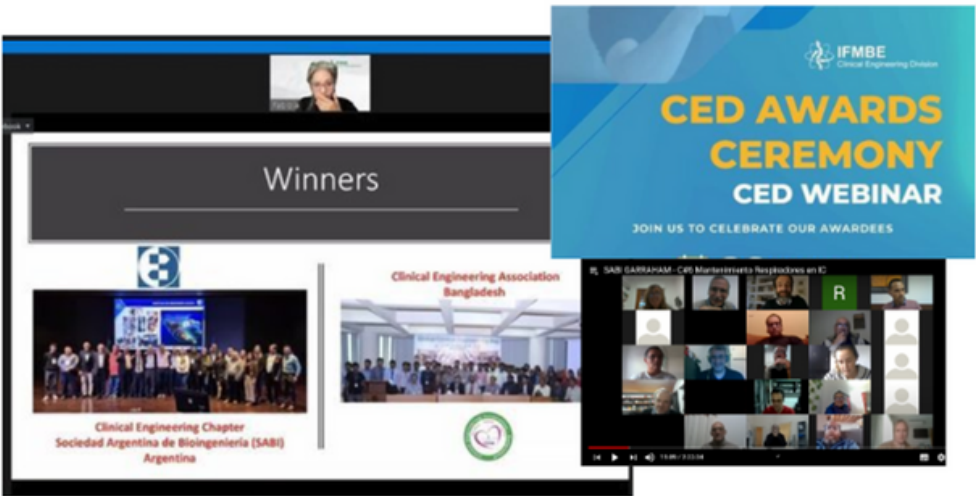


Figure 5. CED Awards Ceremony and an example of the weekly webinars hosted by SABI during the COVID-19 pandemic.



Training professionals in Clinical Engineering: a success story in Argentina



**Emilce N.
Preisz**

Emilce Noemí Preisz is a Biomedical Engineer with over 22 years of experience in Clinical Engineering. She has held leadership positions, including Director of the Specialization program (2014-2022) and Head of the Engineering Department at a provincial reference hospital. Currently, she is an adjunct professor at FI-UNER (Faculty of Engineering at UNER), where she teaches Electromagnetism and Optics. Emilce has extensive experience leading medical technology management projects. She has completed her Master's coursework in Biomedical Engineering at UNER and is currently focusing on her thesis research.



Training professionals in Clinical Engineering: a success story in Argentina



**Rosa M.
Weisz**

Rosa María Weisz is a Bioengineer, a Specialist in Clinical Engineering, and a teacher-researcher at FI-UNER (Faculty of Engineering at UNER). She serves as Director of the Specialization in Clinical Engineering at this university and is an Adjunct Professor of Robotics. Rosa is also a member of CIRINS (Center for Rehabilitation Engineering and Neuromuscular and Sensory Research). She has led research, innovation, and extension projects, contributed to the creation of the Distance Education Area at her faculty, and has made numerous publications and presentations at conferences. Additionally, she has worked as Head of the Department of Biomedical Engineering in the private sector. She is currently completing her PhD in Engineering.



Clinical Engineering Department at Hospital de la Baxada

By **María Virginia Peterson**
Argentina

My name is Peterson, María Virginia. I am a Bioengineer with a specialization in Clinical Engineering, both of which I pursued at the Faculty of Engineering of the National University of Entre Ríos (FI-UNER), a public and free-of-charge institution. For the last seven years, I have been in charge of the Clinical Engineering area at the Hospital de la Baxada in the city of Paraná, province of Entre Ríos, Argentina. I am the only woman in the Engineering team, which includes Clinical Engineering, Infrastructure, Biosafety, and Systems. I work alongside all my colleagues with the conviction of pursuing and promoting equal opportunities.

The functions of the Clinical Engineering area within the hospital change according to the urgent and necessary needs to be addressed. In its begin-

nings, which date back to the opening of the Hospital in October 2015, the area was responsible for receiving medical equipment from different suppliers and verifying that the received items matched the orders. Moreover, when the area started its functions, the type and quantity of medical equipment destined for the hospital were unknown, so a vital task was to inventory and register all the equipment, which we made assessing its risk level according to the ECRI Institute. Currently, the area designs, plans, and equips the different services of the hospital, working in a multidisciplinary way with all the medical and non-medical health personnel to address their needs and ensure they can work in a comfortable and safe manner.

In 2020, with the COVID-19 pandemic affecting the world, the country, and our province, the decision was made to

“I am the only woman in the Engineering team, which includes Clinical Engineering, Infrastructure, Biosafety, and Systems.”



For the past seven years, I have been responsible for the Clinical Engineering Department at Hospital de la Baxada.

In 2020, our Clinical Engineering Department successfully created and put into operation a Respiratory Unit for patients diagnosed with COVID-19. This milestone established Hospital de la Baxada as a reference center for COVID-19 treatment in the providence of Entre Ríos.

put a sector of the hospital into operation as a Respiratory Unit for patients diagnosed with COVID-19. As a result, the hospital became a reference center in the fight against COVID-19 in the province of Entre Ríos. Since then, this unit and the different services of the hospital have helped to relieve the pressure on other healthcare providers, being able to provide quality care to patients in need.

We continuously work on designing, verifying, installing, controlling, and planning the maintenance of medical

equipment to ensure this technology is available in optimal operating conditions when needed. This arduous and continuous work is magnified when considering the limitations and problems associated with the importation of equipment, budget shortages, and the lack of suppliers and geographically close assistance, as most national medical equipment and instruments suppliers are located in Buenos Aires, the capital city of Argentina, 600 kilometers away from our hospital.

The Clinical Engineering area performs preventive, corrective, and predictive maintenance, prepares technical specifications, and awards reports, among other tasks, contributing to improving the health and welfare of the community of Entre Ríos through the management of medical technology.



Clinical Engineering Department at Hospital de la Baxada



**María
Virginia
Peterson**

My name is María Virginia Peterson, I am 38 years old, married, and have a 5-year-old daughter named Maite. I am from the city of Paraná, in the Province of Entre Ríos, Argentina. I graduated as a Bioengineer in 2014 and later specialized in Clinical Engineering, both degrees obtained at the Faculty of Engineering of the University of Entre Ríos (FI-UNER), which is public and free of charge.

I have been in charge of the Clinical Engineering department at the Hospital de la Baxada since its inception, in October 2015. With both successes and challenges, I gradually built the department from the ground, ensuring the proper functioning of medical equipment, to provide quality healthcare to all residents of Entre Ríos.



Challenges faced by Bengali women pursuing careers in Biomedical Engineering

By Biomedical Women Engineers in Bangladesh (BMWWEB) Bangladesh

Biomedical Engineering is a relatively new and emerging field in Bangladesh. There is a rising demand for Biomedical Engineers to create solutions to the continuing health issues linked to the underdeveloped healthcare system. Developing the innovative technologies that drive the medical industry requires professionals with the unique combination of skills, knowledge, and experience that are offered in the undergraduate programs in Biomedical Engineering.

Currently, Bangladesh has 37 Public and 92 Private universities, from which eight universities (7 Public and 1 Private) offer BSc programs in Biomedical Engineering. In 2014, the Department of Biomedical Engineering at the Military Institute of Science and Technology (MIST) was founded and started its academic program, becoming the country's pioneer batch of undergraduate Biomedical Engineers. Following MIST's initiative, other universities—like BUET, KUET, CUET, and JUST—have been working towards improvements in Biomedical Engineering academic development ever since. As a result of these efforts, in 2022, there were about 185 male and 178 female graduate Biomedical Engineers. However, the country still has a shortage of graduate Biomedical Engineers. On top of that, the field of Clinical Engineering has not been

established yet, leaving the healthcare system of Bangladesh in a vulnerable position.

The root reason why the country is unable to address healthcare issues is because of not properly utilizing women's contributions to society. There are undoubtedly many challenges for a woman pursuing a career in a male-dominated field. To begin with, every woman in positions of power still contends with gender-based harassment. A patriarchal society like ours still takes women as a burden for their supposed inability to work like men. This stereotypical mindset gives rise to a lack of confidence due to constantly feeling out of place and like we do not quite fit in.



In 2014, the first Department of Biomedical Engineering in the country was established by MIST and started its academic program.

Bangladesh has eight universities offering a bachelor's degree program in Biomedical Engineering.

Until 2022, Bangladesh has 363 graduates in Biomedical Engineering, of which 178 are women (49.03%).

One of the biggest obstacles that we face as female engineers is an unconscious bias that can manifest as preferences for women who speak and dress in certain ways. The unhealthy obsession with what a woman wears or how she should act takes away their ability to work freely in the workplace. Furthermore, the prevalence of sexual hostility and unwelcome physical actions towards women is quite common in the workplace these days. As harsh as it sounds, female engineers are frequently subjects of demeaning jokes or other comments that are highly inappropriate. Protesting against this attitude often colors them in a way that negatively impacts their career. As a result of unwanted sexual attention, many women are forced to quit their jobs or reduce their work hours; such actions impede their career advancement and may force them to pass up important opportunities.

“Underrating and limiting the potential of female engineers (half of the graduate population) significantly impacts the consolidation of Clinical Engineering and our healthcare system.”

Furthermore, highly qualified women engineers are not taken seriously for authoritative roles in many workplaces like hospitals, pharmaceutical industries (or even in the educational sector) since they might not tolerate gender discrimination or are unobligated to act in certain ways. Sometimes, independent women appear to be a threat to those who have little or no personal voice.

The engineering-related policy framework often does not favor female engineers. For instance, a female engineer has the right to 120 days of maternity leave, be assured salary payment during this period, and the right to return to work after it. Nevertheless, even though the right to maternity leave might apply in many governmental organizations, most engineering firms do not consider it. Moreover, since childcare usually relies on mothers, most female employees with children experience difficulties in workplaces without daycare centers, a need that must be covered.

Being raised in a patriarchal society, along with the stigma associated with social and cultural rituals, makes women inappropriate to work in a place with men. Besides, many families still do not support the idea of a working

Bengali women who pursue a career in Biomedical/Clinical Engineering face multiple challenges by integrating into a male-dominant field, such as:

- gender stereotypes,
- demeaning behavior towards them,
- sexual harassment and hostility,
- workplaces that do not respect maternity-related policy framework,
- social roles established for them, and
- socio-cultural stigma.



“Biomedical Women Engineers in Bangladesh (BMWWEB) was created in 2022 aiming to be a strong platform for women to make their voices heard, their values and capabilities acknowledge, and their career flourished.”

woman, as they believe women are meant to manage the household affairs only. On top of that, many families do not want their daughters to pursue higher studies since it may make them career-oriented and less involved in the housework.

From time to time, these obstacles are present in female engineers' careers and sometimes could make them quit their professional journey to take on social responsibilities, like managing a family. Considering female engineers are half the graduate Biomedical Engineers available in the country, underrating their potential significantly impacts the development and consolidation of Clinical Engineering in Bangladesh and its healthcare system.

Considering these circumstances, Biomedical Women Engineers in Bangladesh (BMWWEB) was established in September 2022 to create, develop, and

promote activities for mitigating the challenges during the professional journey of women Biomedical Engineers in various healthcare facilities and biomedical industries.

BMWWEB aims to provide a multidirectional platform where these engineers can stand together and support each other to solve their problems, strengthening themselves to play a key role through their active services and shape their engineering careers.

It has nor will be an easy task: breaking down the barriers around us and protesting against the stereotypical mindset in everyday life take quite a toll on us. However, ultimately, BMWWEB aspires to be a strong platform to make the voices of women in Clinical Engineering heard, their values respected, and their careers flourishing.



Breaking the glass ceiling in Clinical Engineering

By Adna Softić
Bosnia and Herzegovina

For as long as she could remember, Assist. Prof. Dr. Lejla Gurbeta Pokvić had dreamt of using her engineering skills to make a real difference in the world, and that is exactly what she found in Clinical Engineering.

Assist. Prof. Dr. Lejla Gurbeta Pokvić was born in Bugojno, Bosnia and Herzegovina, in 1991. She finished primary and secondary school in Bugojno. She completed her undergraduate (2013) and master's (2015) studies at the Faculty of Electrical Engineering, University of Sarajevo, Department of Automation and Electronics. She specialized in Biomedical Engineering and completed her doctoral studies in 2019, with her dissertation topic being "Determination and Experimental Validation of Measurement Uncertainty and Documentation of the Traceability Chain in Measuring Temperature, Humidity and Sound in an Incubator for Neonatal and Pediatric Patients."

Bosnia and Herzegovina, being a small country, still lags behind the developed countries in Western Europe and America in the field of Clinical Engineering. The challenge is even greater for women pursuing a career in this field. Lejla encountered a series of obstacles while forging her path in Clinical Engineering. Despite this, her perseverance, diligence, and ambition enabled her to overcome these chal-

lenges and progress in her career. As an early-stage researcher, she focuses on working in the field of medical devices, regulatory compliance, and management. Regarding scientific achievements, she is investigating the application of artificial intelligence for managing medical devices within healthcare institutions. Lejla is only 31 years old, but she already has a remarkable professional and academic career. Currently, she works as Director of Verlab Research Institute for Biomedical Engineering, Medical Devices and Artificial Intelligence—the first private research institute in Bosnia and Herzegovina. Additionally, Lejla is Executive Director of The Bosnia and

“For as long as she could remember, Assist. Prof. Dr. Lejla Gurbeta Pokvić had dreamt of using her engineering skills to make a real difference in the world, and that is exactly what she found in Clinical Engineering.”



Bosnia and Herzegovina, being a small country, still lags behind the developed countries in Western Europe and America in the field of Clinical Engineering. The challenge is even greater for women pursuing a career in this field.

Herzegovina Medical and Biological Engineering Society and an assistant professor at the International Burch University in Sarajevo. Moreover, she is active internationally as an Associate at the University of Warwick, UK, and an Associate of the Clinical Engineering Division at the International Federation for Medical and Biological Engineering (IFMBE). Since 2020, she has also been elected a Councilor to the European Alliance for Medical and Biological Engineering and Science (EAMBES).

Apart from her professional challenges, she is committed to educating and

motivating young people through various events organized in the non-governmental sector. Lejla actively writes and implements social and professional projects in the Biomedical Engineering field. She serves as a mentor to PhD candidates pursuing research in the same field. She is the Conference Chair of the International Conference on Medical and Biological Engineering in Bosnia and Herzegovina (www.cmbebih.com). Notably, she organized the "Women in Biomedical Engineering" session at this year's joint event MEDICON&CMBEBIH.

