

BIOMEDICAL ENGINEERING IN MALAYSIA – POTENTIAL FOR GROWTH

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Biomedical Engineering is an interdisciplinary field that applies the methods of engineering, physics, chemistry and mathematics to the solution of a problem in physiology, biology and medicine.

A biomedical engineer supports and advances patient care by applying engineering methodology to healthcare technology.

There are various sub-categories of biomedical engineering and these include bioinstrumentations, bio-materials, clinical engineering, rehabilitation engineering, etc.

The term biomedical engineering and clinical engineering has not been clearly defined; at least not in the context of local interpretation. In Malaysia, the terms biomedical engineering and clinical engineering have been used interchangeably although the distinction between the

two has been well defined in engineering literature.

While biomedical engineering encompasses a wide coverage of engineering disciplines as explained above, clinical engineering, on the other hand, supports and advances patient care by applying engineering and management skill to healthcare technology at the hospital.

Clinical engineers are based at hospitals where their responsibilities include managing the hospital's medical equipment and systems, ensuring that all medical equipment is safe and effective, and working with physicians to adapt instrumentation to meet the specific needs of the physician and the hospital.

According to Ashok Shah, Chief Executive of Healthtronics (M) Sdn. Bhd. (HMSB), biomedical engineering in Malaysia is a young field that has

the potential to grow. "The term medical engineering or biomedical engineering refers mainly to clinical engineering in Malaysia," he said explaining that clinical engineering was mainly the maintenance of medical equipment.

HMSB has been actively involved in providing comprehensive biomedical engineering maintenance support to hospitals in Malaysia since 1996 and is the top service provider to the government on biomedical engineering maintenance services in Malaysia. HMSB provides maintenance services to 70 government hospitals and also to private sector hospitals.

"In Western countries, biomedical engineering covers extensive research and development on how engineering applications can be used to improve medicine," he said adding that there was immense research and development to be done to improve healthcare.

"In Malaysia, biomedical engineering is fairly basic as it has not got the recognition from the industrial perspective. In Singapore however, a lot of investment is poured in by foreign companies funding research in collaboration with their respective local universities," he added stating that Malaysia needed to concentrate on this area to entice investments for research and development to improve biomedical engineering.

According to Yahya Hassan, Senior Group General Manager of KPJ Healthcare Berhad, the healthcare arm of Johor Corporation, Malaysia's level of biomedical engineering was still in the infant stage.

"The biomedical engineer in Malaysia is mainly involved in deciding what is the most suitable equipment for a medical practice and also maintain the equipment. We do not have research and development yet," he said.

Shah said the field of clinical engineering was vital for hospitals. Hospitals now have qualified



Doctors rely on the optimum efficiency of medical equipment to give accurate diagnosis.



Proper functioning of medical equipment is vital as it may involve a human life.

biomedical engineers to ensure that medical equipment performs optimally and is calibrated properly. He said the biomedical engineer also had the important task of updating the hospital on “health alerts”. Health alerts refers to the monitoring of worldwide warnings and updates on existing and new medical equipment.

“For example, if a medical device fails in the US, we monitor such alerts and we act as an advisor to the hospitals on the appropriate usage and rectification of the given equipment,” Azman Hamid, Senior Manager of Technology Management in HMSB said.

Hamid said HMSB also advises hospitals as to what equipment needed to be purchased in line with

technological innovation and improvement.

Hassan said that the function of a biomedical engineer is a very important one for if medical equipment is not properly calibrated, it is can put a human life in jeopardy. “Upkeep is very important. The biomedical engineer is very vital as he is involved in preventive and corrective maintenance,” he said.

“We decipher technology into simple language for the hospitals so that they can make an informed decision as to what is an economically viable purchase of medical equipment,” Shah added.

Shah said that healthcare organisations practised Health Technology Assessment (HTA). In HTA, the biomedical engineering team in a

hospital has to decide what was vital for the healthcare organisation, whether it was appropriate to acquire such a medical device, how effective the device would be, the cost benefit and analysis.

