Guide for STP Trainees : Rehabilitation Engineering

Learning Outcome Subject	Code	Competency	Examples of evidence	Other competencies which may be demonstrated by this evidence
Assistive Technology	RE-1-C-1	Under supervision, lead a patient assessment in at least two of the modalities listed above, to identify and define individual requirements for intervention.	Clinic report/case study /patient history record and also additionally within reflective practice diary	RE-1-C-2, RE-1-C-3, RE-1-C-4, RE-1-C-7, RE-1-C-9, RE-1-C-10, RE-1-C-11, RE-1-C-12, RE-1-C-13, RE-1-C-14
	RE-1-C-2	Apply a variety of clinical methods to assess biomechanics and function (e.g. forces, active and passive joint movement, motor assessment, muscle activity, interface pressure, shape and energy expenditure) taking into account the complete clinical picture.	Methods of assessment description (review). Case study detailing methods. Clinic report detailing results e.g. Posture report, access to equipment information	RE-1-C-1, RE-1-C-3, RE-1-C-4, RE-1-C-7, RE-1-C-9, RE-1-C-10, RE-1-C-11, RE-1-C-12, RE-1-C-13, RE-1-C-14
	RE-1-C-3	Analyse and interpret the data obtained from these measurements.	Results of test. Clinical reasoning in report. Prescription form for seaing equipment	RE-1-C-1, RE-1-C-2, RE-1-C-4, RE-1-C-7, RE-1-C-9, RE-1-C-10, RE-1-C-11, RE-1-C-12, RE-1-C-13, RE-1-C-14
	RE-1-C-4	Produce a formal report outlining a diagnostic/therapeutic opinion.	Clinical report. Assessment report put in health records/letter to parents/carers.	RE-1-C-1, RE-1-C-2, RE-1-C-3, RE-1-C-7, RE-1-C-9, RE-1-C-10, RE-1-C-11, RE-1-C-12, RE-1-C-13, RE-1-C-14
	RE-1-C-5	Recognise, quantify and discuss the errors in the measurements obtained and discuss their limitations.	Literature review and examples of using each measurement	
	RE-1-C-6	Present to the patient and clinic team the realistic expectations of the intervention and the expected levels of enhancement.	Excerpt from health record indicating discussion. User instructions re equipment. Letter to clinet or family/handover sheet/ reflective pratice log	
	RE-1-C-7	Develop objectives, recommendations and rationale for intervention.	Clinic report	RE-1-C-1, RE-1-C-2, RE-1-C-3, RE-1-C-4, RE-1-C-9, RE-1-C-10, RE-1-C-11, RE-1-C-12, RE-1-C-13, RE-1-C-14
	RE-1-C-8	Perform a risk assessment; propose a risk management strategy.	Understand the departments risk management stratergy. Complete a risk assessment for an adaptation to a piece of equipment of assistive technology e.g. wheelchair, standing frame, seating system. Or for adding additional equipment to a system e.g. a communication aid and a mounting system to a wheelchair. Or an ethics risk assessment for MSc Research project	
	RE-1-C-9	Identify indicators for and contra-indicators to the use of equipment and/or assessment/measurement techniques.	Case study/ clinic reports/ literature review. For inclusion/exclusion in MSc research project	RE-1-C-1, RE-1-C-2, RE-1-C-3, RE-1-C-4, RE-1-C-7, RE-1-C-10, RE-1-C-11, RE-1-C-12, RE-1-C-13, RE-1-C-14
	RE-1-C-10	Evaluate commercially available equipment against clinical requirements.	Participate in the subjective Evaluation of the technical aspects of a new piece of equipment prior to selection.	RE-1-C-1, RE-1-C-2, RE-1-C-3, RE-1-C-4, RE-1-C-7, RE-1-C-9, RE-1-C-11, RE-1-C-12, RE-1-C-13, RE-1-C-14
	RE-1-C-11	Identify indicators for non-standard bioengineering requirements, e.g. for patient with profound disability.	Clinic report with an assessment showing non-standard requirements. Custom made form with case study. Information on medical devices directive and guidance	RE-1-C-1, RE-1-C-2, RE-1-C-3, RE-1-C-4, RE-1-C-7, RE-1-C-9, RE-1-C-10, RE-1-C-12, RE-1-C-13, RE-1-C-14

