

REHABILITATION ENGINEERING SERVICES: FUNCTIONS, COMPETENCIES AND RESOURCES

Produced by

RESMaG

(Rehabilitation Engineering Services Management Group)

and IPEM



(Institute of Physics and Engineering in Medicine)

In collaboration with

CoRE

(Centre of Rehabilitation Engineering, King's College London)

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1. INTRODUCTION

The Institute of Physics and Engineering in Medicine (IPEM) is the appropriate professional body charged by the Department of Health both to set and ensure that standards are met for the practice of engineering in medicine. In its Policy Statement on Rehabilitation Services the IPEM described rehabilitation engineering as follows.

Rehabilitation Engineering is the clinical application of engineering principles and technology in the provision of services, research, and development to meet the needs of individuals with disabilities. It involves the reduction of environmental barriers, and/or the restoration or improvement of the physical, mental and social function of a person with a disability.

Rehabilitation Engineering is an important element of a comprehensive rehabilitation service, and includes the following services and subjects of research, design, development, production and marketing:

- *Wheeled mobility: chairs and special vehicles.*
- *Augmentative and Alternative Communication systems and Telecare.*
- *Assistive technology (AT), for all activities of daily living in domestic, educational, vocational, recreational, social and institutional environments.*
- *Electronic assistive technology (EAT), including telecare, technology access, customised or modified controls, environmental controls, and integrated systems.*
- *Functional Electrical Stimulation.*
- *Biomechanical analysis in rehabilitation.*
- *Specialised orthoses (including seating) and prostheses.*
- *Gait analysis.*

IPEM Policy on Rehabilitation Engineering.

Rehabilitation Engineering Departments or Units generally provide a selection of these activities.

Providers of rehabilitation healthcare require clarification of standards expected of rehabilitation engineering services. This document has been compiled by the Rehabilitation Engineering Services Management Group (RESMaG), together with the IPEM and King's College London. It sets out minimum standards for a) management and resources of the provider, and b) personal qualification of engineers and technologists working in the field. These standards are intended for use by commissioners, NHS management, and professional bodies.

Overview

Purchased standards of service should apply to a team rather than an individual because a range of skills and experience are appropriate to running an efficient service. A 'critical mass' of engineers is also necessary to maximise use of expensive equipment and facilities, to maximise potential for innovation and allow structured training and continuing professional development (CPD).

2. REFERENCE DOCUMENTS

The following reference documents are listed to avoid reproducing the considerable body of work conducted by other institutions in this area.

Service standards

- King's Fund Manual on Organisational Audit - *Medical Physics and Biomedical Engineering Service. (Rehabilitation Engineering)*.
- DoH Health Notice HN(90)18 *Scientific and Technical Services*.
- EN/ISO 2900 (Quality Management) documents.

Personal competence

- DoH Technician Training Programme *First-Stage Technician in Rehabilitation Engineering*. DoH, 1991.
- DoH Technician Training Programme *Rehabilitation Engineering (Advanced)*. DoH, 1992.
- Health Professions Council www.hpc-uk.org (Sept 2003).
- The Engineering Council *Code and Rules of Conduct* and their series *Code of Professional Practice*.
- The Engineering Council *UK Standards for Professional Engineering Competence — Professional Engineers and Professional Engineering Technician* <http://www.engc.org.uk/> (Sept 2003).
- IPEM policy statement *Rehabilitation Engineering Services*.
- IPEM *Code of Professional Conduct and Disciplinary Procedure*.
- IPEM *Training Scheme for Medical Physicists and Clinical Engineers in Health Care*.
- IPEM *Training Scheme for Clinical Technologists*.

3. STRUCTURE AND RESOURCES

Rehabilitation engineering services are provided in the NHS through a number of establishments, with a variety of functions and organisational relationships. The activities are pursued in departments with various titles including, most commonly, Clinical Engineering,, Bioengineering, Rehabilitation Engineering, Medical Engineering,, Medical Physics, and Disablement Services.

The education, training and qualifications of engineering practitioners are reflected in their employment grades which, in the NHS, includes Medical Technical Officers (MTOs) and Clinical Scientists/Engineers.

MTOs (or Rehabilitation Technologists) are primarily concerned with the operational aspects of service delivery such as routine fitting and repair, device manufacture, and basic design specification. MTO career progression depends on continuity, quality, and the scope of a service. Clinical Scientists/Engineers lead the organisational aspects of the service and may conduct independent assessment of clients. They direct complex issues such as the provision of innovative solutions for individual clients, research and development, and the development of new methods and scope of service provision.

IPEM Policy on Rehabilitation Engineering.

Specialist service areas include wheeled mobility, seating, orthotics, prosthetics, gait analysis, environmental controls, assistive devices, communication aids and community equipment management. A rehabilitation engineering service might typically operate in three or four of these areas, with an appropriate size and balance of team (refer to Section 4, “Competencies” for guidance). Numbers of staff and their supporting resources will be dictated by the total activity required. The team would normally comprise a mix of Rehabilitation Engineering Technologists (RET), Rehabilitation Engineers (RE) and Clinical Engineers (CE) as described in Table 1 on page 5.