Through her dedication to Clinical Engineering, Lejla has demonstrated that with hard work and determination, even the most challenging obstacles can be overcome. Her story is an inspiration to all women aspiring to succeed in male-dominated fields.



Breaking the glass ceiling in Clinical Engineering



Adna Softić

Adna Softić is a researcher in the field of natural sciences at the Verlab Research Institute for Biomedical Engineering, Medical Devices and AI in Sarajevo, Bosnia and Herzegovina. She holds a Master's degree in Genetics, from the University of Sarajevo. Her research focuses on Biomedical Engineering, digital transformation in healthcare, and the biological effects of environmental factors on human health. Adna has contributed to several scientific publications, including studies on the genotoxicity of urban air pollution and advancements in patient monitoring technologies. She is also active in organizing conferences and workshops that promote knowledge exchange in her field. Alongside her scientific endeavors, Adna is a member of the Genetic Association of Bosnia and Herzegovina and the Bosnia and Herzegovina Medical and Biological Engineering Society. Passionate about innovation, she is committed to advancing healthcare through automation and artificial intelligence.



Bridging two worlds: my journey into Biomedical Engineering

By Amina Radončić
Bosnia and Herzegovina

I had always been a biologist at heart. Various scientific fields, like molecular biology, zoology, genetics, and microbiology, with all the secrets they held, fascinated me from the very beginning. From my undergraduate years in Genetics and Bioengineering at the International Burch University of Sarajevo, I had never strayed too far from my comfort zone. That is until fate, or perhaps curiosity, led me into the intriguing world of Biomedical Engineering.

After my graduation, an opportunity arose: an internship at the VERLAB Institute for Metrology and Artificial Intelligence in Sarajevo. This was a chance to explore uncharted territories. The concept of merging biology with engineering was a departure from my genetic-centric studies, but I embraced the challenge wholeheartedly. It was a world where science fiction met reality, and I was eager to be a part of it.

My role as an intern moderator within the organizing committee for the

CMBEBIH & MEDICON 2023 conference on Biomedical Engineering was my ticket into this captivating realm. The conference was a melting pot of brilliant minds, each with a unique perspective on how to use engineering to enhance medical science. I was also one of the speakers, presenting my first scientific publication ever in the field of neurorehabilitation and Clinical Engineering. My duties ranged from coordinating schedules to facilitating discussions among experts in the field. It was challenging, to say the least, but every moment was a learning experience!

Amidst the hustle and innovation of the VERLAB Institute, I found another source of inspiration. The majority of participants for the CMBEBIH & MEDICON 2023 conference on Biomedical Engineering were female scientists. Many accomplished women were representatives of IFMBE, and I was honored to meet them and exchange my views and opinions on emerging techniques in Biomedical and



“From my undergraduate years in Genetics and Bioengineering at the International Burch University of Sarajevo, I had never strayed too far from my comfort zone. That is until fate, or perhaps curiosity, led me into the intriguing world of Biomedical Engineering.”

Clinical Engineering, as well as engaging in fruitful panel discussions. Their presence, expertise, and unwavering commitment to the field filled me with empowerment and a sense of belonging. It was in their stories and accomplishments that I saw my own potential. These remarkable women inspired me to dream bigger and aspire to do remarkable things for my community in the world of Biomedical Engineering.

What struck me most was the collaborative spirit that permeated the key sessions at the conference, which were mainly moderated by female scientists: engineers, biologists, computer scientists, and medical professionals worked hand in hand to help shape the future of Bio-engineering. Their shared goal was to revolutionize healthcare and improve

the quality of life for patients around the world. It was inspiring to witness the synergy of these diverse disciplines coming together to solve complex medical challenges.

Now, as a Master's student with a newfound passion, I look forward to continuing my exploration of this captivating field. My experiences through my summer internship and my involvement in the CMBEBIH & MEDICON 2023 conference have set me on a course to bridge the gap between biology and engineering, with the hope of contributing to the advancement of healthcare and the betterment of humanity. This unexpected journey has shown me that sometimes, stepping out of your comfort zone can lead to the most incredible discoveries and opportunities for growth, especially for a woman in science!



Bridging two worlds: my journey into Biomedical Engineering



**Amina
Radončić**

Amina Radončić earned her Bachelor's degree in Genetics and Bioengineering from the International Burch University in Sarajevo, her hometown in Bosnia and Herzegovina. She is currently pursuing a Master's degree in Bioengineering, with a focus on artificial intelligence (AI) and machine learning for biomedical applications. Her research interests include non-invasive neural rehabilitation techniques and the application of AI in clinical diagnostics. She is a published author, scientific writer, and the first international ambassador for WeWomEngineers, an Italian association dedicated to supporting, empowering, and inspiring young engineers, scientists, and women in STEM through educational programs, conferences, and workshops.



Challenges and gratitude: reflecting on 10 years in Clinical Engineering

By Débora Valério
Brazil

In the world we live in today, choosing a profession that truly makes you happy is a challenge. However, after 10 years in the field, I can say that gratitude is the word that best sums up both the challenges and the satisfaction of being part of the global community of women Clinical Engineers. I begin my story this way because, from the moment I started my degree in Biomedical Systems Technology and was introduced to Clinical Engineering, I knew this was the field I wanted to pursue. Behind the scenes, I would be helping countless lives.

Throughout my undergraduate studies in Clinical Engineering, I always tried to apply my theoretical knowledge to prac-

“[...] from the moment I started my degree in Biomedical Systems Technology and was introduced to Clinical Engineering, I knew this was the field I wanted to pursue. Behind the scenes, I would be helping countless lives.”

www.ifmbe.ced.org

tical work, which led to opportunities to publish articles on the subject. My first article was titled “Assessment of Supportability Aspects for Highly Complex Imaging Equipment”. Later, during my postgraduate studies in Brazil with Dr. Saide Jorge Calil (Past Board Member of IFMBE, 2012-2018), I co-authored another article. This one focused on the importance of managing the maintenance of sterilization equipment in a small institution, highlighting the impact on both patient safety and institutional costs.

During my career, I have faced many challenges, yet each has helped me mature and develop new skills. For example, during the COVID-19 pandemic, I saw firsthand the critical role our field plays. I was able to contribute through Clinical Engineering by managing urgent issues, prioritizing process quality, and ensuring efficient results—all essential during such a time of crisis.

As I conclude this brief reflection, I want to share what has driven me to constantly seek improvement: the desire to always deliver the best I can through my work in Clinical Engineering. When people ask why I chose this career, I tell them: “It is not just about being a Clinical Engineer. It is about the power we hold to impact lives by ensuring that the infrastructure behind healthcare is delivered safely and with quality to those who need it.”



Stories of WICE

Though my career is still in its early stages, I believe the journey of a Clinical Engineer is one of continuous learning. Not only is equipment maintenance advancing, but our knowledge is also constantly evolving, requiring us to dedicate ourselves in various ways to absorb more information from the challenges that arise daily in the Clinical Engineering sector.

From the moment I first set foot in a hospital, I was captivated by the behind-the-scenes work. Through meticulous management, I am able to ensure quality processes that minimize errors, offering a chance for healing or delivering a critical diagnosis in someone's life.



Performing maintenance on an ultrasound during the early days of the COVID-19 pandemic.

One of my team members once captured a photo of me while I was focusing on one of our medical equipments, ensuring it received the necessary maintenance. We were in the midst of the COVID-19 pandemic, and the equipment was essential for conducting an ultrasound on a pregnant woman who had been admitted with COVID-19—a rare case at that time. The pandemic put us in a period of heightened tension, demanding even more decisive action from the Clinical Engineering sector. At this moment, I was paying close attention because we needed the technology, along with the technical team's efforts, to provide reliable information about the fetus.

It is a simple image, but sharing it with you is my way of showing the importance of the female presence in Clinical Engineering. With care, love, and empathy, we women bring something special to our work. We manage not only our technical teams and technologies but also the lives of patients who rely on us. It is by giving all of ourselves—our attention, our compassion—that we achieve what might seem “unattainable.”



Challenges and gratitude: reflecting on 10 years in Clinical Engineering



**Débora
Valério**

I am Débora Valério, a Clinical Engineer with over ten years of experience in the Biomedical field, driven by a passion for improving patient care. I began my journey studying Biomedical Systems Technology, where I recognized the importance of behind-the-scenes work in healthcare.

Throughout my career, I have had the opportunity to publish articles on equipment maintenance and quality management, demonstrating a proactive approach to challenges in Clinical Engineering. Notably, during the COVID-19 pandemic, I played a key role in ensuring efficient processes, highlighting the critical importance of Clinical Engineering in global crises.

As a strong advocate for continuous learning, I am committed to achieving excellence in all aspects of my work. My dedication significantly impacts patient outcomes and inspires my colleagues, reinforcing my commitment to the community and healthcare service.



Building my career: my journey in Clinical Engineering and hospital construction

By Maria Carolina Pinto Aguiar
Brazil

My name is Maria Carolina Pinto Aguiar. I have been a Technologist in Biomedical Systems since 2016. I started my career just before finishing college, working at the Santo Antônio hospital, in a small town called Votorantin, in the State of São Paulo, Brazil.

With this short story, I want to share my experience in building hospitals and implementing Clinical Engineering services, with all the women in Clinical Engineering.

In October 2017, I had my first experience building a hospital specializing in cancer patients. It was to be an 18,000 m² extension of an existing hospital. Perhaps you know that the construction area is predominantly occupied by men, likely because it is heavy, dirty, and somewhat dangerous work. In my country, mortality in civil construction is still high, but I did not turn down the opportunity.

I was starting my career at only 22 years old, and I needed to earn respect and show that being a woman did not prevent me from doing anything that other professionals in the field could do. I remember the installation of two magnetic resonance imaging machines, computerized tomography scanners, C-arm, etc. I pushed the boxes from one

side to the other, picked up the necessary parts and pieces, heavy or not. Gradually, I earned my space and was respected for what I knew how to do, and not for my gender. I also remember that we had only one floor of boxed equipment under my responsibility to help control assets, inventory, and take them to the destination sectors where they would be installed and put into operation. During this construction work, I often demonstrated the organizational capacity and effectiveness of a woman

“[...] the construction area is predominantly occupied by men, likely because it is heavy, dirty, and somewhat dangerous work. In my country, mortality in civil construction is still high, but I did not turn down the opportunity.”



“During this construction work, I often demonstrated the organizational capacity and effectiveness of a woman and how we can also contribute to the construction, expansion, and renovations of hospitals.”

and how we can also contribute to the construction, expansion, and renovations of hospitals.

Almost always, after finishing a project, all the employees are laid off if there is no other to follow, and that is what happened to me. However, we handed over the Clinical Engineering project ready to the hospital team.

Equipment specified, negotiated, purchased, received, installed, tested, put into operation, and inventoried in the organization's own Computerized Maintenance Management System (CMMS). It was my first “turnkey” project.

Shortly afterward, I started alone, implementing a Clinical Engineering service in a laboratory of clinical analysis and diagnostic imaging. The team consisted of my manager, who was not from our area, and myself. I followed this journey for a year, going through the following main stages: situational diagnosis, reading of contracts and the history of the most important equipment, inventory, registration in a CMMS, preparation of maintenance procedures (both to be done by me and by contracted third parties), and putting the service to work, as best I could.

In May 2020, I had the opportunity to be part of another challenging project in Clinical Engineering. I participated in the construction of a new hospital for

COVID-19 patients, with 200 beds, in 7 weeks. Initially, the invitation was for Clinical Engineering, but after a week of activities with the team, the infrastructure responsibilities were also assigned to us.

In Brazil, there are many construction companies, but very few know how a hospital should work. So, we participated in each step and delivered the hospital to receive the first patient on May 17, 2023, to be managed by the National Institute of Infectiology (INI), at the Oswaldo Cruz Foundation, in Rio de Janeiro.

We had the opportunity to participate in everything, from generator installations, gas central, mortuary chamber, water for human consumption, and water for hemodialysis, to rooms with air conditioning systems with negative pressure. All to ensure the full functioning of the hospital.

We started with the installation of equipment such as tomography, ultrasound, mobile X-rays, multi-parameter monitors, parenteral infusion pumps, pulmonary ventilators, hemodialysis equipment, equipment for the clinical analysis laboratory, blood bank, CME (material and sterilization center), and two autoclaves for thermal disinfection of all waste produced in the hospital. Additionally, we needed to create a database to manage the technology park of more than 2,000 pieces of equipment in just 4 days, with



For women who want to pursue a career in Clinical Engineering: believe in yourself, study, and always seek new knowledge. Clinical Engineering is an ever-evolving field and offers many opportunities for anyone willing to work hard and overcome obstacles.

just 4 people on the team. The CMMS used is known as GETs, created by the Biomedical Engineering Center from the State University of Campinas, in Brazil.

Our emergency contract was for 90 days, and the mission was to help build, install, and operate a COVID-19 hospital, but it was extended to 180 days with a lot of hard work. However, we ensured the full operation of the hospital and provided all the support for the best possible care to patients and the organization's employees, almost 100% of whom were new and did not know each other or the hospital.

It was an amazing experience and a great learning opportunity for me. The

project ended, and my team returned to their hometowns, but I was permanently hired by the INI hospital. For the last three years, I have been working in Rio de Janeiro as an analyst for biomedical equipment.

For women who want to pursue a career in Clinical Engineering, my advice is not to be afraid to take on challenges, even in the field of construction. Believe in yourself, study, and always seek new knowledge. Clinical Engineering is an ever-evolving field and offers many opportunities for anyone willing to work hard and overcome obstacles.

Throughout my career, I have faced many challenges, but I have always remained focused and determined to overcome them. I believe this attitude has been fundamental to my success. I hope my story can inspire other women to follow their dreams and achieve their goals in Clinical Engineering. Oh, and even better, having a remunerative job, is truly rewarding.



Building my career: my journey in Clinical Engineering and hospital construction



**Maria
Carolina
Pinto Aguiar**

Maria Carolina Pinto Aguiar is a Biomedical Systems Technologist specializing in Health Quality Management.

She has worked on the expansion of two major Brazilian hospitals, A.C. Camargo and INI-Fiocruz.

With her strong background in hospital project management and Clinical Engineering, Maria Carolina has contributed to the enhancement of healthcare processes and infrastructure.