	RE-1-C-12	Using case study examples, evaluate the impact of the intervention on the wider clinical situation.	Case studies/ clinic report (e.g. medicines affecting access/posture). Outcome measures e.g. Goal Attainment Scaling (GAS), Psychosocial Impact of Assistive Devices Scale (PIADs), Therapy Outcome Measures (TOMS)	RE-1-C-1, RE-1-C-2, RE-1-C-3, RE-1-C-4, RE-1-C-7, RE-1-C-9, RE-1-C-10, RE-1-C-11, RE-1-C-13, RE-1-C-14
	RE-1-C-13	Utilise appropriate outcome measures for at least two of the modalities; evaluate the results.	Case Study/Clinic report e.g. Goal Attainment Scaling (GAS), Psychosocial Impact of Assistive Devices Scale (PIADs), Therapy Outcome Measures (TOMS)	RE-1-C-1, RE-1-C-2, RE-1-C-3, RE-1-C-4, RE-1-C-7, RE-1-C-9, RE-1-C-10, RE-1-C-11, RE-1-C-12, RE-1-C-14
	RE-1-C-14	Interface appropriate AT to enhance the use of equipment.	Assess and fit appropriate access equipment for EAT. Appropriate postural support for seating, standing, lying e.g. headrest. Integrated access to optimise use of equipment. Case study/clinic report	RE-1-C-1, RE-1-C-2, RE-1-C-3, RE-1-C-4, RE-1-C-7, RE-1-C-9, RE-1-C-10, RE-1-C-11, RE-1-C-12, RE-1-C-13
	RE-1-C-15	Make appropriate adjustments to any equipment or its application to enhance function, comfort and safety.	Evidence in health record/report/task sheet or workorder	
	RE-1-C-16	Train and familiarise the patient and/or carer in the use of the equipment, and develop user instructions.	User instructions/handover sheets/ clinic report (evidence of face to face training)/ casestudy/ reflective practise log. Stability test for wheelchair.	
	RE-2-C-1	Under supervision and according to local protocols, conduct a clinical interview with a patient and/or their guardians/carers.	Trainee: It is good to read through and make notes on the template that will be stored locally at your unit. Practice interviewing an experienced member of staff who can be pretend to be a parent/guardian. During the interview with the patient, don't ask too many closed questions like "do you wear your orthoses?" but open ones like "tell me about your orthoses". Use an anonymised recording sheet to enter your interview details for evidence. Trainer: prepare your trainee with mock clinical interviews; closely supervise trainee during live interview. You should be looking for the trainee to cover all the questions that need asking but also for the trainee to be sympathetic and flexible in their questioning.	
	RE-2-C-2	Under supervision, perform a physical/clinical assessment and compare your data with local or published reference ranges.	Trainee:familiarise yourself with the local method for performing a clinical assessment. It is important that you gain the confidence of the subject or patient, so tell them what your doing. It is useful practising your examination methods on a fellow trainee or colleague before you do it on patient. Use an anonymised examination sheet to record your data and present as evidence. Trainer: assess the trainee for their interaction with the patient as much as for their manoeuvres. If the examination is complicated and/or is being done on a non-compliant or young patient, you may consider asking the trainee to perform a subset of the measurements.	
	RE-2-C-3	Interpret and report the results of the clinical assessment.	Trainee: your local centre should have normal ranges for your centre. If not, access published ranges. Consider not only the statistical significance of your measurements but also the functional implications of the measured impairments. Document your findings including any statistically signficant findings, and place them in a clinical context. Trainer: is the trainee's interpretation making sense? Do they understand the scales that they are using or the difference between dorsiflexion and plantarflexion?	

Clinical Gait Analysis	RE-2-C-4	Place markers on patients in the correct positions according to local protocols/national guidelines.	Trainee: you should be familiar with the local protocols for marker placement. You should be familiar with the surface anatomy necessary to place the markers. You can place markers on colleagues and patients under supervision. Document your marker placement by using anonymised images. Be prepared to explain your placements to your supervisor/assessor. Trainer: inspect the placement of markers by the subjects by the trainee. Look at the processed data - are there any artefacts that could be explained by inadequate marker placement?	
	RE-2-C-5	Conduct Electromyography (EMG) examination relevant to a biomechanical assessment.	Trainee: there should be local protocols at your centre explaining the placement of sensors. If not, you can use a resource like SENIAM to guide your placement. Document your placement using anonymised images. Ask your assessor to review your placement. Trainer/assessor: can the trainee describe the relevant muscular anatomy and the reasons for the placement of the sensors?	
	RE-2-C-6	Collect kinematic, kinetic and other data from patients with movement disorders. Use complementary clinical methods to further detail the mechanical impairments and functional deficits of these patients.	Trainee: you should be familiar with the multiple measurement tools available in the movement laboratory and of other assessments that are used to detail the impairments of the patient. You should be familiar with the operations of the systems that allow collection of kinematic, kinetic and associated data. Document your activities in the laboratory using a log - which patients you saw, what you did in your session. Have each interaction with a patient signed off by a local registered clinical scientist or other clinician. Assessor: Inspect the trainee's document logging their activities in the unit.	
	RE-2-C-7	Process kinematic, kinetic and other data, identifying and appropriately managing/removing artefacts.	Trainee: Keep a log of your activities in the laboratory (anonymised). Detail any issues you had with the data and which methods you required to account for or modify them. Have	
	RE-2-C-8	Prepare and present a report for the clinical team, summarising findings and interpretation of the data, using alternative presentations of the data to emphasise particular findings.	Trainee: Be familiar with the reporting software at your centre. Inspect prvious reports from the centre to ascertain the style in which reports are written. Write reports according to style of you local centre. Gather feed back on your report from a member of the local team before the full presentation of your findings . Keep an anonymised version of the report for documentation. Assessor: be present at review meetings where the trainee's data and interpretations are reported. Discuss with the trainee any feeedback/corrections from the clinical review team.	
	RE-2-C-9	Perform system checks and calibration tests on a number of pieces of equipment in the laboratory.	Trainee: there will be daily calivbration and system checks carried out in your unit. Try to understand these tests. In your log, record the times you performed these tests and ask a local registered person who saw you conduct the tests to sign off the log. Assessor: inspect the document logging the trainee's activities. Discuss with the trainee what would/did happen if the equipment failed any of the tests.	
	RE-2-C-10	Perform task-specific risk assessments.	Trainee: There will be standard trust forms for conducting a risk assessment at your local centre. Identify an activity performed in the laboratory. Fill out the risk assessment and log a	

