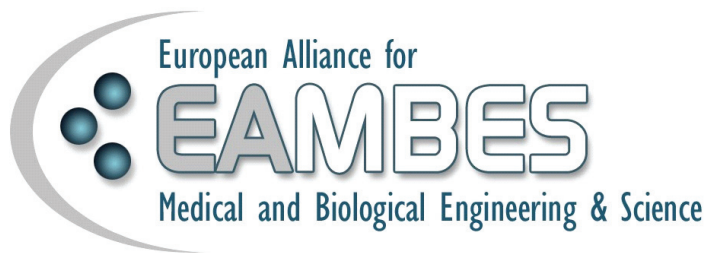


INTERNATIONAL FEDERATION FOR

**MEDICAL AND
BIOLOGICAL
ENGINEERING**



**PROTOCOL FOR
CONTINUING EDUCATION OF
CLINICAL ENGINEERS
IN EUROPE**

BIOMEDEA

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Protocol for Continuing Education of Clinical Engineers in Europe

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Continuing Professional Development for the Medical Physicist

1. Introduction

The requirements for education, training, knowledge, skills and experience in the field of clinical engineering are the subject of the Protocol for the “Training of Clinical Engineers in Europe” A certain level of education and training are recommended to commence practice and to register as a clinical engineer. Continuing Professional Development (CPD) builds on this foundation and ensures increasing competence and expertise post registration. At present CPD is undertaken and managed largely by each individual member of the profession. This document, aims to foster the growth of formal, standardised CPD schemes in Europe.

2. The Necessity of CPD in Clinical Engineering

CPD is the planned acquisition of knowledge, experience and skills (both technical and personal) required for professional practice throughout one's working life. CPD is therefore at the heart of the professional ideal. CPD is also necessitated by the pace of change of medical technology and methods.

The knowledge base suitable for those entering the profession a decade ago is insufficient for present-day services. The clinical engineer is responsible in his area of expertise for equipment, techniques and methods used in routine as well as new clinical services. His personal store of knowledge and skills must be updated to match the pace of change in medical techniques.

At the very minimum CPD can be seen as necessary to the individual, the employer and the profession in order to maintain competence and to protect against challenges from competitors or even the courts. On a more positive note, the individual gains stimulation, job satisfaction and prospects for promotion, the profession gains repute and status, while the employer enjoys good staff morale and a positive attitude toward the introduction of new services. The patient, and thereby the public in general, benefits by good scientific / technical support for medical procedures, and the introduction of new techniques to routine practice.

There is no stage in the clinical engineers career where learning is complete. As one's career progresses, responsibilities grow and the knowledge base adapts to encompass new techniques, so that the need for CPD increases rather than decreases. Thus all clinical engineers who have completed their basic education and training should be involved in CPD.

3. What constitutes Continuing Professional Development?

CPD encompasses all activities which extend knowledge, skills and the personal qualities required to deliver services. Common activities include:

- attending and/or contributing to training courses, seminars, workshops etc. as well as scientific meetings such as conferences, professional sessions etc.
- self-study, research and publication (e.g. regular reading of journals / text books / standards literature / legislation etc., & contributing to such literature).
- service innovation (adapting / creating protocols, introduction of new services etc.)
- education and training of medical physicists and related professions.

4. Resources for Continuing Professional Development

CPD requires resources in the form of finance, time and education / training expertise. All beneficiaries (the individual, the employer, the public and the professional body) must share the responsibility for providing the necessary resources. The individual, in tandem with the employer, contributes time and finance towards his individual CPD program, while the professional body organises workshops / conferences etc. as well as developing and administering a formal CPD scheme; the public contribution emanates mainly from the expertise and resources of public teaching / training institutes; the latter satisfies not only the public's duty to CPD, but also the educational institute's duty toward support and maintenance of its "products" i.e. the graduate workforce [1].

