

REHABILITATION ENGINEERING SERVICES: FUNCTIONS, COMPETENCIES, AND RESOURCES

Produced by



Rehabilitation Engineering
Services Management Group

and



IPEM Institute of Physics and
Engineering in Medicine

In collaboration with



Health Design & Technology Institute



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**Health Design & Technology Institute
Coventry University Technology Park
Puma Way
Coventry CV1 2TT**

REHABILITATION ENGINEERING SERVICES: FUNCTIONS, COMPETENCIES, AND RESOURCES

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(The Rehabilitation Engineering Services Management Group)

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This interim update of the RESMaG 2004 (Issue 2.1) competencies document has been produced by the RESMaG Education & Training Working Group in response to requests for guidance on the impact upon the delivery of assistive technology services of the introduction of Modernising Scientific Careers (MSC). A fully revised version will be issued once MSC has been fully implemented.

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 (1999) 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 (1999).

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 Coventry University. It sets out minimum standards for a) management and resources of the provider, and b) personal qualification of engineers and others working in the field. These standards are intended for use by commissioners, NHS management, and professional bodies.

Overview

Commissioned standards of service should apply to a team rather than an individual because an appropriate mix of skills and experience are necessary 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*.
- IPEM policy statement *Rehabilitation Engineering Services* (June 1999)

Personal competence

- IPEM policy statement *Rehabilitation Engineering Services* (June 1999)
- Modernising Scientific Careers: The UK Way Forward (Feb. 2010)
- The Engineering Council *UK Standards for Professional Engineering Competence (UK-SPEC)* www.engc.org.uk (Dec. 2011)
- IPEM *Code of Professional and Ethical Conduct and Disciplinary Procedure*
- Health Professions Council www.hpc-uk.org
- Voluntary Register of Clinical Technologists www.vrct.org.uk

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...career progression depends on continuity, quality, and the scope of a service...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 (1999).

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 Healthcare Science Associates (HCSA), Rehabilitation Engineers (RE) and Clinical Engineers (CE) – often supported by healthcare science assistants - as described in Table 1 and Figure 1.

In line with 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 details are evolving)

Competence (see MSC:UK Way Forward and UK-SPEC)	Recommended target level of Engineering Council Certification	Title	Minimum qualification/ registration
Routine service delivery working to protocol/under RE/CE supervision.	Eng Tech	Healthcare Science Associate (HCSA)	N/SVQ3 plus formal training e.g. Foundation Degree or equivalent
Independent work in specialist/clinical area, innovative solutions, manage service.	IEng	Rehabilitation Engineer (RE)	Registered Healthcare Science Practitioner*
Direct and develop service, conduct research, independent management of clients.	CEng	Clinical Engineer (CE)	Registered Healthcare Scientist**

*currently registered via Voluntary Register of Clinical Technologists (see www.vrct.org.uk)

**currently Health Professions Council registered Clinical Scientists (see www.hpc-uk.org)

In addition to academic qualifications the IPREM 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 are 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:

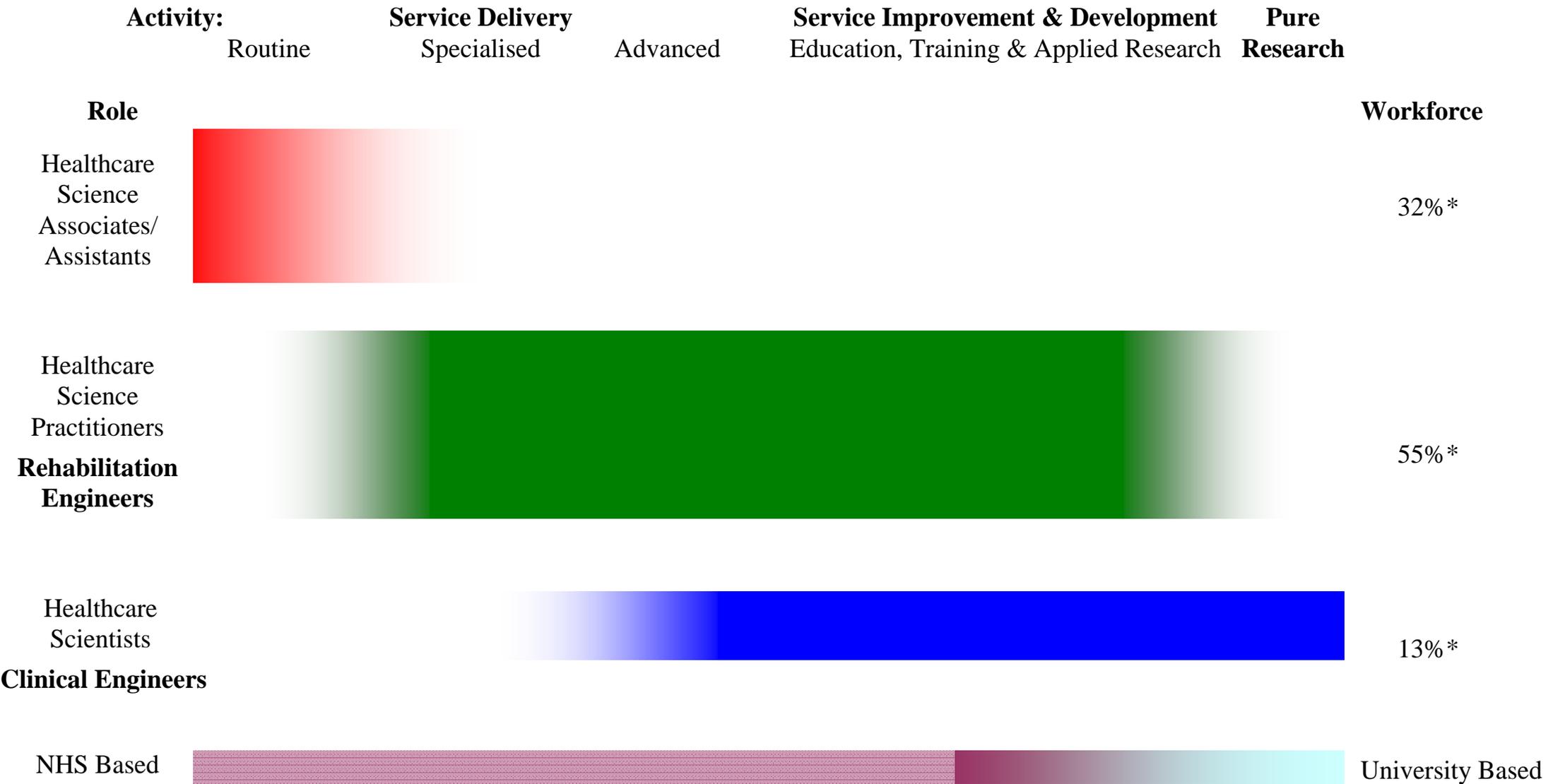
- provide an appropriate skill mix of engineering and technical staff, working both in the hospital environment and the community.
- ensure continuity of service
- ensure structured training and continued professional development
- maintain a 'critical mass' of engineers and associates/assistants that 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.

Commissioning 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...or principal grade...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...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 (1999).

Figure 1 Outline of Respective Activities and Roles in Healthcare Science (Rehabilitation Engineering)



* RESMaG Workforce Planning Survey (January 2012)

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 'HCSA' and an 'RE' will perform many of the activities marked 'HCSA'. The HCSA 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 table 1, 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	HCSA	manufacturer's specifications
4.2.2 Commission powered equipment	HCSA	manufacturer's specifications
4.2.3 Fit equipment modifications	HCSA	accessories, structural mechanics
4.2.4 Fit specialised equipment	HCSA	fabrication techniques
4.2.5 Fit electronic controls and instruments	HCSA	equipment available, electronics
4.2.6 Fit integrated systems	HCSA	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	HCSA	clinic and assessment equipment
4.2.9 Instruct users and carers in use of equipment	HCSA	manufacturer's specifications, clinical conditions
4.2.10 Record recommendation and provision	HCSA	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 table 1, 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	HCSA	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	HCSA	manufacturer's specifications
4.4.2	Maintain clinical and equipment records/ databases	HCSA	information processing
4.4.3	Investigate adverse occurrences and facilitate warranty claims	HCSA	technical and safety standards, manufacturer's specifications
4.4.4	Monitor and submit hazard notices and progress national defect reporting system	HCSA	technical and safety standards, legislation
4.4.5	Fabricate equipment or modifications when appropriate	HCSA	technical skills, material properties
4.4.6	Monitor maintenance and repair contractors	HCSA	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 table 1, 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 professionals 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 promote and develop education, training and continuing professional development for rehabilitation engineering service professionals;
- to act as a co-ordinating body for collection and dissemination of information from related organisations such as

MHRA	Medicines and Healthcare products Regulatory Agency
NWMF	National Wheelchair Managers' Forum
HDTI	Health Design & Technology Institute
PMG	Posture and Mobility Group
IPEM	Institute of Physics & Engineering in Medicine

Representatives at *RESMAG* Council

Member	Representation
Council Chair and Deputy Chair,	2
SIG Chair and Deputy Chair,	6
National Group representation from England, Scotland, Wales and Northern Ireland	4
Regional representation from England	8
Regional representation from Scotland	1
Regional representation from Wales	1
Regional representation from Northern Ireland	1
Representation from Associates	3

Special Interest Groups (SIGs)

Wheelchairs and Special Seating
Prosthetics and Orthotics
Electronic Assistive Technology

Associates

Medicines and Healthcare products Regulatory Agency (MHRA)
Health Design & Technology Institute (HDTI)
Rehabilitation Engineering and Biomechanics SIG of the
Institute of Physics and Engineering in Medicine

Contact

For further information and contacts see: www.resmag.org.uk