The valuable contribution of female colleagues to our Biomedical Engineering Department

By Adeel Alam
Canada

A couple of years ago, our Biomedical Engineering Department changed our entire operational model. We went from being equipment-based accountability to location-based. Naturally, this had a profound impact on many of the senior members of our team. While the pros behind the move were numerous, such as better communication with units, better knowledge of equipment issues, and greater opportunities to learn about different pieces of equipment, among others, there were some hidden cons that a female colleague brought to my attention.

After a major operational change in our Biomedical Engineering Department, one of my colleagues pointed out several drawbacks. Her insights helped me adjust our approach, and through our collaboration, we achieved a smoother transition.

She mentioned the challenge of making such a substantial change for folks who have been here for over 20 years. She noted the change in their daily workflows, their relationships that will be altered, the challenge of learning new equipment, and the likelihood of accepting the latest changes. This new point of view made me reconsider my approach, and I worked with this colleague to alter our change management strategy. Without her guidance and insight, this transition would not have been as successful as it is today. I truly appreciated her willingness to bring these points up to me and then work with me to come up with a different strategy. It is through this and many other experiences that the female colleagues in our department make it a better place to work.



The valuable contribution of female colleagues to our Biomedical Engineering Department



**Adeel
Alam**

Adeel is the Director of Biomedical Engineering & End-User Computing at Sinai Health and an advocate for the safe use of medical technology in hospital environments. He has contributed to healthcare technology initiatives at academic centers such as Massachusetts General Hospital and St. Joseph's Healthcare Hamilton. Adeel also serves as the Chair of Professional Affairs for the Canadian Biological & Medical Engineering Society (CMBES). At Sinai Health, he initiated a framework to secure medical devices by aligning them with biomedical processes, which he presented at the annual CMBES conference.

Adeel is a Professional Engineer, certified Project Management Professional, and holds a Bachelor's Degree in Electrical & Biomedical Engineering from McMaster University, as well as a Master of Health Sciences in Clinical Engineering from the University of Toronto.



An all-women Clinical Engineering team

By Alice Casagrande Cesconetto
Canada

Between June 2022 and May 2023, [Lower Mainland Biomedical Engineering's](#) Regional Clinical Engineering Team was composed solely of women, reaching a total of five Clinical Engineers during this period. Although the all-women composition of the Clinical Engineering Team happened by coincidence (all engineers were hired based on their skills, character, and potential for development through a competitive hiring process), team cohesion, camaraderie, and trust noticeably improved under these circumstances. For example, team members started to speak more openly

with one another about topics such as the struggles women face in STEM professions, imposter syndrome and strategies to overcome it, and how to foster an inclusive work environment that allows for professional and personal growth for equity-deserving groups. Since this time, team members have demonstrated increased vulnerability in their day-to-day interactions with one another, resulting in more frequent and open discussions about difficult topics. Another distinctive characteristic of this all-women engineering team is genuine caring for one another. Each team



From left to right: Alanna Bateman, Angela Varghese, Jun Lim, Alice Casagrande Cesconetto, and Rand Bawab.



“Although the all-women composition of the Clinical Engineering Team happened by coincidence (all engineers were hired [...] through a competitive hiring process), team cohesion, camaraderie, and trust noticeably improved under these circumstances.”

member sincerely wants to help others succeed in everything they do, creating an environment where egos are left aside. These combined traits have contributed to unsolicited positive feedback from the larger Biomedical Engineering Department and other external role-holders on the highly collaborative nature of the Clinical Engineering Team. This positive shift in work culture has made the team more

approachable, catalyzing new partnerships and bringing increased value to the organization. Since May 2023, our Department has hired two new Clinical Engineers, both self-identified as men, and the benefits from the environment fostered by the all-women team continue to reverberate through a more diverse Regional Clinical Engineering Team and the Department as a whole.



An all-women Clinical Engineering team



**Alice
Casagrande
Cesconetto**

Alice Casagrande Cesconetto is a dynamic and data-driven professional with over 11 years of engineering experience, excelling in leadership, operations, risk management, and process improvement. As a creative problem solver and systemic thinker, she challenges the status quo to streamline processes, improve systems, and enhance quality. Alice is a tenacious troubleshooter and a passionate lifelong learner who shares her knowledge generously. An empathetic and inclusive leader, she values diversity and fosters a collaborative environment. Outside of work, Alice is a dedicated soccer player and LEGO master builder, bringing the same attention to detail and creativity to all her pursuits. Her commitment to improving quality, safety, and customer satisfaction while effectively managing risks defines her professional ethos.



Perspectives on the role of women in Clinical Engineering

By Marie-Ange Janvier
Canada

Throughout this text, I will expose my point of view on opportunities, challenges, and the significance of women in this field.

Clinical Engineering: A rewarding and inclusive field for women

Clinical Engineering is a highly rewarding and inclusive field that offers excellent opportunities for women to excel. This multidisciplinary domain blends various areas such as engineering, healthcare, and technology, making it ideal for individuals who enjoy working in diverse environments. Clinical Engineering welcomes individuals with various educational backgrounds, further enhancing its appeal for women seeking a fulfilling career. While a degree in Biomedical Engineering or a related field is common, professionals in Clinical Engineering come from various disciplines such as electrical engineering, computer science, or healthcare management. This openness allows women with different educational backgrounds to bring unique perspectives and skills to the field, fostering innovation and collaboration.

Women inherently possess the skillset required to succeed in this career path. Effective communication skills are crucial, as professionals collaborate closely with healthcare providers,

patients, and equipment manufacturers to ensure the optimal functionality and safety of medical devices. The ability to multitask is also essential, as Clinical Engineers manage the full spectrum of health technology, from acquisition and implementation to maintenance and decommissioning. Moreover, the impact of Clinical Engineering extends beyond direct patient care. By ensuring the proper functioning and safety of medical devices, Clinical Engineers indirectly contribute to improving patient outcomes and the overall quality of healthcare. Their expertise in health technology management helps streamline workflows, enhance efficiency, and minimize risks associated with medical equipment, ultimately benefiting patients and healthcare providers alike.

“Clinical Engineering welcomes individuals with various educational backgrounds, further enhancing its appeal for women seeking a fulfilling career.”



Women inherently possess the skillset required to succeed in this career path such as effective communication skills and the ability to multitask.

Clinical Engineering offers a wide range of opportunities, allowing women to explore different specialties such as biomedical equipment design, quality assurance, or clinical informatics. Continuous education and training keep women updated with the latest innovations and best practices in this rapidly evolving field. Moreover, Clinical Engineering is a dynamic profession that constantly introduces new technologies and approaches, creating ample space for women to make significant contributions. Whether developing cutting-edge technologies, implementing robust cybersecurity measures, or optimizing healthcare systems, women in Clinical Engineering have the chance to contribute to the profession and advance healthcare on multiple fronts. In hospitals, research institutions, medical device companies,

“While women can enter the field of Clinical Engineering, they often face limited prospects for promotion and less visibility in managerial or leadership roles.”

and regulatory bodies, women can utilize their skills and expertise to positively impact patient care and shape the future of healthcare.

Addressing challenges for women in Clinical Engineering

While women can enter the field of Clinical Engineering, they often face limited prospects for promotion and less visibility in managerial or leadership roles. Opportunity for advancement may be constrained, and women can sometimes face penalties for growing their families. To support women Clinical Engineers and ensure their growth and motivation, it is crucial to address these challenges. Providing support for flexible schedules and work-life balance can create an environment where women can excel both professionally and personally. Additionally, breaking away from the patriarchal model of management and fostering a culture of inclusivity and equal opportunities is essential. Implementing mentorship programs, leadership development initiatives, and networking opportunities specifically

Some key points to support women Clinical Engineers' growth:

- providing support for flexible schedules and work-life balance,
- breaking away from the patriarchal model of management and fostering a culture of inclusivity and equal opportunities, and
- implementing mentorship programs, leadership development initiatives, and networking opportunities specifically tailored for women.



“The success of women in Clinical Engineering can serve as a model for achieving gender diversity and equality in STEM fields, demonstrating the valuable contributions that women can make in traditionally male-dominated sectors.”

tailored for women can help cultivate their leadership skills and create a path for advancement. Organizations and institutions should actively encourage and empower women to take on leadership roles and provide the necessary resources and training to enhance their career progression. By championing the growth of women Clinical Engineers and recognizing their valuable contributions, we can pave the way for the next generation of female leaders in the field.

Women as Pioneers in Clinical Engineering

Clinical Engineers play a pivotal role as key partners in healthcare, and their significance will only continue to grow. In this field, women have a unique opportunity to establish themselves as experts in health technology management. As Clinical Engineers, women can contribute their skills and

knowledge to ensure the safe and effective use of medical devices, improve patient outcomes, and enhance the overall quality of healthcare delivery. By excelling in this domain, women can become role models and advocates for other women in STEM fields, inspiring them to pursue careers in Clinical Engineering and other related disciplines.

The success of women in Clinical Engineering can serve as a model for achieving gender diversity and equality in STEM fields, demonstrating the valuable contributions that women can make in traditionally male-dominated sectors. As more women enter and thrive in Clinical Engineering, it sets a precedent and encourages further progress in breaking down barriers and biases, fostering a more inclusive and diverse STEM workforce.



Perspectives on the role of women in Clinical Engineering



**Marie-Ange
Janvier**

Marie-Ange Janvier is a certified Clinical Engineer (CCE) at the Children's Hospital of Eastern Ontario in Ottawa, Canada. She is a licensed professional engineer in both Ontario and Quebec. Currently, she serves as the vice president of the Canadian Medical and Biological Engineering Society and is a member of the American College of Clinical Engineers. Mrs. Janvier is also the North America Regional Group Representative for the Council of Societies and Co-chair of Women in Biomedical Engineering in the International Federation for Medical and Biological Engineering (IFMBE). She holds a PhD in Biomedical Engineering from the University of Montreal and a degree in Electrical Engineering from the University of Ottawa. Additionally, she is an Adjunct Research Professor in the Department of Systems and Computer Engineering at Carleton University and an Adjunct Professor in the Department of Mechanical Engineering at the University of Ottawa.



The ten years I have been an Engineer

By Chen Jie
China

I have been working in the medical equipment department of Ningbo Women and Children's Hospital since 2014. The first decade is crucial for an engineer's career, especially for a woman engineer. For female engineers, this is the easiest time to change their careers, for instance: three girls in my class didn't like being an engineer, so they took up other majors. As for me, during these ten years working in the hospital's medical equipment department, I passed from being a recently graduated rookie clinical engineer to an intermediate engineer.

Before going any further, I would like to thank IFMBE CED for holding this initiative, allowing me to look back on the past ten years so that more people can listen to the stories of female

Clinical Engineers, reflect and move forward together with women compatriots.

When I was in university, I mainly learned theory but, the hands-on abilities learned through practices at the front line are always challenging, especially taking into consideration the vast diversity of medical departments and health technology. To become a qualified engineer, a qualified female engineer, not only needs to study hard—boldly and carefully—, but also to be able to effectively communicate with doctors, manufacturers, and other relevant personnel, and understand their needs aiming to provide better healthcare services for patients. It is important to learn and work hard, to be good and aspire to succeed, to live up



Ningbo Women and Children's Hospital in
Zhejiang, China.

to the trust of the people, and to serve the people.

I remember when I started working at my job, I had to move out so I came alone to this strange city. All were new to me: the working environment, work content, and colleagues. I felt very uneasy and anxious. At that time, equipment repair mainly relied on the fixed-line telephone, so I would easily get nervous at the ringing phone. Also, whenever I encountered new difficult tasks, I was so anxious that I started sweating.

I will share a small story from that time: when I just started my career, the Department of Gynecology called us to request a repair, and my mentor sent me to check out the medical equipment. When I got there, the doctor saw me—a new face to them at that time, and he said: why are you here? Call your mentor, you can not fix this. I remember blushing and feeling my eyes filling up with tears, and my

confidence took a hit. When the doctor saw my mentor, he immediately changed his attitude and patiently explained the situation. I made a quick diagnosis and the problem turned out to be an accidental failure related to the high-frequency electronics. In the end, since the equipment had been used for over ten years, and it was also a high-risk medical device, my mentor suggested its retirement.

The professional ability of young female engineers tends to be easily subestimated and misunderstood, and the right of discourse is relatively weak, especially for health technology maintenance-related works. This job has always been dominated mostly by men, so there is some level of certain gender discrimination. However, it is undeniable that the role of female engineers has its advantages, especially in some hospital departments, such as gynecology, obstetrics, delivery room, etcetera. In addition, in Specialized Hospitals in certain healthcare branches, such as Gynecology and Obstetrics, the advantage of female engineers is more obvious. For instance, sometime after the incident at the Department of Gynecology, I was assigned responsible for the maintenance of the medical equipment of this Department.

After spending more time working with doctors, I understand that they pay more attention, above all, to the healthcare provided to patients and

“By working in Clinical Engineering, a male-dominant field, young female engineers’ professional abilities tend to be easily subestimated due to prejudices and stereotypes.”

Female Clinical Engineers could be ideal professionals to work in health departments or Specialized Hospitals oriented to certain medical branches like Gynecology and Obstetrics.



Even though young female Clinical Engineers' abilities are questioned in most workplaces, some women's intrinsic characteristics like empathy and effective communication are deeply valued by healthcare professionals and patients.

their wellness. To give an example: in my short story shared, I felt sad about how I was treated but later I understood the situation was urgent, so the doctor did not devote attention to other things outside patient care. After that situation, I tried my best to serve their departments and work together. When there were many patients, I waited for them to finish their work before I started my own work.

By working hard with them these years, I have gained their respect. Along the way, there are not only bitter tears but also praise and flowers. During the work, especially in healthcare departments and with medical staff, they are always surprised to see a

female engineer at first. They will ask about my major but, when I fix their equipment, they will tell me how good I am and how great it is that I can fix so many types of medical equipment. How impressive that a woman can be a Clinical Engineer. Now I found out that gender was only an issue at the very beginning of my professional journey, when my professional competence was questioned and was the key core to winning trust.

The difficulties presented at the beginning of my career were naturally solved by trying to quickly adapt to the work environment, studying and working hard to enhance my professional abilities, and improving my self-confidence to prepare myself each day to face daily challenges and prove my worth regardless of my gender.