5. Formal CPD Schemes

Traditionally CPD has been managed informally by individuals, as appropriate to a relatively new and developing profession. Maturation of the Clinical Engineering profession brings the need to standardise and formalise learning at all levels; this helps to protect against incompetence and excessive local variations in practice.

Formal programmes require some methods of quantifying CPD. This may be based on numeric values ("CPD Points") for activities which contribute toward or result from CPD. The scheme can then measure individual performance against a target (e.g. required number of "CPD points" to be achieved over a set period). National Registration Schemes for Clinical Engineers are unlikely to receive full recognition by IFMBE and EAMBES unless the scheme requires evidence of continued activity in clinical engineering for registration renewal [2]; CPD schemes provide a mechanism for monitoring such activity. One example is the pilot scheme for the IPEM [3]. These moves towards formal, standard requirements for continued endeavour throughout professional life will enhance the status of the profession and its value to the patient and the employer. An IFMBE/EAMBES directory of CPD schemes is being opened so as to foster exchange of information among national organisations and the growth of new CPD schemes, with the future aim of establishing an IFMBE/EAMBES recommendation for CPD.

6. Recommendations

- All clinical engineers should be involved in CPD after qualification.
- Formal CPD programmes should be developed to recognise individual effort.
- Formal CPD programmes should set out clear objective guidance for the extent of CPD to be achieved within a defined timescale.
- National organisations should have their CPD scheme included in the IFMBE/EAMBES Directory.
- Renewal of professional registration should be linked to CPD performance.
- The resources for CPD should be provided by the individual, the professional body, the employer and public education / training bodies.

7. Conclusions

CPD is vital to the ideal of Professionalism; it promotes excellence within the profession and protects the Profession and the Public against incompetence. Within the Clinical Engineering Profession CPD is vital to embrace the pace of change occurring in medical practice.

Formal, standardised CPD schemes foster the status and integrity of the Clinical Engineering. CPD also benefits the individual clinical engineer by maintaining competence and competitiveness, by promoting job satisfaction and career prospects. It benefits employers by ensuring minimal standards, and by encouraging competent, highly motivated staff, who can readily adapt to new techniques and practices. It benefits patients and therefore the public as a whole, by encouraging a high standard of technical and scientific support for patient care.

CPD requires commitment, time, finance and training expertise / materials. The responsibility for CPD resources must be shared by all beneficiaries, i.e. individual physicists, their employers, professional bodies and public training / education institutions. Failure to implement CPD results in poor standards of patient care. Thus the costs of not doing CPD far outweigh the costs of CPD.

References

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- [2] Dendy, P.P. "Work of the European Federation of Organisations for Medical Physics (EFOMP) in establishing uniform standards of radiation protection in health care in Europe." *Radioprotection* Vol 28(2), 153-161 (1993).
- [3] "Continuing Professional Development Programme", Issue 2, IPEM (1996).

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Recommended Guidelines on National Schemes for Continuing Professional Development of Medical Physicists

1. Preamble

Modern Health Care Services are met with ever increasing demands on competence, specialization and cost effectiveness. The Clinical Engineering Services in hospitals face the same demands. Continuing Professional Development (CPD) is vital to the Clinical Engineering Profession to embrace the pace of change occurring in medical practice; it promotes excellence within the Profession, and assists in the protection of the Public against incompetence. Furthermore, CPD is a prerequisite of some statutory registration schemes.

2. Introduction

One of the objectives of BIOMEDEA is to harmonise and promote the best practice of Clinical Engineering in Europe. In order to accomplish this goal, BIOMEDEA has presented protocols, making recommendations on the appropriate general responsibilities and roles of the Clinical Engineer and proposing guidelines for education, training and accreditation programs in Clinical Engineering. All Clinical Engineers who have completed their basic education and clinical training should be actively involved in CPD in order to maintain and increase competence and expertise after qualification.

