Pakistan

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1. State of Clinical Engineering (CE) - Health Technology Management (HTM)

Currently, there are 4 major barriers for establishing a successful CE-HTM landscape in Pakistan:

   a. Lack for defined role for CE
      i. There is no centralized body which safeguard the interests of CE’s in Pakistan. Hence, CE’s are not aware of the level of education needed and the job opportunities that would fit there skill set. There is a lack of liaison with other similar organizations such as ACCE to train and certify CEs.

   b. Limited educational institutions that focus on CE content
      i. Currently, there are only 13 universities and colleges in Pakistan offering CE programs in Pakistan to serve a population of 210 million people. From the 13 universities, only two are in Punjab, with a population of 100 million people.
         Eg: One of the leading colleges in Pakistan - University of Engineering Technology started its Biomedical Engineering Technology program in 2014. Currently, the graduates are not registered by the Pakistan Engineering council and are under the vocational training authority. This has been very demotivating for the graduating class since they are not eligible for jobs in public sector facilities.
      ii. The CE course content of the degree doesn’t meet any accreditation. It is not focused on management of equipment life cycle. Majorly, HTA and HTM are virtually non-existent.

   c. Limited Jobs Opportunities
      i. The job opportunities for CEs are non-existent. Mostly, graduates take on role in other industries or go abroad for better job opportunities. In 2014, only 40 biomedical engineers were working in public healthcare facilities. All of these engineers were on contract basis and had no job security. There were efforts made by the previous government to hire at least 1 biomedical engineer for each district but the number is still very low.
      ii. The role of CE has been taken over by technicians that focus on corrective actions rather than PPM and predictive engineering skills.
      iii. The CEs are not involved in planning and commissioning of equipment.

   d. Lack of Regulating, Assessing and managing health technologies
      i. There is a limited focus on Healthcare technologies by the public/private sector focus.
ii. Recently, medical devices were unregulated in Pakistan until the DRAP ACT 2012 was issued where medical devices were recognized as a separate entity. It was not until 2017 when the current medical device rules were published and regulation of medical devices were established. This led to substandard devices being purchased. Hence, the process for regulation is still new and in progress.

iii. The medical equipment is procured without comprehensive service contracts in Pakistan. Since most hospitals lack CE department resources or are not budgeted. There is lot of nonfunctional equipment present in health care facilities.

iv. The maintenance management is limited to a few good private hospitals in the country.

2. How would you suggest to show the Value of and from having CE-HTM program

The CE-HTM will help to improve assessment and management of health technologies, patient and staff safety, innovate new care processes and optimize digital medicine initiatives. The CE will- HTM will also help converting to paperless hospitals with HMIS, EMR and integrated medical equipment.

3. Example of success stories where CE supported patient outcomes

Example 1: A Biomedical Equipment Resource Centre (BERC), a first of its kind was conceptualized and implemented in Secondary healthcare facilities in Punjab, Pakistan for complete and efficient management of biomedical equipment in the province. BERC manages the maintenance system through a networked computerized maintenance management system (CMMS) and Customer Centre to ensure an uptime of 95% of all medical equipment in District Head Quarter Hospitals (DHQs) and Tehsil Head Quarters (THQs). The three main components of BERC are:

- RFID tagging and Line Listing (Inventory Management, through ECRI’s software)
- Computerized maintenance management System and Call Centre
- Three District Level Workshops and nine associated mobile workshops.

This resulted in the overall functionality of equipment to increase in the province. Moreover, since all equipment was tagged, the decision makers were at a better position to make patient focused decision on what needs to be procured for the next financial year.

Example 2: A leading Hospital in Lahore Pakistan, was operating the CE department for 15 years. The most common device that was send for repairs was infusion pump. When the problem was investigated, it was found out that the local engineers were not doing their jobs properly, PPM were not carried out (both preventive and calibration), this led to frequent breakdowns. The main cause of this was due to uncalibrated infusion pumps.

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This resulted in all infusion pumps recalibration and logging of PPM data was made mandatory into the online maintenance management system. It was found out that the complaints for the infusion pumps decreased by 50% in a month.

4. **CE Education program available (levels and content) – Body of Knowledge (BOK)**

| 13 Universities and Colleges are offering BE Bio-Medical in Pakistan |
|--------------------------|----------------|-------------------|-------|------------|
| **Institute**            | **City**      | **Degree, Duration** | **Fee** | **Deadline** |
| 1. Air University        | Islamabad     | BE, 4 Years        | 0      | 07-10-2019  |
| 2. Liaquat University Of Medical And Health Sciences | Jamshoro | BS, 4 Years | 15000 | 04-12-2018 |
| 3. Metni University Of Engineering & Technology | Jamshoro | BE, 4 Years | 45000 | 05-08-2019 |
| 4. Dow University Of Health Sciences | Karachi | AD, 2 Years | 100000 | 11-11-2018 |
| 5. Ned University Of Engineering & Technology | Karachi | BE, 5 Years | 29120 | 22-08-2019 |
| 6. Irsa University/hospital | Hyderabad | B.TECH [HONS], 4 Years | 50000 | 15-10-2016 |
| 7. Riphah International University | Islamabad | BS, 4 Years | 241132 | 21-10-2019 |
| 8. Barrett Hodgson University | Karachi | BE, 4 Years | 0 | 24-08-2019 |
| 9. Hamdard University | Karachi | BE, 4 Years | 152400 | 01-08-2019 |
| 10. Sir Syed University Of Engineering & Technology | Karachi | BS, 4 Years | 155000 | 07-10-2019 |
| 11. Zia-ud-din Medical University | Karachi | BE, 4 Years | 113000 | 14-11-2019 |
| 12. University Of Engineering And Technology (sub Campus) | Kala Shah Kaku | BS[TECHNOLOGY], 4 Years | 11225 | 15-09-2019 |
| 13. University Of Engineering & Technology | Narowal | B.Sc [Engg], 4 Years | 0 | 15-09-2019 |

Table 1: List of current BME universities and programs in Pakistan

5. **CE Association/Society and Credentialing/Certification program if available**
   Currently, there is No Association / Society CE program available in Pakistan

6. **CE major challenges (think of 3 subjects)**
   The major 3 challenges for CE in Pakistan are:
   a. Lack of developing, managing, regulating and assessing health technologies
   b. Limited educational institutions that focus on CE content translating into substantial job opportunities
   c. Lack for centralized body/association for CE

7. **What is the most important action you will support to increase CE recognition**
   The following actions are needed to increase CE recognition in Pakistan:

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a. Define role and responsibilities of CEs for developing, managing, regulating, assessing and maintaining health technologies
b. Create a defined educational structure focused on CE which meets international standards
c. Define investment opportunities on healthcare innovation to guide students from ideation to commercialization of health technologies

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