	RE-2-C-11	Compare the standard biomechanical model used locally to alternative models by considering and evaluating the strengths and weaknesses of each.	Trainee: modifications can be made to biomechanical models that might improve the interpretation of the patients problem or might be a simplification of an existing model that facilitates its use in a particular population of patients. Comparison of the standard to alternative models might include a detailed understanding of the construction of the axis systems, the order of rotations. Document your comparison in a report. Assessor: does the trainee have a good understanding of the construction of alternative biomechanical models? Do they understand the difference in operation of the standard model to the alternative(s).?	
Medical Engineering Design	RE-3-C-1	Develop a detailed functional specification through discussion with the client/users, e.g. clinician and/or patient and their carer.	Design bespoke equipment based on client's clinical need e.g. lateral supports, footbox, switch mount	RE-3-C-2
	RE-3-C-2	Perform and document a design feasibility study from a functional specification.	Design bespoke equipment based on client's clinical need e.g. lateral supports, footbox, switch mount. Follow a standard such as BS 7000 design process model	RE-3-C-1
	RE-3-C-3	Apply the requirements of the Medical Devices Directive and appropriate standards and legislation to the design and manufacturing process.	Design a bespoke AT product resulting from a clinical assessment or departmental need. Project file or technical file	
	RE-3-C-4	Perform a risk assessment; propose a risk management strategy.	Project or technical file or within the bounds of a specific risk assessment for a client	
	RE-3-C-5	Develop technical documentation for development of a medical device.	Technical file (or project file developing into a technical file)	
	RE-3-C-6	Source components and materials in the preparation of an estimate or quotation.	Technical file. Within the client's health record if bespoke/custom equipment	
	RE-3-C-7	Design and develop a medical device.	Technical file. Within the client's health record if bespoke/custom equipment	
	RE-3-C-8	Carry out validation and verification of a medical device realisation.	Ensure the product is appropriate is meets the design brief. Appropriate safety testing prior to use. If bespoke seating this could include pressure. Design of a QA systemmapping	
	RE-3-C-9	Commission a medical device; produce protocols for its safe and effective introduction into service.	Standing operating procedure. Develop user or if required technical instructions. Quality control check protocol	
	RE-3-C-10	Train and familiarise the client/user in the use of the equipment, including the development of user instructions.	User instructions, handover documentation or training presentation. Clincial notes/case study	
	RE-3-C-11	Review the use of a medical device to enhance function, comfort and safety.	Follow up with client or service. Clincial notes/case study	

DOPS

		DOPS	**Examples of evidence**	**Competencies which may share evidence with this DOPS**
		Analyse and interpret the data/information obtained from the history and physical assessment.	Observe trainee analyse and interpret data/information obtained from the patient history and physical assessment	RE-1-C-3, RE-1-C-5
		Prepare a clinical report, documenting the relevant and critical elements of the assessment.	Observe trainee prepare a clinical report which documents the relevant and critical elements of the assessment	RE-1-C-4
		Prepare a funding application for a piece of equipment	Observe trainee prepare a funding application for a piece of equipment	