BIOMEDEA has recommended a certain level of education and training to start working independently and to register as a Certified Clinical Engineer. Continuing Professional Development activities should continue directly after qualification, ensuring increasing competence and leading to a higher level of qualification, for example the level where the Clinical Engineer may act as a Clinical Engineering Expert.

CPD is the planned acquisition of knowledge, experience and skills (both technical and personal) required for professional practice throughout one's working life.

CPD is an ethical and moral obligation for each Clinical Engineer throughout their professional career in order to maintain the highest possible professional standards.

3. Aims and Objectives

The most important factor in the BIOMEDEA approach to achieve harmonisation in the qualification of the Clinical Engineer in Europe is the establishment of education, training and CPD schemes according to BIOMEDEA recommendations.

The objectives of the Guidelines on Schemes for Continuing Professional Development are:

- To promote CPD in the clinical engineering community.
- To provide a framework, which allows the National Member Organisations (NMOs) to create their own CPD schemes.

- To guide the NMOs in establishing a credit system for CPD.
- To ensure harmonisation in Europe in the assessment of CPD related activities.

All Clinical Engineers should be involved in CPD after recognition as a Certified Clinical Engineer. While IFMBE/EAMBES recognises that it has no statutory authority in this area, IFMBE/EAMBES fully supports CPD undertaken on a voluntary basis as a practical contribution to enhancing patient care.

Programs for Continuing Professional Development have been and are being developed at a national level within the Clinical Engineering Community. These may be credit based or outcome based (e.g., portfolio). The NMOs of IFMBE/EAMBES have different work practices and varying training systems. The BIOMEDEA Guidelines presented here are for a credit based CPD scheme. They are intentionally flexible, thus allowing the NMOs to set up their own detailed CPD schemes within this framework and under their present local and national circumstances and constraints. The concept of CPD is related to the knowledge, skill and experience acquired rather than to the amount of time used to acquire them. The outcome of CPD should lead to an improvement in professional practise. As quantitative out-come based systems are developed, these Guidelines may be revised.

BIOMEDEA recommends that NMOs set up their own National Schemes for CPD, in agreement with the national Health Authorities and in accordance with the Guidelines presented here. National Member Organisations are then invited to submit their respective CPD Schemes to IFMBE/EAMBES for formal recognition.

Guidelines for formal recognition by IFMBE/EAMBES of National Registration Schemes for Clinical Engineers will be established. IFMBE/EAMBES approval includes the requirement for “a regular renewal mechanism with a requirement for evidence of continuing activity in relevant areas”. CPD is now being recommended as the best way to meet this requirement. National Member Organisations will be responsible for the administration of their National CPD schemes, in a similar manner to the IFMBE/EAMBES-approved National Registration Schemes.

If an NMO feels it needs to differ substantially from the guidelines set out in this policy document then, when seeking IFMBE/EAMBES recognition of their scheme, they should write formally to the registrar explaining in detail their reasons for non-compliance.

4. Recommended Guidelines

All National Member Organisations should develop their own detailed CPD Scheme according to the following general requirements. Each CPD Scheme should be based on a quantitative assessment of the individual’s CPD activities. Both the CPD Scheme and the credit point system recommended here are intentionally very general and flexible, as mentioned above, and NMOs are challenged to design their own CPD Schemes and credit point systems to meet local requirements.

There are two forms of IFMBE/EAMBES recognition of the National CPD Schemes: conditional and full approval. Conditional approval is awarded for a time period of three years, if the CPD Scheme does not fully comply with the requirements. Full approval is awarded for a

time period of five years. At the end of the approval period or in the case of a modification of a National CPD Scheme, a renewal of the approval is required.

4.1. General requirements on National CPD Schemes

The most important aspect of CPD is the outcome of the CPD activity rather than the length of time involved in its participation. Nevertheless the following quantitative guidelines are suggested.