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The ten years I have been an Engineer



Chen Jie

I graduated from the Department of Biomedical Engineering at Wenzhou Medical University and currently work in the Equipment Department at Ningbo Women and Children's Hospital. My responsibilities include tracking and compiling statistics on adverse events related to medical sutures, performing daily maintenance of obstetric and gynecological medical equipment, and conducting preventive maintenance of medical devices. I am meticulous, patient, and responsible, always eager to seek advice, skilled in discussions, and full of creative ideas. Optimistic and confident, I believe that those who approach their work seriously will always find good luck.



My experience as a woman Clinical Engineer

By Jingying Gao
China

Hi, women who are considering a career in Clinical Engineering. I am a female Clinical Engineer and I have been working in the Medical Engineering Department of a large general hospital for 12 years. When I graduated with a master's degree in Biomedical Engineering, I did not know exactly what this department was responsible for. I just thought that if I worked in a hospital, I could have access to various types of health technology and medical equipment, in contrast to working with

a medical device manufacturer, where I would only have limited access to a certain kind of equipment. Indeed, my department is responsible for the whole life-cycle management of all medical equipment in the hospital, including procurement, installation, maintenance, quality control, and archive management.

As a Clinical Engineering technician, engineers are required to be brave and careful, rigorous and patient, diligent in enterprising, passionate about new technology, and dedicated to lifelong learning.

During my career, I have been in charge of more than 125 departmental units, repaired more than 6,000 medical

Gaining the recognition and gratitude of the clinical departments when I use my technical skills to solve urgent problems has made me realize the value of this profession.



Wuxi No. 2 People's Hospital: a) Northern campus and b) Southern campus.



Clinical Engineers need to be meticulous, capable of overcoming all kinds of difficulties, and mobilize all the available resources to ensure the normal operation of medical equipment. Thus, we play a vital role in the healthcare a hospital can offer to patients.

devices, and can proficiently handle common faults of multiple medical devices. I can quickly identify the cause of the problem and perform component-level self-repair, saving the hospital a lot of maintenance costs. With the improvement of my technical level, I have won many awards in national and urban Medical Engineering skills competitions, and have become a leader among young Medical Engineers in the region.

In daily work, Clinical Engineers need to adhere to the concept of excellence, be meticulous, overcome all difficulties, mobilize all resources, and try every possible means to ensure the normal operation of every medical equipment in the hospital and provide a full guarantee for the normal operation of every department in the hospital. When I use my technical abilities to solve urgent problems for the clinical departments, their recognition and gratitude make me proud and give me a sense of achievement, letting me realize the enormous value of this profession.

So, it is an interesting, challenging, and meaningful job. Welcome to join us.

Jingying Gao
Deputy Director of Medical
Engineering Department
Wuxi No.2 People's Hospital
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My experience as a woman Clinical Engineer



**Jingying
Gao**

Gao Jingying is an Associate Chief Technician with dual master's degrees in Biomedical Engineering from Southeast University and Advanced Materials from Ulm University, Germany. Since 2012, she has worked at Wuxi No.2 People's Hospital, serving in roles including Clinical Engineer in the Medical Equipment Department, Leader of the Maintenance Team, and Deputy Director of the Medical Engineering Office.

She is a member of several professional committees, including the Clinical Engineering Branch of the China Association for Medical Equipment and the Clinical Medical Engineering Professional Committee of the Wuxi Medical Association. Additionally, Gao participated as an international industry expert in reviewing the "2022 Compendium of Innovative Health Technologies for Low-Resource Settings" by the World Health Organization.

Gao has been recognized with multiple awards, including being named one of China's top 50 national technical experts in the "Clinical Engineers of China" competition. She holds a utility model patent, has published several research papers, and has contributed to a national research project under the Ministry of Science and Technology.



The “flower” of Clinical Engineering

By Wang Xi and Yin Jiao-jiao
China

From industry perception, the number of female Clinical Engineers is indeed smaller than male Clinical Engineers, just like the flowers in the green forest. This may be due to the fact that female students are less interested in Clinical Engineering curriculum courses than male students. Certainly, universities are the diversion ridge for undergraduate majors and professional career direction.

Generally speaking, men have more advantages than women in terms of physical strength and practical ability. While it is true that there used to be more men than women in Clinical Engineering, as medical equipment be-

comes more intelligent and equipment maintenance patterns are changing, more and more Clinical Engineering jobs are suitable for women to do.

What can women do when they are engaged in Clinical Engineering? With more than 30 years of experience, I share my perspective and feelings:

1. The Equipment Maintenance

In the past, due to the low degree of integration of medical equipment, the circuit was basically composed of components, and the functions were realized through circuit construction. Therefore, many kinds of components would be encountered during maintenance, and the circuit diagram was needed to check the faults one by one. This "component level" maintenance method is relatively difficult for female engineers. In fact, there are indeed more men than women engaged in engineering work.

“In Clinical Engineering, the number of female engineers is smaller than male engineers, just like the flowers in the green forest.”



“The role of women Clinical Engineers will surely consolidate through the continuous development of the industry, the increment of medical equipment information, and intelligent health technology changing each passing day.”

Now, by using electronic patch components, the degree of integration of the internal electrical components of medical devices has been greatly improved, and the equipment intelligence has become increasingly powerful. As long as the problem of which circuit board failed can be determined (it is not necessary to find out the specific component), the circuit board can be replaced directly. Therefore, the original "component level" maintenance has been upgraded to "board level" maintenance of circuit board replacement. The circuit board maintenance is completed by the manufacturer through special professional equipment, which greatly reduces maintenance's degree of difficulty for Clinical Engineers and improves maintenance efficiency.

On the other hand, many intelligent devices have their own fault diagnosis function (self-inspection) and, can be consulted remotely by the manufacturer's engineers guiding the Clinical Engineers to complete the fault diagnosis and troubleshooting through the network.

Hence, as the maintenance difficulty of medical equipment is greatly reduced, the number of female engineers working full-time in maintenance will increase. Furthermore, if medical equipment (for instance, a colposcope) suddenly breaks down during a procedure in a female patient, in order

to protect her privacy, it is preferred that female engineers intervene to realize emergency maintenance.

2. The Equipment Management

The whole life cycle management of medical equipment is also very suitable for female engineers, starting from the budget, technical evaluation, procurement, acceptance, delivery, use, preventive maintenance, repair, scrap evaluation, and other aspects.

In the management process, female engineers can get better results through hard work. For instance, our hospital has more than 200 infant incubators which are difficult to manage because of the high risk of use and scattered placement. Aiming to reduce the high risk of use, we have successfully executed a method for real-time and remote monitoring of the temperature and humidity of infant incubators. This project was led by female engineers with the cooperation of clinicians and nurses, and applying the Internet of Things technology. It is important to point out that the methodology used has been recognized by peers and obtained the first group standard for real-time medical equipment monitoring in China.

3. The Innovation and Transformation

If we can detect problems in our work and design solutions, female engineers can also obtain patents and own



Consolidation of female Clinical Engineers' role:

- As the complexity of equipment maintenance decreases, the number of female engineers working full-time in this field is expected to increase.
- Equipment management is particularly well-suited for female engineers. For example, at our hospital, female Clinical Engineers successfully led a project for real-time remote monitoring of infant incubators.
- In terms of innovation, female Clinical Engineers can secure patents and own intellectual property rights.

intellectual property rights, and even successfully realize transformation and serve society.

For example, our hospital recently developed an intrauterine blood collection device, a clinical puzzle and demand. The female engineers worked with clinicians and nursing staff to find solutions and, finally, achieve a medical device production plan. The sample is expected to be produced in May 2023

(according to the signed contract) for clinical trial before marketing. If we accomplish its use in the clinical practice, this medical device will greatly promote clinical diagnosis and treatment, and even fill the gap in the industry.

In summary, with the continuous development of the industry, the increment of medical equipment information, and intelligent health technology changing each passing day, female Clinical Engineers will surely consolidate their role, acknowledging their importance, realizing their career dreams can be achieved, to become the ideal "flower" in their minds. We firmly believe that more and more women will fall in love with and engage in this industry, and even move to senior leadership positions.

Wang Xi and Yin Jiao-jiao
from the West China Second
University Hospital, Sichuan University



The “flower” of Clinical Engineering



Wang Xi

She is a Senior Engineer and professor with over 30 years of experience in Clinical Engineering. She previously served as the Director of the Medical Equipment Support Department, where she conducted in-depth research on the intelligent management, safe use, and quality control of medical equipment and consumables. Currently, she is responsible for the innovation and transformation of clinical diagnosis and treatment technologies, medical equipment, consumables, and drugs in the hospital's Science and Technology Department.

She has contributed to the compilation of six monographs, published 55 professional articles, and holds 16 national patents. As the project leader for several research initiatives, she also actively participates in national and provincial industry associations. She is passionate about promoting industry development.



The “flower” of Clinical Engineering



Yin Jiao-jiao

Yin Jiao-jiao has worked at the West China Second Hospital of Sichuan University in China for 8 years. As a female Clinical Engineer, she is involved in the full life cycle management of medical equipment, including budgeting, equipment evaluation, procurement, acceptance, and delivery. Her strength in this role comes from her solid background in Clinical Engineering, with a foundation in both medical and engineering knowledge. She holds a bachelor's degree in Biomedical Engineering from China Medical University and a master's degree in Biomedical Engineering from the University of Electronic Science and Technology of China.



Pursuing my professional career in Clinical Engineering

By Juliana María Ballesteros Lora
Colombia

My name is Juliana María Ballesteros Lora. I am a Bioengineering graduate from the University of Antioquia, Colombia, with a specialization in Health Institutions Management. I am 29 years old, and for the last seven years, I have been dedicated to coordinating the Biomedical Engineering and Hospital Infrastructure Departments.

In 2017, I began my academic practices at a public hospital in the neighboring municipality of Medellín, which did not have an engineer for health technology management. Faced with this situation, I asked myself, "What should I do here?" I began preparing to take responsibility for the area's activities, and eventually, I not only took charge of the department but also supported other hospital processes. I became the right hand of the quality department, served as a process auditor, and participated in the financial risk management plan committee.

At the end of 2019, another public hospital, also from a neighboring municipality of Medellín, contacted me to present me with a problem: they needed to develop a project to provide medical equipment for their surgical service. They had one month to carry out this project, and I was able to accomplish it successfully. In January 2020, this hospital hired me to manage their Biomedical Engineering and infra-

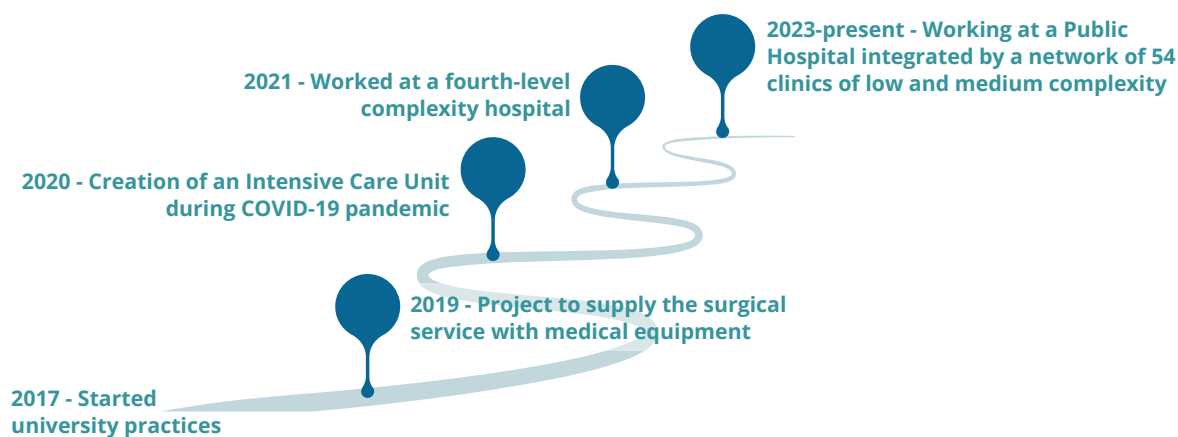
structure departments. As a result, I started working in both hospitals.

Four months later, the COVID-19 pandemic arrived and presented me with two significant challenges. One hospital needed a new four-story building with first-level health services, while the other, which only had ambulatory surgery services, required the creation of an intensive care unit ready to operate in three months. I continued working in both hospitals until I successfully completed both projects.

For the intensive care unit project, neither the hospital staff nor I had prior experience in this area. So, I studied the relevant regulations and sought support from colleagues and medical specialists to better understand health technology's operation and interaction with patients. In the end, we completed this project within the three-month deadline, providing critical healthcare during the pandemic. Similarly, in my

"We can create and achieve as much as our minds, knowledge, and willingness allow us."





other role, I successfully delivered the new facilities to care for COVID-19 patients.

In August 2020, after achieving my two biggest challenges, I decided to leave my first job to fully commit to one hospital, where I had opened the intensive care unit.

In 2021, I was contacted by a fourth-level complexity hospital, recognized at both the departmental and national level as a leader in Biomedical Engineering. Seeing this as a step up in my career, I decided to dedicate myself completely to this new challenge. During this time, I grew up both personally and professionally, particularly in leadership skills, as I managed a Biomedical Engineering Department with a team of 21 people. The hospital's emphasis on teaching allowed me to network with specialists, further strengthening my clinical knowledge to improve decision-making.

I served in this role until November 2022, when I was contacted by another public hospital, the largest public hospital in Colombia—a network with 54 operating sites of low and medium complexity. My main tasks include opening a new site, overseeing verification visits from the Sectional Health Secretary, implementing a health

technology management process from scratch, exploring technology renewal options for an institution with limited resources, and addressing the challenge of more than 40% of the hospital's biomedical technology being obsolete. I am also working to bring more engineers into this vast hospital network. This role has been a pivotal move in my career, offering numerous opportunities for improvement, and it remains my current focus.

Thanks to these experiences, on March 30, 2023, I had the opportunity to participate at the V Congress of Clinical Engineering, where I shared a project born from health technology management—an essential process for healthcare in which Clinical Engineers play a critical role.

Since then, I have dedicated my time and effort to health technology management. I have developed tools for various clinics across the country, addressing specific needs related to technology management and healthcare delivery. I have also decided to start my own company, which I hope to launch soon. My goal is to ensure that knowledge, opportunities and tools reach areas that are unaware of the transformative impact health technology can have on patient care and the work of healthcare personnel.



This will be my contribution to the field in which I have invested time and effort and gained valuable experiences—both positive and negative—that have helped me progress one step at a time, enabling me to contribute to the institutions I belong to and the society for which we work to support.