In line with EN/ISO2900 quality management principles and the King’s Fund Organisational Audit, a rehabilitation department will require:

- Sufficient office space for the staff.
- A comprehensive range of equipment (stock and assessment).
- Adequate storage space for equipment.
- Adequate workshop space (including tools and machinery).
- Communication and transport support.
- Administration support.
- Access to suitable clinical facilities.
- To provide the particular type and volume of work required.

Table 1 Competence, certifications and qualifications

(Note that exact titles are evolving)

Competence (see Section 4 and <i>SATOR</i> , Section 2)	Recommended target level of Engineering Council Certification	Title	Recommended basic academic qualification
Routine technical work under RE supervision.	Eng Tech	Rehabilitation Engineering Technologist (RET)	C&G, BTEC ONC, or NVQ level 2
Independent work in specialist/clinical area, innovative solutions, manage service.	IEng	Rehabilitation Engineer (RE)	BTEC HNC, BTEC HND, NVQ level 3, or BSc / BEng
Direct and develop service, conduct research, independent management of clients.	CEng	Clinical Scientist / Engineer (CE)	BSc, BEng, MEng or MSc

In addition to academic qualifications the IPER recognises and requires minimum periods of experience and structured training, following the guidelines of the Engineering Council.

At all levels, rehabilitation-specific education, training and CPD is necessary in addition to basic qualification. Existing services should work towards these levels by training existing staff as necessary and employing new staff within these guidelines.

The Department of Health Circular HN(90)18 points out the economic and quality benefits of Supra-District or Regional services in the engineering disciplines. Such arrangements:

- Provide an appropriate skill mix of engineering and technical staff, working both in the hospital environment and the community.
- Ensure continuity of service.
- Ensure structured training and continued professional development.
- Maintain a 'critical mass' of engineers and Technologists that will have maximum potential to innovate, to evaluate and develop the service, and to collaborate with relevant research projects.
- Maximise the use of expensive facilities.

Contractual arrangements for Supra-District and Regional services need to ensure an effective balance between Regional, District and local interests.

Each rehabilitation engineering service should have an identified head of department responsible for its proper functioning, for setting its priorities and for the quality of the service provided. This will normally be a consultant (C-Grade) or principal grade (B17 and above) Clinical Scientist/Engineer. Where the head of the service is not a Consultant Grade appointment, the unit should be linked formally with a larger department/unit headed by a consultant grade Clinical Scientist/Engineer with experience in rehabilitation or medical engineering. The purpose of the link is to provide professional support for assuring service standards and career development.

IPEM Policy on Rehabilitation Engineering.

4. ACTIVITIES AND COMPETENCE LEVELS

Note that the competence level for each activity shown in the following table is a minimum. A 'CE' can and will perform many of the activities marked 'RE' or 'RET' and an 'RE' will perform many of the activities marked 'RET'. The RET always acts under the supervision of an RE or CE. An RE normally acts under the direction of, or is professionally linked to, a CE.

Topic / Activity	Minimum level	At level of competence stated in the table on page 5, having knowledge of ...
4.1 Professional practice		
4.1.1 Responsibility and conduct		risk issues, safety standards
4.1.2 Law		legal framework of practice, liability
4.1.3 Communication		inter-personal and writing skills
4.1.4 Professional development		opportunities for education and training
4.1.5 Public awareness		relevant social issues, social situation of users and carers
4.2 Clinic (in addition to above)		
4.2.1 Commission manual equipment.	RET	manufacturer's specifications
4.2.2 Commission powered equipment.	RET	manufacturer's specifications
4.2.3 Fit equipment modifications.	RET	accessories, structural mechanics
4.2.4 Fit specialised equipment.	RET	fabrication techniques
4.2.5 Fit electronic controls and instruments.	RET	equipment available, electronics
4.2.6 Fit integrated systems.	RET	equipment available, electronics
4.2.7 Assess, specify and/or design for any of the above.	RE	clinical conditions
4.2.8 Set and operate assessment equipment.	RET	clinic and assessment equipment
4.2.9 Instruct users and carers in use of equipment.	RET	manufacturer's specifications, clinical conditions
4.2.10 Record recommendation and provision.	RET	equipment, clinical conditions
4.2.11 Communicate with multi-disciplinary team.	RE	colleague's disciplines and language
4.2.12 Assess for and configure integrated systems.	RE	clinical conditions, equipment available, information technology
4.2.13 Engineering services for prosthetics and orthotics.	RE	clinical conditions, basic prosthetics, equipment characteristics
4.2.14 Assist in assessment for and fit FES equipment.	RE	FES, clinical conditions
4.2.15 Measure biomechanics of function.	RE	analysis equipment and clinical conditions
4.2.16 Report biomechanics of function.	CE	biomechanics, clinical conditions