4.1.1. Description of the CPD Scheme

To maintain professional competence 50 credit points of formally agreed and recorded CPD should be undertaken per annum. The CPD Scheme should be based on a 5-year cycle with a total of 250 credit points. Because circumstances vary from time to time and with them the opportunity to earn CPD points NMOs may feel it appropriate to maintain a five-year rolling average of 50 credit points per annum. The minimum time of professional activity within the 5-year cycle, required for the renewal of registration, should be specified by the NMO. CPD activities should be classified into two categories:

- Category 1 (see 5.2.1) activities are attendance at pre-assessed COURSES, i.e. lectures, scientific meetings, workshops, refresher/training courses etc. The assessment of the COURSE should be related to its contents and relevance and should be regulated by the NMO.
- Category 2 (see 5.2.2) activities are different types of planned and agreed self-directed learning tasks.

4.1.2. Notification of current CPD status

- NMOs should develop a model for recording of credit points for the individual Clinical Engineer.
- A National CPD record should be maintained by the NMO.
- All Qualified Clinical Engineers enrolled in CPD should report their CPD credit point records to the NMO for validation and record keeping.

4.2. Requirements on the credit point system

- The credit point, cp, is the unit of CPD; 1 cp typically corresponds to one full hour of educational activity in Category 1. Since category 2 activities are diverse in character, there is no similar simple equivalence between credit points and hours spent.
- In order to ensure a well-balanced CPD over the five-year period, the total of 250 cp should be earned on the basis of about 50 cp per year.

- The 250 cp should be achieved as a mixture of Category 1 and 2 activities as prescribed below.
- Courses organised by other NMOs, specialist groups, or at an international level, where the course content is relevant to Clinical Engineering practice and where there is prior CPD approval by the hosting organisation, should give credit points recognised on that same basis.
- Credit points in excess of the required 250 cp should not be carried forward into the following cycle of five years, unless a system of a rolling five year average has been adopted.

To allow for maximum flexibility in setting up a National CPD Scheme, the credit points in all categories may vary within a range of $\pm 30\%$ of the recommended value.

4.2.1. Category 1 credit points

- NMOs should require that all course organizers apply prospectively for CPD approval of the event and for credit point assessment. For repeated Courses, renewed application and CPD approval should be required.
- NMOs should notify course organisers as to the number of Category 1 credit points awarded, and this figure should be included in the advertisement of the event.
- Course organisers should provide the participants with documents describing the course content and, if combined with examination, the results.
- Each participant in a Category 1 activity should retain a document, which includes the content of the course and the results of an examination if applicable.
- Category 1 events should be classified into events with and without examinations. Basically, one full hour of educational activity should correspond to one cp. However, events with examination should be ranked higher.
- A total of 100-150 cp of Category 1 is recommended per 5-year cycle. (This corresponds roughly to attending a 2-day meeting twice a year.) If an NMO feels that it needs to differ from this recommendation, at least 50 cp per 5-year cycle (corresponding roughly to attending one 2-day meeting per year) should be expected.

4.2.2. Category 2 credit points

Due to the large variety and differing local availability of Category 2 events, BIOMEDEA recommends that the following classes of CPD activities may be considered.

- Formal local hospital educational activities, e.g., attendance at lectures, seminars, regular organized teaching activities: 1 cp per full lecture-hour or per meeting.