Building my professional career in Clinical Engineering



**Juliana María
Ballesteros
Lora**

I am a Bioengineer from the University of Antioquia, with a specialization in Health Institution Management from EAFIT University. I am 29 years old and was born in San Bernardo del Viento, Córdoba, Colombia.

For the past seven years, I have worked in both the public and private sectors on projects and processes related to health technology management, covering strategic, financial, and operational areas. I have led departments overseeing biomedical equipment, hospital infrastructure, medical gases, and pharmaceutical services. My experience spans hospitals of low, medium, and high complexity, as well as in coordinating large-scale hospital networks.

In addition to my professional career, I am passionate about education. I have advised students on graduation projects in Clinical Engineering and actively participate in research, supporting students and companies in developing tools according to their needs.



My journey developing a career in Biomedical Engineering in India

By Kavi Bharathi
India

I am Kavi Bharathi, currently working as an Assistant Biomedical Engineer at the Tamil Nadu Medical Services Corporation. My career began in 2012, in a small town in southern Tamil Nadu, where few people even knew what a Biomedical Engineer does. Moving from there to becoming a Biomedical Engineer at Madras Medical College in Chennai, one of Asia's largest hospitals, in 2016, was a dream realized. The challenges I faced along the way were directly proportional to the knowledge I gained in medical equipment maintenance and management.

The most difficult period of my career was during the COVID-19 pandemic, when healthcare workers were battling to save lives. My team and I were responsible for maintaining 50 ventila-

tors a day, which included preventive and corrective maintenance, transportation, installation, and ensuring that the equipment was functioning optimally. We had to keep over 300 ventilators running non-stop, which was physically and mentally exhausting. The curfew restrictions made things even harder, and with little external support, we had to be on standby at all times to fix errors immediately. We also provided remote assistance and were responsible for quickly identifying and sourcing spare parts and consumables. It was an intense effort, but in the end, we succeeded, largely due to the unwavering support and encouragement of my colleagues.

Despite the valuable lessons learned during this time, it was also incredibly stressful. We were acutely aware that lives were at stake, and every decision we made felt more critical than ever.

As a woman Biomedical Engineer, my journey was not without its challenges. In the beginning, my efforts were often overlooked, as there is a common belief that only men can handle difficult situations. However, as I persisted and my results spoke for themselves, my hard work was eventually recognized. One of the proudest moments of my career was representing Women in Clinical Engineering (WICE) at the 5th International Clinical Engineering and Health Technology Management

“The challenges I faced along the way were directly proportional to the knowledge I gained in medical equipment maintenance and management.”



Women can excel in anything they set their minds to—and Clinical Engineering is no exception.

Congress (ICEHTMC), where I had the opportunity to present my work. It was a significant milestone that marked my progress in the field.

My family, initially hesitant about my chosen career path, grew more supportive as they saw the impact of my work. During tough times, I would remind myself to give my best effort, and in the end, the satisfaction of contributing to the improvement of healthcare systems made all the struggles worthwhile.

For women pursuing a professional career, especially in Biomedical Engineering, achieving a balance between work and life is crucial. It not only makes life easier but also allows time for continuous learning and skill development. I am incredibly proud of the many women Clinical Engineers across the globe who are excelling in their careers, competing confidently alongside their male counterparts.

I would like to express my gratitude to IFMBE-CED for encouraging women in Clinical Engineering and providing a platform for us to showcase our talents. This initiative inspires the next generation of girls to pursue education and careers in Biomedical Engineering. Women can excel in anything they set their minds to—and Clinical Engineering is no exception.



My journey developing a career in Biomedical Engineering in India



**Kavi
Bharathi**

Kavi Bharathi is a Biomedical Engineer at Tamil Nadu Medical Services Corporation Limited, a public-sector enterprise under the Government of Tamil Nadu, India. With a master's degree in Biomedical Engineering and over a decade of experience in Clinical Engineering, she currently leads the Clinical Engineering wing at Rajiv Gandhi Government General Hospital, one of Asia's largest public hospitals, as well as its affiliated institutions. Her responsibilities include ensuring the efficient delivery of Clinical Engineering services to improve healthcare outcomes.

Kavi is dedicated to fostering an inclusive and empowering environment for women in Clinical Engineering. She actively collaborates with fellow female engineers to advocate for a supportive workplace and continues to work toward expanding opportunities for women in this specialized field.



Self-experiences trigger better actions!

Tanima Chinnu Tomi
India

I was carrying my precious one when, two and a half weeks before the due date, I was admitted to the Labor room with a history of recurrent contractions. As a patient, there is always an advantage when you get admitted to the hospital where you are employed: the environment and people are familiar and comfortable. Moreover, you know your medical equipment, so there are no questions or panic when you see one.

Immobile, tied down with all those sensors, and my large tummy aching, I felt uneasy. I hoped the graphs would get printed as fast as newspapers did. All in vain, my dearest colleague in there, the non-stress test (NST) machine, betrayed me: it just refused to show the contractions on the tocodynamometer. The pain persisted with no one believing me because everyone trusted what the (my!) medical equipment said. Just then, my gynecologist came in and palpated my abdomen to find contractions actually happening—contractions that the machine was not picking up. "No question of being induced, better to get up and walk." Stay active, faded the voice as I saw the figure move out to the hallway.

My mind lingered on why my machine was not picking up my contractions. The pain was no longer a concern, the machine was. I set out to investigate as

my treasure still wanted some time to make an earthly entry. Meanwhile, I approached the nursing supervisor and asked her, "Are you not reporting the issues of the NST machine and probes to the Biomedical Engineering Department? It seems the probes are not working well." She instantly replied that each time a failure is detected, the complaint is registered, and the equipment gets the pertinent corrective measures, but the cycle continues. I found that all of them had their maintenance stickers. I recalled they were properly done a few months back.

"Two and a half weeks before the due date, I was admitted to the Labor room. As a patient, there is always an advantage when you get admitted to the hospital where you are employed: the environment and people are familiar and comfortable."





The non-stress test (also known as the fetal NST) is performed during pregnancy to assess if the fetus is healthy and receiving enough oxygen by measuring fetal heart rate and its response to movement and contractions.

I kept walking, pondering about the whole thing. As I reached the store room, I saw it open, so I peeped in to look at my machines. I was jaw-dropped to find at least two to three NST machines kept away unutilized with numerous probes entangled around them, dirty and sticky. Why are these NSTs kept away in such a shabby condition? I asked surprised. These do not work properly, came the reply from behind. "Why have you not yet complained about these then?". The nursing supervisor replied: I could not find the time, and we have a few functional ones that we are swapping for easy use, so we have not made the report. My inner Biomedical Engineer suddenly struck in on-duty mode. I sternly said to the supervisor: I want them cleaned, each probe neatly tied to their respective machines, and handed them over to me now. She looked at me

in shock. "Are you serious?" she said. I almost forgot that I was a patient in the Labor room. But I did not budge, I wanted to find the root cause.

Luckily, that day was not flooded with cries and moans of the usual maternity unit chaos since the patient flow was low. That gave me some peaceful time to happily work on the medical equipment found in the store room. I swapped the transducers and response switches, checking them on myself, and comparing their performance with the available machines in service. I found out that the transducers and two machines did need service. I reported it to my colleague in the Clinical Engineering Department, who initiated further actions to resolve it.

I was admitted that same day. I had to undergo NST twice a day since there was not even a hint of what my beloved was planning internally. Each time I went in for the NST, the supervisor used to ask me if I could give them unofficial training for a particular medical equipment while I was hanging in there. I was excited and happy to help.

By being closely involved in knowing their day-to-day work and the issues they faced, I was able to help them better.



“As Female Engineers, we create numerous limitations and inhibitions by ourselves. Even when you may be in the most vulnerable state: be resilient, seize opportunities, and let your passion drive you to face those challenges.”

It took me another two days until I could hold my cherished one. Those few days, I experienced something peculiar each time I went back to the labor room for my routine exams: a sense of satisfaction, pride, peace, and pleasure whenever I managed to help the caregivers and patients resolve problems with the medical equipment. By being closely involved in knowing their day-to-day work and the issues they faced, I was able to help them better.

Back to work after my maternity leave, I made it my first task to trace the serial number of each probe and its corresponding NST machine. Then, I tagged the probes and response switches with their respective NST machine ID. This led to an easy identification of which probe belonged to which NST machine, allowing complaint tracking to be easier for both



That is **me**, a day before the birth of my child.

parts: the user and service personnel. In the long run, the new capital expenditure (CapEx) was raised intended for the purchase of additional NST machines and the replacement of worn-out probes.

It is only when—as a patient—you face an issue with the healthcare service you provide, that you realize the discomfort that comes along. You only then wholeheartedly think of ways to improve it. The nursing supervisor appreciated my efforts in training other staff at such a crucial time for me. She also thanked me for streamlining their medical equipment inventory, which undoubtedly made their work easier when it came to identification and, therefore, effective management of NSTs.

As Female Engineers, there are numerous limitations and inhibitions we create by ourselves. Even when you may be in the most vulnerable state: be resilient, seize opportunities, and let your passion drive you to face those challenges.

That was the day I realized the essence of the responsibility I carry on my shoulders at being part of the health technology management community. Being a Biomedical Engineer has always been an integral part of myself, just like my precious baby that I carried inside, a witness to all that happened. A feeling money could not possibly buy!



Self-experiences trigger better actions!



**Tanima
Chinnu Tomi**

Tanima is a graduate in Biomedical Engineering with experience spanning both the healthcare and research industries in technology management. She is an AHPI-certified (Association of Healthcare Providers India) Clinical Engineer. Currently, she heads the Biomedical Department at SK Hospital, a tertiary care facility in Trivandrum, Kerala. Tanima is also a certified soft skills trainer, with expertise in helping organizations benefit from continuous employee upskilling and reskilling in the most in-demand, human-centric skills, enabling individuals to stay agile in the evolving world of work.



The story of a Clinical Engineer working in Japan

By Emiko Asai
Japan

First of all, I hope that everyone engaged in this work, regardless of gender or country, will be able to stand by many patients and contribute to people's health.

I would like to take this opportunity to talk about three things: one, the reason why I aimed to become a Clinical Engineer; two, how to interact with patients; and three, our future.

There are about 50,000 Clinical Engineers in Japan, and about 30,000 are currently working in the medical field. It has been nearly 40 years since the national qualification was established, and the demand for Clinical Engineers is increasing along with the advancement of medical equipment in recent years.

“[...] although I am an engineer, I feel a profound responsibility for life while working closely with patients, much like doctors and nurses.”

When I was in high school and thinking about my future career, I had two options in mind. One was to become a nurse, like my mother, and the other was to pursue a job related to rehabilitation. I wanted to help my family and people close to me. Influenced by my grandfather, I aimed for a career that allowed me to work with both, machines and medicine.

Luckily, I had many friends who supported each other during our student life. They, along with my teachers, gave me a dream. During a class, a teacher showed us medical photos from overseas, and I was shocked by the differences from Japan. I had a strong desire to do something for those people, and I formed a concrete dream about what I should do.

While working at the hospital, my day-to-day duties allowed me to spend time with patients, giving me the opportunity to interact with many of them. As a result, two significant events have had a lasting impact on me. The first was when the percutaneous cardio-pulmonary support (PCPS) machine was turned off because the patient's condition was not expected to improve. The second was visiting numerous patients in the Intensive Care Unit, who were connected to machines, to check the medical equipment daily. These experiences, along with the intrinsic relationship between patient safety and



Medical work is still conducted through relationships between people, which cannot be replaced by artificial intelligence.

the field of Clinical Engineering, has made me realize that, although I am an engineer, I feel a profound responsibility for life while working closely with patients, much like doctors and nurses.

One of the most common questions about the job of a Clinical Engineer is whether this job will be replaced by artificial intelligence (AI). Medical work is still conducted through relationships between people, which cannot be replaced by AI. Of course, it is conceivable that AI will improve safety

and functionality. However, I believe that people connect with their hearts.

Furthermore, the career of a Clinical Engineer in Japan is not limited to working at a hospital but is widely sought after in society. There are many places and opportunities where Clinical Engineers can work.

I am currently a teacher at a school that trains future Clinical Engineers. Society and patients are waiting for you, and we are waiting for such companions.

I would like to express my greatest gratitude to everyone who gave me this opportunity and to everyone who read this. I wish you all the best in your success.



The story of a Clinical Engineer working in Japan



**Emiko
Asai**

My name is Emiko Asai. I am happy to contribute to daily advances in medical technology alongside a diverse range of students, utilizing my clinical experience in hospitals and my teaching experience in developing countries. I completed my master's degree at Fujita Health University in 2019, where I conducted research on the effectiveness of human resource development in advancing medical care in developing countries. After graduating, I joined Tokai College of Medical Sciences and began my current position in April 2019. I find fulfillment in contributing to medical care together with students. My hobbies include watching movies, surfing, and trying local specialties from various countries.



A measured evolution: Clinical Engineering from the metrology side

By Diana Laura Rojas
Mexico

I truly believe there is no better word to describe my professional journey than "evolution." At 18, while all my friends had everything set to begin university, I had no idea what I wanted to do. Then I discovered Biomedical Engineering, and there was no turning back. Initially, I had only one dream in mind: to create a device that would change the world.

I spent six months in the Biomedical Engineering Department of a private hospital in San Luis Potosí, Mexico, which gave me the opportunity to learn

“The rapid development of the medical industry demands new standards and systems for conformity assessment to ensure the minimal performance and safety of the new devices in the market.”

about the day-to-day life of a Clinical Engineer. I faced the stress of equipment failures in the middle of surgeries and infant incubators not working when the Neonatal Intensive Care Unit was full. Only in a hospital can you understand the impact of your actions. Every test performed, daily facility inspections, and decisions about accepting new equipment must be executed with the utmost care. However, this experience also offered me a different perspective on the health system, particularly the disconnect between the technical, administrative, and clinical areas. This led me to pursue a diploma in health institution management, where I worked with professionals from different profiles and sectors. I was the only Biomedical Engineer and the youngest student. I finally grasped that a support system working together is necessary to meet the population's needs. A person can accomplish much, but a team is always stronger.

