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The French Clinical Engineer:A Key Resource to Manage Biomedical Equipment in the Hospital

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Among hospital engineers of all specialties, approximately 540 work part- or full-time as clinical engineers (CE) in French hospitals, who work as qualified technical managers, with health professionals and hospital executives to build and to operate the medical equipment policy of the hospital, thus contributing to the safety and efficiency of care.

This paper presents the present state of the clinical engineering profession in the country, according to a survey that A.F.I.B. undertaken in 2006 [1], as well as some future trends for these professionals.

Clinical Engineering Today

In a French hospital or clinic, the role of the clinical engineering division (CED) is to manage medical equipment, from planning to scrapping:

• to advise or to contribute to new hospital design,

• to purchase medical equipment, including planning, buying, specifying implementation constraints, checking new delivered equipment,

• to manage the maintenance, replacement and scrapping of medical equipment.

The CED, most often part of the technical and/or logistics and purchasing department, is answerable to the hospital chief executive. Indeed, the main results of the A.F.I.B.'s 2006 survey are the following, drawn from 118 answers among over 400 clinical engineers questioned.

Among those answers :

• 95% had 5 or more years' post-"baccalaureat" study,

• 54% of the respondents had worked 10 years or fewer,

• 33% worked less than 70% of their working time as CE; the other activities included mainly hospital quality assurance, building, information systems and networks, or logistics.

CE work mostly (over 63%) in several domains, among them intensive care and anesthesia, operating theatre, medical imaging, functional explorations, clinical laboratory.

CE in French hospitals are in charge of:

• for 93% of the respondents, equipment planning and purchasing, which takes up 40% of their working time,

• for 79%, team management and leadership, which take 13% of the time,

• again for 79% of the respondents, advice and contribution to projects of new or renovated hospital buildings, for 13% of the time,

• for 67%, maintenance and technical control management, for 11% of the time, including safety of medical devices ; 44% said they were in charge of radiation protection as far as equipment is concerned.

• Quality assurance (54% respondents – 5% time) and contribution to hospital strategy (47% respondents – 4% time) are the main other activities quoted.

The mean size of the CED is 10,3 people, among which 2 engineers, 6,7 technicians and 1,5 administrative staff. The proportion is 1 engineer for 3,35 technicians, slightly more than in a former survey conducted in 2002 in France [2].

Finally, a mean of 1 engineer for 342 acute beds is noticed, yet a wide dispersion of this ratio is still to be explored.

Besides a slight increase of the mean number of individuals per service, these results confirm the missions and the position of CE in French hospitals, working with health professionals as interface between them and hospital executives to manage the medical equipment assets of the institution.

Future Trends

Environmental Changes

In order to draw some future changes for the CE, we have to consider the trends in medical technologies, of citizens' expectations about their health and the way care is delivered, and finally of the engineer's job itself.

Engineers are trained to cope with technological changes, but some major breaks seem to be on their way, supported by information technology, genetics and molecular diagnosis and therapy, and nanotechnologies. These will lead to new ways of diagnosing, monitoring and treating – possibly remotely – that are adjusted to the individual patient.

There is also a trend towards concentration of medical technology in the design of new hospitals, for safety or economic purposes, and also due to the shortage of qualified medical and nursing staff. Moreover, safety and security concerns on one hand are increasing citizens' expectations, and economic considerations on the other hand are more and more critical as health expenses grow.

Finally, a general trend for all engineers themselves is that they will have to add human skills to technical qualifications, in order to manage teams of different origins towards a common goal. This implies adding organization and management competences to technical knowledge.

A Future for Clinical Engineering

Clinical engineering is, and will continue to be, a strategic position in the hospital. Indeed, medical equipment is a major issue for medical strategy.

The knowledge and skills of the clinical engineer allows him/her to help hospital executives address strategic or practical issues such as :

• Which technical resources are necessary, and which are the most efficient ones to achieve the medical performance our hospital needs to achieve?

• Which equipment is the most appropriate, in terms of performance and use, at the lowest cost, for our given medical need?

• What is the breadth, the best organisation and the cost of the maintenance plan needed to assure safety and appropriate operational availability of medical equipment in our facility?

Moreover, the clinical engineer serves the entire hospital interest, and can thus suggest organisational changes in order to increase efficiency of medical equipment use.

It seems to us that the major trends for the CE' mission and role are the following :

• Information systems and networks skills will be necessary, as most pieces of medical equipment include computers, tend to be linked together and can be connected to the Hospital Information System;

• Technology assessment is a concern to be aware of, as medical technology efficiency will be challenged by health authorities, governmental organisations, and patients themselves. This is an opportunity to show the engineer's ability to cope with methodological reasoning;

• Monitoring of technological development is a major part of clinical engineering added value in hospitals, and should be sustained and developed;

• The development and spreading of medical technology offers opportunities for clinical engineers to move towards different positions: technical expert, maintenance manager, project manager, …

Other opportunities, which are a reality for some of our colleagues, lead on one hand to managing responsibilities in Imaging and/or Laboratories departments. We can also foresee opportunities such as operating theatres management.

On the other hand, CE will probably be needed to run sophisticated medical equipment, as technology exceeds healthcare professionals' specific skills. Finally, it is highly probable that research teams will need more engineers as the technological level is steadily increasing.

We can thus foresee opportunities for the development of clinical engineering in France, as clinical research, technology assessment and efficiency become challenges for the healthcare community. Engineers will need to show human intelligence and management abilities to continue to contribute to efficient patient care using technology.

References are available at english@hospital.be

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