- Formal on the job training activities and experiences, e.g., development of interpersonal skills, time management etc. Up to 10 cp per year.
- Planned self-directed learning, e.g., reading of textbooks, journals etc., including computer-based 'distance learning facilities': up to 10 cp per year.
- Preparation and delivery of formal lecture or seminar: up to 10 cp for the first time presentation and 3 cp for a repeated presentation.
- Visits to other departments for special training: up to 5 cp per year.
- Publication of a) a paper in a recognised scientific journal: up to 20 cp, depending on the type of the journal (e.g., peer reviewed/non-peer reviewed) and on the contribution of the author (single author, co-author); b) a textbook: up to 50 cp, depending on the authorship and the size of the contribution.
- Oral or poster presentation at a congress: up to 10 cp per presentation, depending on the type of congress (international, national, regional) and the authorship (single author, co-author).
- Implementation of new technologies/procedures with a significant impact of Medical Physics: up to 5 cp per activity and 10 cp per year for a documented implementation and development of new technologies and procedures, depending on the complexity of the technology.
- Active membership in tasks groups relevant to Clinical Engineering (working groups, standardization committees and equivalent): up to 5 cp per membership and year, depending on the type of group (international, national, regional, local) and scientific relevance (telemedicine, e-health, rehabilitation engineering, equipment standardisation, etc.), altogether not more than 15 cp per year.

5. Summary

The Guidelines presented here constitute a set of general requirements on the design of the CPD Scheme itself and the credit point system. CPD should be assessed on the basis of a 5-year cycle, and a total of 250 credit points should be earned during this period. Two categories of CPD activities are introduced, attendance at pre-assessed courses (Category 1) and self-directed learning (Category 2), and the credit points should be about equally balanced between both categories. Category 1 credit points should be awarded on the general basis of one credit point per full course hour. Category 2 credit points should be awarded according to the relative importance and relevance of CPD in 8 subgroups: formal local hospital education activities, reading of textbooks and articles, lecturing, training visits, publications, congress contributions, implementation of new technologies and active membership in task groups.

BIOMEDEA recommends that National Member Organisations encourage participation in CPD Schemes, to the benefit of the individual Clinical Engineer, the employer, the patient and the Clinical Engineering Profession. All beneficiaries should share the responsibility for CPD resources, i.e. the individual Clinical Engineers, their employers, professional bodies and public education and training bodies.

National Member Organisations that have set up Schemes for CPD according to the above Guidelines are invited to submit their respective CPD Schemes to IFMBE/EAMBES for formal recognition.

Appendix - An example of a suitable credit point system

An example of a suitable credit point system	
Category 1 activities	
Attendance at pre-assessed courses (i.e., lectures, scientific meetings, workshops, refresher/training courses etc.), national and international	general rule, 1 cp/h events with examination 2cp/h
Total number of Cat. 1 credit points	100 cp per 5-year cycle
Category 2 activities	
Attendance at formal local hospital educational activities (e.g., lectures, seminars, regular organised teaching activities)	1 cp/meeting or 1 cp/lecture-hour Max in this category 10 cp/year
On the job training activities and experiences, e.g., includes development of interpersonal skills, time management etc	Up to 10 cp/year
Planned self-directed learning (e.g., reading of textbooks, journals, including 'distance learning facilities')	Up to 10 cp/year
Preparation and delivery of formal lecture or seminar	10 cp for first time presentation 2 cp for repeated presentation Max in this category 15 cp/year
Special training visits to other departments	Up to 5 cp/year
Publication of a) a paper in a recognised scientific journal b) a textbook	a) 2 to 20 cp, depending on the type of journal (e.g., peer reviewed or not) and on the contribution of the author b) 5 to 30 cp, depending on the authorship and the size of the contribution Max in this category 30 cp/year
Oral or poster presentation at congress	2 to 10 cp per presentation, depending on type of congress (international, national, regional) and authorship (single author, co-author) Max in this category 15 cp/year
Implementation of new technologies/procedures	Up to 5 cp per activity and 10 cp per year for a documented implementation and development of new technologies and procedures, depending on the complexity of the technology
Active membership in tasks groups (working groups, standardization committees and equivalent)	Up to 5 cp per membership and year, depending on type of group (international, national, regional, local) and scientific relevance (telemedicine, e-health, rehabilitation engineering, equipment standardisation, etc.). Max in this category 15 cp/year
Total number of Cat. 2 credit points	150 cp per 5-year cycle
Total number of credit points	250 cp per 5-year cycle