I still remember the phrase my thesis director once told me: "How can you assure that what you are doing is actually what it must be?" At the hospital, we lacked sufficient tools to test all the equipment, and during my management course, I had to explain multiple times why medical equipment needed specialized tools to be tested. This is how I eventually moved to Guadalajara to work in one of the only



Some milestones of my career:

- In 2022, I was chosen to represent Mexico in the Young Professionals Programme (YPP) of the International Electrotechnical Commission (IEC).
- In 2023, the Mexican Society of Biomedical Engineering (SOMIB) recognized me with the Woman in Biomedical Engineering award.

two biomedical metrology companies in the country. To this day, I have learned about active medical equipment for life support, patient safety, quality management, specialized tools, and how to perform the right tests. Additionally, I have had the chance to learn about the health systems in other Latin American countries and the significant differences compared to the USA, Canada, and Europe. Thus, another phase of my career was unlocked: the Young Professionals Programme (YPP) of the International Electrotechnical Commission (IEC). I was elected to represent Mexico for the 2022 cohort after two months of training in a field that I thought I knew but, to my surprise, I did not. Once again, I was the only Biomedical Engineer. Participating in the YPP and being involved with new people was entirely refreshing for me. The rapid development of the medical industry demands new standards and systems for conformity assessment to ensure the minimal performance and safety of the new devices in the market.

Since then, I have been actively involved in raising awareness about the importance of applying international standards. In May 2023, I became a member of the IEC I-NRG group, where

we gather ideas and develop projects to create new products and services that promote the use of international standards.

I am one of those rare individuals who genuinely love what they do, and I am deeply concerned about what should be taught in universities. That is why, in 2021, I started a social media channel to discuss Clinical Engineering, metrology, and international standards with new generations of students in an easy and amusing way, hoping to spark their interest in these fields: STEM.darizate.

A great surprise came to me in October 2023 when I was recognized with the Woman in Biomedical Engineering award by the Mexican Society of Biomedical Engineering. It is truly satisfying to realize that people are noticing what you do and that they are willing to provide this kind of support and motivation, even at an early stage in my career.



In a YPP meeting at the IEC in October 2022.



Receiving the Woman in Biomedical Engineering award.

While I may not be a Clinical Engineer inside a hospital, I am delighted that my work contributes to supporting those working in hospitals, field engineers, and those who design or manufacture new devices. I hope more students find their own pathways, no matter how much time it takes. Then, with fear but no doubt, they can raise their voices and pursue their goals. Your potential is limitless: believe it.



A measured evolution: Clinical Engineering from the metrology side



**Diana Laura
Rojas**

She is a Biomedical Engineer specializing in biomedical metrology, with a particular focus on active medical devices. Throughout her professional journey, she has actively engaged with international standards relevant to the Latin American medical industry, assisting hospitals and manufacturers in identifying the necessary evaluations for compliance with standards such as IEC 60601.

Selected as Mexico's representative for the IEC Young Professional Programme in 2022, she has demonstrated her commitment to advancing standards and practices in her field. Since May 2023, she has been a dedicated member of the IEC I-NRG group. Her contributions were recognized with the Woman in Biomedical Engineering award by the Mexican Society of Biomedical Engineering in October 2023.

Passionate about promoting the importance of international standards and conformity assessment, she founded STEMdarízate, a project dedicated to educating and engaging young professionals and students in Biomedical Engineering on these critical topics.



Clinical Engineering sorority is a reality

By Fabiola Martinez Licona
From Mexico

Many years ago, I started studying Biomedical Engineering at the university. At that time, the groups were few, and the students were too. I remember that I entered in a period in which several girls, like me, decided to study Biomedical Engineering. And although some of us, including me, had no idea what it was about, it was enough for us to know that the academic program was one of the most promising, not only for incorporating technological development, a banner that was used on more than one occasion to denote an advance in the state of things but also for having an aspect of impact on people's health.

“Once we graduated, everyone took their own path [...]. My impression at the beginning was that a cycle had come to an end [...], but time proved me wrong because a bond of sisterhood was formed...”

As expected, one enters the first day of classes with uncertainty and even fear of what we may find. So, instinct directed me to find my pack, my support group with whom to work and team up to survive in these new territories. It took me only a short time to find a group of classmates with whom I identified and studied the subjects we had to endure. As time went by, the teams changed, but generally, the friendships prevailed. In particular, I remember a team of three female students of Biomedical Engineering and one in electronic engineering for circuits and systems laboratories, and another similar for practical work on biomedical systems. We shared the work between design, implementation, experimentation, taking results, analysis, and reporting. It worked well for us both for successes and lessons learned, that is, for failures.

Once we graduated, everyone took their own path, some in the academy, others in the hospital environment developing engineering and clinical research, and others in the industry. My impression at the beginning was that a cycle had come to an end, and with it, the relationship, especially with my colleagues, but time proved me wrong because a bond of sisterhood was formed that was fed with the first sporadic communications between us through phone calls or email. Talking about getting together was complicated



The female nature of the sisterhood we have formed over time supports us to continue our path and incorporate our younger sisters in the beautiful course of Clinical Engineering.

by each one's schedules, so a contact per year and a birthday greeting were enough to hear from each other.

With the development of social networks, we were able to reconnect and be more in communication, and several things were achieved: on one hand, the personal and professional updating of my friends made me feel proud of my generation; the organization of social meetings, not very frequent due to the schedules,

were planned and well-organized events where the positive atmosphere energized us in a very powerful way. On the other hand, we could enhance the opportunities to support each other in our professional projects with physical and virtual presence in activities of importance to the profession. The group was enriched by the integration of fellow Clinical Engineers who share that same essence of collaboration. And although several of our male partners contribute to this community in relevant ways, the female nature of the sisterhood we have formed over time supports us to continue our path and incorporate our younger sisters in the beautiful course of Clinical Engineering. And for that opportunity alone, I feel very grateful.



Clinical Engineering sorority is a reality



**Fabiola
Martinez
Licona**

Fabiola earned her Bachelor's and Master's degrees in Biomedical Engineering from UAM-Iztapalapa. She is a professor at the Autonomous Metropolitan University, where she has taught more than 250 courses in the undergraduate and graduate programs of the Department of Electrical Engineering. Fabiola is a member of the National Laboratory for Research in Instrumentation and Medical Imaging (CI3M), specializing in Optimization and Artificial Intelligence. Internationally, she has collaborated on speech technology and biomedical engineering projects in Argentina, Colombia, and Russia, and has supervised graduate theses. She has published research on Biomedical Engineering, Signal Processing, and Artificial Intelligence in national and international forums. Fabiola is the president of the Clinical Engineering Division of the International Federation of Medical and Biological Engineering and collaborates with the Clinical Engineering Commission of the College of Biomedical Engineers of Mexico and the Mexican Society of Biomedical Engineering.



Thank you for all, Lau. A farewell honoring BME Laura Lopez Meneses

By Roberto Ayala
Mexico

"What are they going to tell me about medical devices if I have them attached to me all day long." That is how my Lau—which was how we affectionately called the Biomedical Engineer Laura Patricia Lopez Meneses—used to joke about it since, due to a cardiovascular procedure, she had to carry an implanted pacemaker, an oxygen concentrator, and a pulse oximeter. But this never limited her from giving her best to the Biomedical Engineering profession, and particularly, to her specialty: Clinical Engineering.

I began to get to know Laura in the early 2000s through interviews I was doing to gather information on medical equipment incorporation processes while I was working for a nationwide private hospital corporation. Nevertheless, I later discovered through

a photograph she had hanging in her workplace, that we actually "met" for the first time in 1986 at a National Congress organized by the Mexican Society of Biomedical Engineering.

I do not know much about her professional career after she graduated from the Universidad Autónoma Metropolitana (in English, Autonomous Metropolitan University) but, I do know very well that she was a key player in the creation of the National Center of Technological Excellence in Health (CENETEC) of the Mexican Ministry of Health, since in the early 2000s, she was part of the team invited by Adriana Velázquez to aim this national milestone. I remember she told me an anecdote about how they struggled to find a name for the unit, eventually settling on emulating that of the



A photo from the first time Lau and I met at the National Congress of Biomedical Engineering, Mexico 1986.

- Laura López played a key role in the establishment of CENETEC, by being part of the team led by Adriana Velázquez.
- During her time as deputy director of Clinical Engineering at CENETEC there were big advancements in Mexico's building capacity for CE, with publications about good practices and guidelines.
- Also, Laura contributed to worldwide Clinical Engineering through her collaboration with the World Health Organization as an advisor in the publication of technical specifications guides.

National Institute for Health Care Excellence (NICE) in the United Kingdom, from whom they had learned about the assessment of health technologies.

In 2012 I joined CENETEC as director of the Biomedical Engineering area, of which Lau was deputy director of Clinical Engineering. She immediately taught me the principles and relevance of medical equipment management, through a scheme that she helped to establish and on which all actions performed around the technology life cycle can be grouped into five major processes: planning, incorporation, installation, operation, and removal. Furthermore, we almost immediately gave continuity to the nationwide Clinical Engineering training workshops, which were very well received by the community.

"The best way to establish these processes in the health system is first with the conviction of those who have to carry them out," she told me, and although she could not travel much due

to her health condition, she tried to be attentive to the results. Besides, she was a promoter of generating regulations for Biomedical Engineering professionals to be part of hospital units and for medical equipment management processes to be recognized as their tasks. She was also involved in health technology assessment tasks.

"What do you mean you don't use social media?" she questioned me one day. "You should. It's a practical way to stay in touch with those who might have an interest in what we do." So thanks to her I began to have more presence in some social media channels, opening a Facebook page of the Biomedical Engineering Unit at CENETEC, which reached about 14 thousand followers.

No one was unaware of the empathy that Laura generated, not only because she always made her knowledge available to those who needed it, but also because she always sought good treatment towards others.

After leaving CENETEC in 2015, Laura remained active as an advisor and collaborator with international bodies



At one of the Clinical Engineering Workshops coordinated by Laura.



such as the World Health Organization, where she contributed to important publications such as the technical specifications guide for blood pressure measurement devices or the list of essential medical devices for the care of cardiovascular diseases and diabetes.

Sadly, Lau died on September 6th, 2021, due to COVID-19 complications.

Her physical presence will no longer be with us, but her legacy and teachings will prevail in time, her love for the

profession will keep us motivated to continue on the path she helped forge and the love she professed for others will be the balm that will allow us to move forward as we heal from her loss.

Thank you. Thank you so much for everything, my Lau.

Note: This publication was first available in Spanish on the following link: <https://www.linkedin.com/pulse/gracias-por-todo-lau-roberto-ayala/>



A photo of the Biomedical Engineering Team at CENETEC. Laura seated at the center.



Thank you for all, Lau. A farewell honoring BME Laura Lopez Meneses



**Laura
Patricia
Lopez
Meneses**

Born in Mexico City on June 2, 1965, Laura Lopez earned her undergraduate degree in Biomedical Engineering from the Universidad Autónoma Metropolitana, Mexico City, in 1988, and pursued studies in Radiological and Hospital Safety at San Carlos University Hospital in Madrid, Spain. She played a key role in the establishment of the National Centre for Healthcare Technology Excellence (CENETEC) under Mexico's Ministry of Health in 2002, where she served as Deputy Director in the Biomedical Engineering and later the Health Technology Assessment departments until 2016. Afterward, she worked primarily as an independent consultant, collaborating with international organizations such as the World Health Organization. She passed away in September 2021, along with her beloved husband, Jesús Barragán, due to complications from COVID-19, leaving behind two children.



Success stories in Clinical Engineering at the Ministry of Health in Tabasco

By Veronica G. Castillo Sanchez
Mexico

Infrastructure:

Currently, the Ministry of Health in Tabasco (Secretaría de Salud Tabasco) has 616 medical units classified as follows:

- 1st. level: 568 health centers,
- 2nd. level: 18 General and Community Hospitals, and
- 3rd. level: 5 High Speciality Regional Hospitals (HRAES).

Timeline:

2017

- September 2017: Incorporation of the Biomedical Engineering profile in the Medical Care Department.
- First challenge: Integration of a medical equipment inventory of the 5 HRAES with the support of Biomedical Engineering students from the Olmeca University. A total of 551 medical equipment items

The **first challenge** faced was the integration of a medical equipment inventory of the 5 HRAES, realized with the support of Biomedical Engineering students from Olmeca University.

In **2018**, with CENETEC support, we proposed the creation of a Department of Biomedical Engineering.

In **2019**, the first Department of Biomedical Engineering was established and started a training program for students.

were inventoried, equivalent to 40% of the installed base of medical equipment.

2018

- With the report generated at the end of 2017, the final survey report is presented to the Secretary of Health, detailing the main needs of the medical equipment (functional status, useful life, and maintenance needs).
- The creation of a Department of Biomedical Engineering, which would be in the Directorate of Medical Care, is proposed as a solution. To promote this initiative, we received the support of the National Center for Technological Excellence in Health (CENETEC), and together we presented the benefits of having a State Department of Biomedical Engineering.

2019

- Some actions related to Medical Team Management are included in the State Development Plan 2019-2024:
 - **Line of action: 2.5.3.6.2.4.:** Establish the State Unit for Biomedical Engineering and Health Technology, which regulates the acquisition and operation of high technology.
- The Hospital del Niño "Dr. Rodolfo Nieto Padrón" (a pediatric health-





Biomedical Engineering students during a hospital tour organized to enrich their education (with me at the center).



Collecting data from the anesthetic machine as part of my duties in the Biomedical Engineering Department.

care hospital) and the Hospital “Dr. Gustavo A. Rovirosa Pérez” begin to receive social service providers of Biomedical Engineering. The Hospital del Niño establishes the first Department of Biomedical Engineering attached to the Planning area.

- We started with the elaboration of projects for the replacement of medical equipment and strengthening of Medical Units, with the support of INSABI (Instituto de Salud para el Bienestar, Institute of Health for Wellness). INSABI provides health services to people who are not entitled to any institution of the National Health System. Currently, INSABI does not longer exist, it was replaced in 2023 by IMSS-Bienestar.

In **2019**, we started the elaboration of projects for the replacement of medical equipment. These projects were reactivated in 2021.

In **2020**, during the COVID-19 pandemic, we managed to convert 30.4% of beds to treat severe and high severe COVID-10.

2020

- During the pandemic, we consolidated the profession in the State of Tabasco and achieved the hiring of Biomedical Engineering personnel for the COVID Units.
- At the end of 2019, there were 1,584 hospital beds and 83 intensive care beds in the sector.
- At the beginning of the pandemic, the sector converted 30.4% of the beds to treat severe and high-severe COVID-19 cases.
- 185 mechanical ventilators and 1 computed tomography scan were purchased.