“At the end of the day, the hospital is a business and they want to get their ringgit value. There is a lot of fantastic technology out there but it would be pointless for a hospital to spend, say, RM10mil on an equipment only to be able to treat a mere 3 patients,” he added.

Shah said in clinical engineering, the calibration of equipment was of utmost importance and the biomedical engineer had the task of ensuring the equipment was regularly calibrated. This is essential for if the medical equipment gives a wrong reading or diagnostic, the doctor in turn will give a wrong analysis.

“By virtue of having provided extensive engineering services to clinical staffs, clinical engineers have been well respected by physicians, nurses, administrators and other clinical professionals at the hospitals,” he added.

The biomedical engineer uses specific test equipment to simulate the actual performance in order to calibrate to see if the equipment if functioning optimally.

Shah added that the task to ensure that all medical equipment is working optimally was as important as that of a surgeon.

PREVENTIVE OR BREAKDOWN MAINTENANCE

Previously, hospitals in Malaysia perform preventive maintenance on medical equipment on a case-by-case basis. In most cases, when equipment breaks down, only then would they call the vendor. However, in the advent of competition in the healthcare field and education in medical law, a hospital cannot afford to experience any downtime as this would involve human lives and potential legal suits.

Currently, hospitals are taking a different view of such equipment.

“Now it is required for us as a service provider to come up with a schedule for maintenance for hospitals. All hospitals now practice this. We strictly adhere to the service requirements prescribed by the manufacturer plus calibrate medical equipment on a regular basis. We don’t wait for a machine to breakdown,” he added.

According to Shah, if a hospital had a schedule for maintenance, the number of breakdowns should fall drastically.

Yahya said that asset management was very important. Each equipment has their individual record and PPM (Planned Preventive Maintenance) was essential.

“We do the preventive maintenance and rectify a potential problem before the problem occurs,” he said.

Yahya said that every equipment have their manufacturer’s recommendation of service and calibration. “For PPM, we have a check list for each equipment. But bear in mind that maintaining equipment involve cost and we have to strike a balance to ensure an equipment or part is not unnecessarily replaced,” he said.

The biomedical engineer also has the difficult task of balancing the budget for maintenance, upgrades and the management of financial budget.

“We have to approach the management and convince them that it does not eat into their profit,” he said stating that this was indeed a very difficult task for the biomedical engineer to balance.

FUTURE FOR BIOMEDICAL ENGINEERING

Shah is of the opinion that the field of biomedical engineering as a whole had a bright future in Malaysia as the next step after clinical engineering would be research and development, which is the true sense of the definition of biomedical engineering.

“The industry however needs to recognise the importance of the biomedical engineer,” he said.

HMSB is closely linked with

University of Malaya’s (UM) Biomedical Engineering department and graduates of biomedical engineering do their practical training with HMSB.

“We have a lot of talented graduates, unfortunately, the majority of them are not joining the biomedical industry as it is not developed,” he added.

“In addition to this, foreign biomedical engineering companies come into Malaysia but they essentially bring their technology here to do the manufacturing and go away. There is no local value added in terms of research and development,” he said adding that the manufacturers were not aware of the high quality of local biomedical graduates.

Shah said that Malaysia was currently very strong in clinical engineering and the next step would eventually involve the other areas of biomedical engineering which involved research and development. He added that there were also good prospects within the region to export our clinical engineering services to the region. “Currently we are providing clinical engineering services to Thailand, Philippines and Vietnam,” he said.

Shah added that the Biomedical Association of Malaysia as well as UM was in the process of discussing with The Institution of Engineers, Malaysia (IEM) to include biomedical engineering as a recognised discipline in engineering.

“Malaysia also must look into avenues to develop our own medical equipment acclimatised to Malaysian needs, instead of just importing and using medical devices catered for foreign use. For basic equipment, we should manufacture locally and not have too much dependence on the West,” he said adding that the Ministry of Health Malaysia was coming up with a Medical Devices Act to regulate the industry. ■