Activities and Competence Levels (continued)

	Topic / Activity	Minimum level	At level of competence stated in the table on page 5, having knowledge of ...
4.2.17	Assessments independent of other disciplines	CE	clinical conditions
4.2.18	Assessment /specification of bespoke assistive systems for mobility, communication and control	CE	clinical conditions, software design, equipment
4.2.19	Introduction of new assessment / measurement techniques	CE	clinical conditions, equipment, metrology
4.3 Domiciliary visits (in addition to above)			
4.3.1	Inspect / maintain home-based equipment	RET	manufacturer's specifications, technical standards
4.3.2	Assess for or review for an individual's requirements	RE	clinical conditions, equipment available
4.3.3	Commission equipment and instruct users and carers	RE	manufacturer's specifications, clinical conditions
4.3.4	Evaluate environment	RE	building standards, equipment available
4.4 Workplace (in addition to above)			
4.4.1	Inspect equipment delivered and relinquished	RET	manufacturer's specifications
4.4.2	Maintain clinical and equipment records/ databases	RET	information processing
4.4.3	Investigate adverse occurrences and facilitate warranty claims	RET	technical and safety standards, manufacturer's specifications
4.4.4	Monitor and submit hazard notices and progress national defect reporting system	RET	technical and safety standards, legislation
4.4.5	Fabricate equipment or modifications when appropriate	RET	technical skills, material properties
4.4.6	Monitor maintenance and repair contractors	RET	technical and safety standards, legislation
4.4.7	Manage maintenance and repair contractors	RE	technical and safety standards, legislation
4.4.8	Design equipment or modifications, provide relevant documentation	RE	design methods, technical and safety standards, legislation, production techniques
4.4.9	Audit clinical provision	RE	quality management and audit standards
4.4.10	Advise multidisciplinary colleagues	RE	technical and safety standards, legislation

continued –

Activities and Competence Levels (continued)

	Topic / Activity	Minimum level	At level of competence stated in the table on page 5, having knowledge of ...
4.4.11	Evaluate new equipment	RE	technical standards, inspection techniques
4.4.12	Assist in the negotiation and management of service contracts	RE	management techniques, legislation, training requirements, quality systems
4.4.13	Provide Quality Assured Management Systems	RE / CE*	management systems, quality accreditation, Health and Safety
4.4.14	Plan and manage service bidding and funding	RE / CE*	safety standards, legislation, quality accreditation
4.4.15	Teach, train and assess staff, including non-engineers	RE / CE*	available training processes and techniques, CPD
4.4.16	Direct service	CE	management techniques, legislation, training requirements, quality systems, ethical issues
4.4.17	Develop service	CE	management techniques, legislation, training requirements, quality systems, ethical issues
4.4.18	Manage and report on clinical trials	CE	ethical issues, research methodology, legislation
4.4.19	Research and development	CE	ethical issues, research methodology, special expertise

* RE or CE depending on details of the activity.

THE REHABILITATION ENGINEERING SERVICES MANAGEMENT GROUP – *RESMAG*

Members of this group are actively involved in the day-to-day management of rehabilitation Engineering Services and represent every Region in the country. The group meets three times a year with specialist groups meeting more frequently:

- To provide a representative body for rehabilitation engineering service managers to statutory, voluntary, educational, service, and professional groups at national level
- To provide advice on rehabilitation engineering services.
- To initiate and continue to promote and support quality management systems within the field of rehabilitation engineering.
- To co-ordinate and exchange information between rehabilitation engineering services at regional and national level.
- To assist in the implementation and review of C.P.D. and the relevant training systems for Rehabilitation Engineers and Rehabilitation Engineering Technologists.
- To act as a co-ordinating body for collection and dissemination of information from related organisations such as:

MHRA	NHS Medicines and Healthcare products Regulatory Agency
PASA	NHS Purchasing and Supply Agency
WSSIG	Wheelchair and Special Seating Group
NWMG	National Wheelchair Managers' Forum
CoRE	The Centre of Rehabilitation Engineering
PMG	The Posture and Mobility Group
IPEM	The Institute of Physics & Engineering in Medicine
PCAG	The Prosthetics Commodities Advisory Group

Representatives at **RESMaG**

Region	Representation
Northern & Yorkshire	1
North West	1
Trent	1
West Midlands	1
Eastern	1
London	1
South East	1
South West	1
Scotland	1
Wales	1
Northern Ireland	1
Special Interest Groups	
Wheelchairs and Special Seating	1
Prosthetics and Orthotics	1
Electronic Assistive Technology	1
Associates	
Medicines and Healthcare products Regulatory Agency (MHRA)	1
NHS Purchasing and Supply Agency (PASA)	1
Centre of Rehabilitation Engineering (CoRE)	1
Rehabilitation Engineering and Biomechanics SIG of the Institute of Physics and Engineering in Medicine	1

Contact

For further information and contacts see: www.kcl.ac.uk/core