The Biomedical Engineering Department in a meeting with healthcare stakeholders during the COVID-19 Pandemic.





X-ray area before (left) and after (right) its remodeling.



Creation of a new operating room in one of the Ministry of Health's hospitals.

2021

- Challenge: hospital deconversion, increase in patients with chronic diseases due to the backlog left by the COVID-19 pandemic.
- Reactivation of the INSABI projects: "Oncology Tower Equipment," "CESSA Maximiliano Dorantes Equipment," "Replacement of the Linear Accelerator and Brachytherapy Equipment," "General Hospitals and Community Hospitals Equipment," "High Speciality Regional Hospitals and UNEME Imaging Equipment."

2022

- The need for more Biomedical Engi-

In **2021**, we faced the challenge of hospital deconversion and the increment in patients with chronic diseases as consequences of the COVID-19 pandemic.

For **2022**, the need for Biomedical Engineers became tangible, so we managed to incorporate more professionals into the HRAES (High Speciality Regional Hospitals).

Currently (2023), we are focused on the incorporation of 5,251 new medical devices for 2nd. and 3rd. level hospitals.

neers became tangible, and we managed to incorporate more professionals into the High Speciality Regional Hospitals.

- A functional inventory is carried out using the G-Suit in second-level care units, resulting in accurate information on 905 medical equipment items located in 18 hospitals.

2023

- We are currently receiving medical equipment from the INSABI (now, IMSS-Bienestar) projects: 5,251 new medical devices for second and third-level medical care hospital units.



Installation of a MRI machine.

Success stories in Clinical Engineering at the Ministry of Health in Tabasco



**Veronica G.
Castillo
Sanchez**

Veronica G. Castillo Sanchez, a Biomedical Engineer with a Master's degree in Hospital Management and Administration, has been leading medical equipment management at the Ministry of Health in Tabasco since 2017. Her expertise includes planning, procurement, installation, and maintenance of medical devices, ensuring optimal functionality and quality across hospital units. She has also designed and implemented equipment strategies, overseen hospital operations, and managed infrastructure projects, with a strong focus on safety protocols and compliance with Mexican regulations.



My journey as a Clinical Engineer

By Comfort Seun Ajaelu
Nigeria

I grew up seeing every female around as a teacher or a nurse, and my young mind began seeking, asking there surely would be more opportunities for women to explore. I wanted something more challenging, and my first childhood dream was to become a medical doctor, until one day when I saw on a television show that a female child could be a builder or a marine engineer. That day, I told myself: if I could not become a medical doctor, I would rather be an engineer.

After my secondary school education, I was admitted to study civil engineering at Ladoke Akintola University of Technology in Ogbomoso, Nigeria. Thereafter, I made up my mind to pursue the teaching and research aspect of engineering, so immediately after obtaining my first degree, I went for my first master's degree in civil engineering with a specialization in public health and environmental engi-

neering option. I found the course interesting, and I graduated with a PhD grade. During this time, the public health aspect of my postgraduate reminded me of my childhood dream to become a medical doctor. So, when the call for Africa Biomedical Engineering Mobility (ABEM) was out, I was delighted to learn about a field of study that could bridge my desire to become a medical doctor who helps the sick and an engineer who loves solving problems.

This new knowledge of the Biomedical Engineering profession and my desire to achieve goals in this health-related area inspired me to opt for a second master's degree. Therefore, I applied for ABEM and was granted a scholarship and admission to study at Mbarara University of Science and Technology in Uganda. I traveled to Uganda with a set of twins and my husband. I have enjoyed good support throughout my life, especially on my career path, from

“During this time, the public health aspect of my postgraduate reminded me of my childhood dream to become a medical doctor.”



I departed Nigeria with my family in 2018 to pursue my master's degree in Uganda.



“I believe in the principle of doing with all my might whatever my hands find to do.”

from God and everyone around me: my parents, disciplers, mentors, siblings, friends, and husband. Despite my challenging routine as a mother and wife, the support I received gave me a lot of life balance, allowing me to graduate with a first-class (4.82/5.0) and as the best student in my international class.

I had a great experience while I was in East Africa pursuing my specialization in Biomedical Engineering. I believe in the principle of doing with all my might whatever my hands find to do. So, while pursuing my master's degree, in 2018 I participated in a Swiss-Africa business workshop that took place in Nairobi, Kenya where I presented a research



Myself, along with a group of fellow ABEM scholarship recipients from Nigeria, Ethiopia, and Kenya.

idea on the development of a neonatal application for detecting jaundice in Africa. Also, I attended conferences and workshops on the application of artificial intelligence in solving medical problems in Uganda.

Being a Clinical Engineer set me on the path of fulfilling my childhood dream. Now, my goal is to train future Clinical Engineers and contribute to solving the problems of late, inaccurate, expensive diagnosis and treatment of diseases in Africa.



Departing Uganda for Nigeria after excelling in my postgraduate studies, with the support of my family.



My journey as a Clinical Engineer



**Comfort
Seun
Ajaelu**

Comfort is a lecturer in the Department of Biomedical Engineering, Faculty of Technology, University of Ibadan, Nigeria. She was a beneficiary of the Africa Biomedical Engineering Mobility (ABEM) project under the Intra-African Mobility Scheme of the European Union, which supported her in earning a master's degree in Health Information Technology from Mbarara University of Science and Technology, Uganda. This opportunity allowed her to be among the early group of Africans trained in the emerging field of Biomedical Engineering.

Comfort is currently a Co-Ambassador in Nigeria for the African Students and Alumni Forum (ASAF), funded by the European Union. She has published in peer-reviewed journals and attended international conferences and training courses.

Comfort is a member of the Nigerian Society of Engineers (NSE). Her research interests include maternal and child health, bioinformatics techniques for early disease diagnosis and intervention, digital health innovations, and biomedical data modeling and simulation. She is happily married and blessed with two children.



Dealing with heavy work as female engineers

By Maria Cristina Perez Leon Sosa
Peru

Hello, I am a Peruvian field service electronic engineer specializing in medical equipment, and here is my story. As some background about my professional development, I had the opportunity to take several training courses outside my country.

From my point of view, a disadvantage we have as a female field service engineer is how to handle heavy tools and equipment without asking for help so as not to be perceived or labeled as weak. For these situations, I recommend you always keep your eyes and mind wide open, so you can apply your knowledge and be creative. As women, these qualities are in our intrinsic characteristics.

I am glad that I have always found a way to move equipment without using my force. For example, once, I had to move a laminar flow cabinet from the warehouse to the laboratory because the dispatcher left it there. There was around 100 meters of distance in between, and the laboratory manager wanted my company to move it, but it would take a while to have someone to do it and I was already there, so I had to do it by myself. At the medical center, the employees were only women, but they were all occupied in their work. I looked around and noticed they had lots of wood, so I took some of them and managed to put them under one

side of the box. Then, I rolled the cabinet (just as the Egyptians did) until I reached the laboratory entrance. Later, I proceeded to open the wooden box, also without help. My wit to resolve a day-to-day situation helped me gain the respect of the laboratory manager and his colleagues, and the rest is history.

In my actual position, I do the maintenance of vacuum pumps that weigh more than 25 kilograms (around 55 pounds). Here what I do is lift it from one side, put a cardboard under it, place the vacuum pump again, and move the cardboard until the correct place to lift the vacuum pump completely. This technique has been helpful in avoiding injuries from carrying the vacuum pump and protecting it from damage while transporting. In the end, I did not need help and nobody noticed that "a woman" did the job.

If the systems are heavier, I am no longer afraid to ask for help: two persons can manage it more safely. Our physical abilities do not measure our capabilities as Clinical Engineers; even male engineers ask for help to avoid having a back injury. My recommendation is to be aware: you are not "a woman", you are human.

With Love,
Maria Cristina Perez Leon Sosa.



Dealing with heavy work as female engineers



**Maria
Cristina
Perez Leon
Sosa**

My name is Maria Cristina Perez Leon Sosa, and I am a 39-year-old Electronic Engineer from Lima, Perú, specializing as a Field Service Engineer.

My career began while I was finishing college, working as a service coordinator at H. W. KESSEL S. A., a local family-owned company. After my trial period, I joined the field team as a Quality Control Engineer, and the following year, I was promoted to Junior Field Service Engineer.

My problem-solving abilities and other skills helped me become a specialized Field Service Engineer for renowned global brands like ZEISS.

Looking back, I can only be grateful for everything I have experienced. I have had the opportunity to work with people who respected me, believed in me, and challenged me with tasks that opened doors to better opportunities and places. That has been the best gift I could have ever wished for.



A letter to female Clinical Engineers

By Melissa Concha Lopez
Peru

A message to all the women Clinical Engineers, from my experience working for more than 15 years as a field service engineer, 10 of them in GE HealthCare (GEHC):

It is an honor—and a challenge—to be the only woman holding a position of field service engineer in the modality of X-ray machines, computed tomography scanners, mammography systems, and vascular equipment throughout the Cove region of my company, where I am particularly working in the installation, and preventive and corrective maintenance. The real challenge was not getting the opportunity to work at GEHC: it was to stay in and grow professionally for more than ten consecutive years. There had been many difficulties, one of them being that I do not have the strength that my

male colleagues have to lift or move parts that weigh 80 kg - 100 kg, or to loosen 60 Nm - 100 Nm screws. However, as I was once taught "it is not strength, it is skill" which will help you find the best solution to any problem. There will always be tools that will allow you to achieve the goal, and we have many other qualities and aptitudes that lead us to be good at what we do and solve any problem that arises.

Women, if one day you are given the opportunity—either because of your abilities and knowledge or gender diversity—you must take advantage of it: give your best, stand out, and demonstrate being a woman does not represent a difference or a limitation. You can achieve your goals and overcome any challenge that comes your way.



“The real challenge was not getting the opportunity to work at GEHC: it was to stay in and grow professionally for more than ten consecutive years.”

A letter to female Clinical Engineers



**Melissa
Concha
Lopez**

My name is Melissa Concha Lopez. I was born and raised in the city of Cusco, but I currently live in Lima. I studied Electronic Engineering at the National University of San Antonio Abad de Cusco (UNSSAC). In 2007, I completed my professional internship at the Regional Hospital of Cusco. From 2008 to 2014, I worked at Grupo Tecnológico del Perú SAC, where I was responsible for the installation and maintenance of mid-range equipment such as vital sign monitors, fetal monitors, defibrillators, ultrasounds, digitizers, digital printers, operating tables, and more, from brands like PHILIPS, Mindray, and Fujifilm. Since February 2013, I have been working at GE Healthcare del Perú, specializing in X-rays, mammography, tomography, and vascular equipment. My role includes installation, preventive and corrective maintenance, as well as conducting power and grounding audits and safety audits.



My journey in Clinical Engineering

By Mery Vidal Vidal
Peru

Mery Vidal is Peruvian, married, and the mother of two beautiful children. She considers herself a person of integrity, someone who is committed, passionate, and supportive. Her philosophy of life is to be happy and enjoy life, to contribute to a better world through a fairer and more equitable society, a better country, and a sustainable planet, and to positively impact many people. She is a referent, speaker, and active participant in the development of Clinical Engineering in Peru and Latin America.

Mery Vidal is the regional manager of Clinical Engineering and medical devices for the AUNA Group in Peru, Colombia and Mexico, president and founder of the Peruvian Association of Clinical En-

gineers (ASPIC), and a professor in Clinical Engineering at the Pontifical Catholic University of Peru (PUCP). She graduated in electronic engineering from PUCP and is a certified Clinical Engineer by the US Healthcare Technology Foundation. She also holds a Master of Global Business Administration from Tulane University, USA, and Centrum PUCP Business School, Peru. She is a member of various international associations such as the American College of Clinical Engineering (ACCE), Association for the Advancement of Medical Instrumentation (AAMI), FEPAS, and a collaborating Member of the IFMBE CED.

As one of her major professional accomplishments, Mery Vidal founded the Clinical Engineering Department at AUNA in 2010. Since then, it has grown into a strategic department that actively participates in the decision-making process and has a cutting-edge management approach that has been applied successfully in three countries (Peru, Colombia, and Mexico). This department has employed more than 60 people, manages more than 20 medical facilities, and oversees an inventory of USD 120M in medical assets, leading 100% of the lifecycle of medical equipment: evaluation, planning, acquisition, reception, maintenance, and final disposition. It has actively participated in the implementation of five medical facilities in Peru (four) and Colombia (one) with

“As Clinical Engineering leaders, we should be ambassadors of the humanization of the healthcare environment and give access to good quality, affordable, appropriate, safe, and efficacious medical devices.”



Mery Vidal is the regional manager of clinical engineering and medical devices for the AUNA Group in Peru, Colombia and Mexico, president and founder of the Peruvian Association of Clinical Engineers (ASPIC), and a professor in Clinical Engineering at the Pontifical Catholic University of Peru (PUCP).

satisfactory results in time, scope, and cost, and has transferred this knowledge. Additionally, it has contributed to the rise of the Clinical Engineering profession by promoting the creation of other Clinical Engineering Departments in Peru and has improved the level of service of major suppliers.

In her current and past roles, she promoted a shift in the Clinical Engineering paradigm from engineers maintaining medical equipment to technology managers of medical equipment. In recognition of her contributions to the Clinical Engineering field in Latin America, she received the recognition of her leadership given by AUNA's Clinical Engineering team in 2019, the Antonio Hernandez International Clinical Engineering Award from ACCE in 2021, and was inducted into the AAMI Fellow Class of 2022. Also in 2022, she was selected as a member of the first-ever Strategic and Technical Advisory Group on Medical Devices (STAG MEDEV) from the World Health Organization and was recognized by the Peruvian Federation of Health Administrators.

Mery always says: "As Clinical Engineering leaders, we should be ambassadors of the humanization of the healthcare environment and give access to good quality, affordable, appropriate, safe, and efficacious medical devices. There is much to do in Latin America, especially in developing and low-income countries. In that sense, I want to be part of a group whose efforts can make a significant impact and contribution."

Being recognized as part of the WICE stories will help her to positively impact more Clinical Engineers, and more women not only in Latin America but globally.



Mery Vidal received the Antonio Hernandez International Clinical Engineering Award, granted by ACCE in 2021.



