EDUCATION OF ALLIED HEALTH PROFESSIONS FOR ENDOSCOPIC SURGERY

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Background and Objectives

The endoscopic surgery highly depends on the medical equipment in comparison with a conventional open surgery. Many technicians assisted the surgeon in operating medical equipment for endoscopic surgery since the start of endoscopic surgery in Japan. Situation and problems in the education of allied health professions for endoscopic and robotic surgery were reported in this study.

Materials and Methods

The clinical engineer (CE) is national medical qualification as allied health professions in Japan. CE's scope of work in Japan was defined by law as operation and maintenance of life-support system, such as cardiopulmonary bypass and artificial kidney. The education curriculum of CE includes medicine, engineering and medical equipment. Therefore, from the beginning of endoscopic surgery, CEs assisted the surgeon in operating the medical equipment and management of power supply in the operating room. Changes and the problem of the clinical engineer education curriculum were reviewed from the viewpoint of endoscopic and robotic surgery.

Conventional curriculums for undergraduate CE course (～2021)

Minimal required curriculum:1046 hrs (excluding liberal arts & general education)

*Medical subjects
Anatomy, Physiology, Biochemistry, Pharmacology, Clinical Laboratory Science, Internal Medicine, Surgery, Public Health etc.

*Engineering subjects
Applied Mathematics & Physics, Electronic engineering, Mechanical Engineering, Information and Computer Sciences , Biomaterial engineering etc.

*Medical Engineering
Cardio-Pulmonary-Bypass & Artificial Heart, Artificial Kidney, Respirator, Electro Surgical Unit, Ultrasonic Aspirator , Surgical Laser , Video-Endoscope system, Medical Safety Engineering etc.

Conventional CE's scope of work in Japan


Cardio-Pulmonary Bypass




Artificial Kidney


Cardiac pacemaker


Electro surgical unit


Ventilation system


ECMO


Ventricular Assist Device

Revision of CE Curriculums for endoscopic and robotic surgery

Minimum Required Curriculum hours : 1046hrs⇒1136hrs (9%↑)
Basic medicine : 90hrs⇒101hrs
Clinical medicine : 68hrs⇒80hrs
Equipment for Minimal Invasive Surgery & IVR : 90hrs⇒112hrs,
Safety Engineering : 56hrs⇒68hrs,
Clinical Training : 180hrs⇒315hrs

New additions
Devices for Minimally Invasive Surgery, Surgical Robot System , Nerve-Stimulation Device, HIFU, Cather Ablation System for Cardiology etc.

In the 2022 revision, CEs were officially allowed to manipulate surgical devices themselves during operation as a scrub staff. For these purpose, CE curriculums were revised and strengthened.

Usefulness of CE as the paramedic for endoscopic and robotic surgery

*Knowledge & experience in electronic and mechanical engineering
*Knowledge & experience in medical device and artificial organ
*Knowledge & experience in safety management


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Conclusion

Problems of surgical robot in O.R.
Workload during setup and movement due to size and weight
Computer malfunction during robotic surgery
Complexity of cleaning and sterilization of reusable device

Involvement of CEs in endoscopic surgery is also useful in improving the efficiency and workload of surgeons. However medical device manufacturers are required to solve problems such as computer malfunction during robotic surgery and complexity of sterilizing and washing reusable parts of surgical robot that cannot be solved by CE alone.