Being a partner of the medical team

By Ewa Zalewska
Poland

Abstract

This story describes the experiences of working in the unique aspect of Clinical Engineering—as a creative partner of the medical team. This role involves participating in medical equipment application by contributing interdisciplinary knowledge and a holistic approach to performing patients' examinations and interpreting results. This is especially valuable in difficult, borderline, or atypical cases when a differential and verification analysis is needed. Women's aptitudes in this domain are valuable and desirable.

Why this role is important and necessary?

The increasing complexity of medical equipment and the widening knowledge base needed for its functions have resulted in the need for Clinical Engineers as creative partners of the medical team, not only in technical support but also in medical procedures.

Medical equipment and implemented methods for analysis, even very advanced, have unavoidable limitations, especially when automatic analysis of measurements is applied. Routine utility may not be sufficient in difficult, borderline, or atypical cases to solve the diagnostic problem requiring enhanced and differential diagnosis and may even lead to misdiagnoses. Clearing up any doubts or verifying diagnostic hypotheses requires understanding the concept on an advanced level,

as well as the technology of medical equipment itself, and applied beyond routine scope in a creative manner. Therefore, the participation of Clinical Engineers in providing such support has become desirable and has established an important role for this profession.

In my career, I have been a member, partner, or consultant of the medical team in everyday practice, in the field of neurophysiology. In what follows, I would like to share my experiences in this role, highlighting its importance and attractiveness.

On the way

Two crucial steps helped me reach this professional position. Firstly, when choosing Biomedical Engineering as a field of study, I focused my interests on neurosciences and started collaborating

“In my career, I have been a member, partner, or consultant of the medical team in everyday practice, in the field of neurophysiology.”



with the medical students' scientific circle at the medical academy. This was an invaluable school of cooperation and mutual understanding of different points of view, gaining medical knowledge, first experiences in solving interdisciplinary problems, and learning how to communicate with medical professionals to understand each other. Students' collaboration is the best opportunity for gaining such skills. I value these early experiences very much because they allowed me to enter a medical environment later as a valued contributor without the usual barriers in cooperation between specialists from different fields.

Secondly, I started my professional career as a constructor and designer of devices for neurophysiological examinations and conducted clinical tests of these devices in hospitals, which gave me the opportunity to test my skills in hospital practice. Having the ability to directly assess the effectiveness and limitations of the apparatus where my design contribution was applied, and receiving direct feedback from medical professionals, was crucially important. By overcoming these two thresholds, I was able to attain a position as a partner of medical teams in everyday practice.

How do I reach working in the neurosciences field?

- Collaboration with medical students.
- Work on constructing and designing devices for neurophysiological examinations and conduct clinical tests.

In practice

In everyday practice, I have been developing measurement methods and analysis procedures useful in cases where an interdisciplinary approach and technical point of view were necessary. In the field of neurophysiology, due to the variability of signals and reactivity to stimulation, the occurrence of various kinds of artifacts, standardization, and automation is not easy and efficient. Difficult and atypical cases encountered in everyday practice require an individual approach and enhancement of methodological and technical facilities.

In electroencephalography, for example, it involves adjusting a dedicated multimodal stimulation program, analyzing changes in spontaneous brain activity during stimulation which enriches the interpretation of evoked potentials and allows verifying some diagnostic doubts, differentiating seizure and pseudo-seizure brain activity, and identifying other kinds of physiological but atypical activity. In some cases, analyzing interactions between brain and heart bioelectrical activity was helpful.

In electromyography, for example, it involves analyzing atypical motor unit potentials of various shapes, often with satellite components, which are classified as outliers by automatic methods and excluded from analysis and evaluation. In fact, these outliers contain very relevant diagnostic information, sometimes necessary for a correct diagnosis.

An important aspect was correlating the results of neurophysiological examina-



“This area of activity is intriguing as it delves into the essence of Clinical Engineering, which is an interface between medical and technical aspects.”

tions with structure and morphology, i.e., neuroimages and muscle biopsy, including functional neuroimaging synchronized with neurophysiological recordings. This integrated analysis led to finding explanations in special cases.

It is important to note that these extended diagnostic procedures cannot be standardized, as each atypical case necessitates an individual approach.

Recognition of activities in this role

Recognition of competencies, belief in the value of creative engineering contribution, and trust from partners were built over the years. The experiences and achievements acquired over almost 40 years have solidified the belief in the value they represent.

Being an active member of the Polish Society of Clinical Neurophysiology and holding entrusted functions within the organization attest to my recognized partner position in the medical environment. Since 1997, I have held various essential positions, including serving as a member of the board, sections, and education committee. From 2015 to 2025, I will also be serving as a board member and the president of the largest Warsaw chapter of this medical society.

Recommendations

Collaboration of Clinical Engineers with medical teams as a partner in everyday practice improves healthcare delivery and is an important factor in creating new ideas and supporting development in both medicine and Clinical Engineering.

This area of activity is intriguing as it delves into the essence of Clinical Engineering, which is an interface between medical and technical aspects. It is important to underline that while partnering with medical professionals in everyday practice may seem similar to the collaboration of medical and technical teams in research studies, the level of involvement and responsibility is vastly different. The former aims to address individual patient needs and resolve specific diagnostic challenges, with success evaluated by the improvement in the patient's outcome. This should be distinguished from technical support and collaboration in research studies.

My experiences in the aforementioned field indicate that women's aptitudes in the required holistic and creative approach are valuable and desirable. Therefore, this path of a professional career in Clinical Engineering should be considered by women.



Being a partner of the medical team



**Ewa
Zalewska**

Professor of Biomedical Engineering and a specialist in Clinical Engineering, Ewa's professional focus is on the application of Clinical Engineering in neurophysiology. Her contributions to integrating engineering into everyday medical practice have earned her a respected position within both the Clinical Engineering and medical communities.

She served as the secretary general of the Polish Society of Medical Physics and later as secretary and president of the Polish Society of Biomedical Engineering. She has also been a regional consultant in Medical Engineering (the term used for Clinical Engineering in Poland). From 2012 to 2018, she was a member of IFMBE CED. Concurrently, she has held positions in the Polish Society of Clinical Neurophysiology, where she is now a board member and president of the Warsaw chapter. She was a co-founder and is currently the president of the Clinical Engineering Association of Poland, as well as the editor-in-chief of a journal published in Polish on medical physics and engineering. This year, she was appointed National Consultant in Medical Engineering.



Witnessing the transformation of Saudi Arabia into a country that actively pursues women's career development

By Sarah K. Albahiti
Saudi Arabia

My journey as a Clinical Engineer began in 2000. At that time, I believe I was the first female Saudi engineer with both a bachelor's and master's degree in Biomedical Engineering, along with a second master's in engineering management. However, the professional landscape was not yet prepared to accommodate women in engineering roles. There were no universities offering engineering programs for women, and the workplace was not designed to place female engineers on equal footing with their male counterparts.

To prove my capabilities, I volunteered for six months before securing a perma-

nent position as a Clinical Engineer at King Abdulaziz Medical City in Jeddah, National Guard Health Affairs. My role involved the repair and maintenance of various medical devices, including infusion pumps, defibrillators, patient monitors, incubators, and more. I also conducted preventive maintenance tests in critical areas such as operating rooms and intensive care units.

I vividly recall the initial reactions of surprise from colleagues when they saw my toolbox or the screwdriver in my lab coat pocket. Over time, that surprise turned into admiration as I demonstrated my competence and expertise. My skills in troubleshooting and repair continued to grow, leading to my assignment in the female ward and delivery unit—an area where my presence was particularly valuable due to privacy considerations for female patients.

“Despite my achievements, being the only female in this field came with limitations, particularly in terms of career advancement.”

In 2000, Saudi Arabia's professional landscape was not yet prepared to accommodate women in engineering roles:

- There were no universities offering engineering programs for women,
- The workplace was not designed to place female engineers on footing with their male counterparts.



“The country has moved from being unprepared for female engineers to actively encouraging them into leadership roles. I consider myself a living example of this progress [...].”

As my responsibilities expanded, I became involved in hospital-wide projects, including capital medical equipment procurement, installation, and acceptance testing. I also contributed to writing technical specifications for new medical equipment tenders. My career continued to progress, and I eventually transitioned to the Senior Engineer role in the Project Commissioning Division. Here, my knowledge of medical equipment was applied on a broader scale, working closely with management, healthcare professionals, engineers, and manufacturers to address operational needs.

Despite my achievements, being the only female in this field came with limitations, particularly in terms of career advancement. I faced a critical decision: remain patient and continue my slow ascent as a female Clinical Engineer, or seize the opportunity to pursue a Ph.D. in Medical Physics in the United Kingdom. Due to family commitments, I chose the latter.

Three years later, I returned to Saudi Arabia and joined King Abdulaziz University's Faculty of Medicine as an academic staff member. Despite the fact that engineering programs for women were still unavailable at that time, my background as a Clinical Engineer proved invaluable. As a medical physicist, I was responsible for quality control testing and managing radiation protection in diagnostic imaging. My engineering expertise

allowed me to optimize imaging equipment performance and ensure patient safety—an intersection of Clinical Engineering and Medical Physics that holds great potential for healthcare quality improvement.

Today, after more than 22 years in the field, I am an Associate Professor with extensive experience in teaching and training medical students and physicists. I have published numerous papers on diagnostic imaging and patient safety, and I work with national regulatory bodies to standardize safety protocols. As the chairperson of the Saudi Scientific Society for Biomedical Engineering (SSSBE), I am proud to lead the Biomedical and Clinical Engineering community in the region.

I am deeply grateful to have witnessed the profound changes that Saudi Arabia has undergone in recent years. Several universities now offer Biomedical and Clinical Engineering programs for women, and the workforce is becoming increasingly inclusive. The country has moved from being unprepared for female engineers to actively encouraging them into leadership roles. I consider myself a living example of this progress—from initially being excluded from the SSSBE due to gender segregation, to becoming the chairperson of the very society that once limited my participation. Today, I am proud to contribute to the growth and development of both men and women in the field of engineering.



Witnessing the transformation of Saudi Arabia into a country that actively pursues women's career development



**Sarah K.
Albahiti**

Dr. Eng. Sarah K. Albahiti is a distinguished Biomedical Engineer and Medical Physicist with over 22 years of experience in healthcare and education. She specializes in quality control for diagnostic imaging and patient radiation safety, collaborating closely with governing bodies to ensure that the highest standards are upheld across the country.

Dr. Albahiti is the founder and Deputy Secretary General of ArabSafe (arabsafe.org), an initiative dedicated to improving diagnostic imaging practices, supporting self-regulation, and raising awareness about radiation safety for patients, healthcare workers, and the general public. ArabSafe, which promotes a culture of radiation safety, is endorsed by the World Health Organization, the International Society of Radiology, and AfroSafe Imaging.

Dr. Albahiti previously served as a Senior Engineer at King Abdulaziz Medical City in Jeddah. Currently, she is an Associate Professor at the Faculty of Medicine at King Abdulaziz University in Jeddah, Saudi Arabia.



My experience as a Clinical Engineer immigrant

By Maria Isabel Alvarez Sisiruca
United States of America

Hello, I am Maria from Venezuela. Since 2015, I have lived in Orlando, FL, USA with my two beautiful daughters, my son and my husband, and I will share a little bit about who I am and how I got here.

I resigned from my position as a Clinical Engineer in Venezuela to move to the United States of America in 2015, where I have had various work experiences, always with the goal in mind of continuing my professional development in the engineering field.

In Venezuela, I graduated in Electronic Engineering in 2009, with postgraduate studies in Clinical Engineering in 2012. In my native country, most of my professional experience was in the areas of Clinical Engineering, bioengineering, and healthcare technology management.

My professional experience in the USA between 2015 and 2022 spans various areas of customer service and IT support at companies such as Lowe's, Universal Studios, and Amazon. I have also worked in electronic technical support for a local patio LED lights company and as a Clinical Engineer at

Alluriam Healthcare, a start-up technology platform that integrates telehealth, coaching partners, specialists, providers, payers, laboratories, imaging, traditional and complementary medicine (T&CM), and information technologies.

It has been 8 years of adapting to a new country, culture, and language, and being a mom for the first time. Throughout this journey, I have always strived to perfect my English and validate my engineering degree, which I did in 2021.

In 2020, during the COVID-19 pandemic, I decided to pursue a position in the Clinical Engineering area for the first time since arriving in this country. I officially entered the field in 2021, and by 2022 I gained my first professional experience in a hospital setting in the USA at AdventHealth Hospital as a Clinical Engineer II. This was followed by a promotion to Clinical Engineer III in 2023. In February 2024, I had the opportunity to continue growing my career with a Senior Clinical Engineer role at Orlando Health Hospital, a position I currently hold with great satisfaction and enthusiasm.

“It has been 8 years of adapting to a new country, culture, and language, and being a mom for the first time.”



My career path since I moved to the United States in 2015:

- In 2021, I had validated my engineering degree.
- In 2022, I started working as a Clinical Engineer II at AdventHealth Hospital and was promoted to Clinical Engineer III in 2023.
- Currently, I hold the position of Senior Clinical Engineer at Orlando Health Hospital.

I am extremely grateful for everything I have experienced and learned on my journey until I finally secured my first professional job in my field in this country.

It is my greatest aspiration to continue growing and adding value to each of the people and institutions I work with, as well as promoting and being a spokesperson for the opportunities that exist in the field of Clinical Engineering, especially for women.



My experience as a Clinical Engineer immigrant



**Maria Isabel
Alvarez
Sisiruca**

Maria Isabel Alvarez Sisiruca is a highly skilled Clinical Engineer, born in Venezuela in 1986, with over 10 years of experience managing medical technology and equipment services. Currently a Senior Clinical Engineer at Orlando Health, she excels in assessing new medical devices and ensuring compliance with Joint Commission, FDA, and other regulatory standards. Her expertise includes the installation, repair, and calibration of complex biomedical equipment, as well as providing technical support and training across departments.

Maria holds a Bachelor's degree in Electronic Engineering, postgraduate studies in Clinical Engineering, and multiple certifications in biomedical technology. She has previously worked at AdventHealth and Allurian Healthcare, where she contributed to performance assurance inspections and integrated healthcare solutions. Bilingual in English and Spanish, she is known for her problem-solving skills and attention to detail. She is committed to enhancing patient safety and service delivery in healthcare environments, leveraging her extensive knowledge and leadership skills to drive innovation and efficiency. Passionate about continuous learning, Maria actively engages in professional organizations to stay updated on advancements in the field.



Stories of WICE



Women in Clinical Engineering Project