Assistive Technology		Manufacture a custom contoured seating system and interface to a wheelchair base	Observe trainee manufacture a custom contoured seating system and interface it to a wheelchair base.	RE-3-C-7
		Manufacture a custom made orthosis	Observe trainee manufacture a custom made orthosis	
		Assemble and bench align a prosthetic limb	Observe trainee assemble and bench align a prosthetic limb	
		Manufacture/substantially modify another type of AT.	Observe trainee manufacture/ substantially modify another type of AT	RE-3-C-7
		Interface non-standard switching mechanisms to an EAT or FES device.	Observe trainee interface non-standard switching mechanisms to an EAT or FES device	RE-1-C-14
		Complete a risk assessment relevant to the modality and produce an action plan to reduce/manage the risk.	Observe trainee complete a risk assessment relevant to the modailty and produce an action plan to reduce/manage the risk	RE-1-C-8
		Set up a piece of AT for a patient, making the necessary adjustments and modifications to meet the previously agreed objectives	Observe trainee set up a piece of AT for a patiend and make the necessary adjustments and modifications to meet the previously agreed objectives	RE-1-C-15
		Select and use an outcome measure appropriate to monitor performance of the intervention.	Observe trainee select and use an outcome measure appropriate to monitor performance of the intervention	RE-1-C-13
		Prepare and calibrate equipment	Observe trainee prepare and calibrate equipment	
Clinical Gait Analysis		Perform system tests and QA checks on the	Observe trainee perform system checks and QA checks on the laboratory equipment	
		Prepare and calibrate the laboratory and its equipment, ready for clinical data collection.	Observe trainee prepare and calibrate the laboratory and its equipment, ready for clinical data collection	
		Analyse and interpret the data/information obtained from the history and physical assessment, and compare your data to local or published reference ranges.	Observe trainee analyse and interpret data/information obtained from the history and physical assessment, and compare your data to local or published reference ranges	
		Process and report data and appropriately manage/remove artefacts	Observe trainee process and report data and appropriately manage/remove artefacts	
		Interpret the data obtained and complete a clinical report appropriate to a multi-disciplinary audience	Observe trainee interpret the data obtained and copmlete a clinical report appropriate to a multi-disciplinary audience	
		Complete a risk assessment relevant to the modality and produce an action plan to manage the risk.	Observe trainee copmlete a risk assessment relevant to the modailty and produce an action plan to manage the risk	
Medical Engineering Design		Present a functional specification to a project initiator.	Observe trainee present a functional specification to a project initiator	RE-3-C-1
		Lead a project design multi-disciplinary meeting to formally appraise the developed design concepts.	Observe trainee lead a project multi-disciplinary meeting to formally appraise the developed design concepts	RE-3-C-2
		Produce a CAD drawing, or part thereof, from the specification for either a mechanical or electronic piece of equipment	Observe trainee produce a CAD drawing, or part theror, from the specification for either a mechanical or electronic piece of equipment	RE-3-C-5
		Demonstrate appropriate analysis/critique/detail development of a design throughout the process	Observe trainee demonstrate appropriate analysis/critique/detail development of a design throughout the process	RE-3-C-3, RE-3-C-4, RE-3-C-5, RE-3-C-6, RE-3-C-7
		Manufacture or assist in the manufacture or direct the manufacturing of the designed equipment.	Observe trainee manufacture or assist in the manufacture or direct the manufacturing of the designed equipment	RE-3-C-7
		Perform verification and validation tests on the equipment produced	Observe trainee perform verification and validation tests on the equipment produced	RE-3-C-8
		Commission the piece of equipment, taking account of staff and patient safety issues	Observe trainee commission the piece of equipment, taking account of staff and patient safety issues	RE-3-C-9
		Appraise commercially available products against the design specification in order to justify the development of a custom made device, or part thereof	Observe trainee appraise commercially available products against the design specification in order to justify the development of a custom made device, or part thereof	

CBD

	CBD Example	Examples of evidence	Competencies which may share evidence with this CBD
RE1	**Discuss clincial assessment, outcome and reasons using a clinic report**		
RE2	**Discuss process of the development of a medical devices and its success**		

OCEs

		OCEs	Examples of evidence	Competencies which may share evidence with this DOPS
Assistive Technology		Review the information contained in the referral; clarify this with the patient and identify their personal aims/objectives	Observe trainee review referral at the beginning of an assessment/appointment and confirm details with patient and/or family/carers (depending on capacity). Agree aims and objectives of appointment with patient and/or family/carers	RE-1-C-1
		Gain consent from a patient for the assessment and/or provision of equipment.	Observe trainee gain informed consent from the patient for the assessment and/or provision of equipment. If informed consent cannot be obtained to follow the appropriate mental capacity act proceedures.	RE-1-C-1
		Take a patient history relevant to the modality	Observe trainee take a relevant patient history for that assessment	RE-1-C-1
		Carry out a physical assessment of a patient to inform provision of an AT	Observe trainee carry out a physical assessment to inform provision of an AT. This could be a range of movement examination, postural assessment, functional assessment	RE-1-C-2
		Review a piece of AT with the patient following previous provision, agree the changes required, including reprioritisation of objectives; make any necessary adjustments/modifications/replacements; document the clinical reasoning involved	Observe trainee review current AT equipment with patient (or following … their power of attorney for health) and agree changes with them. Observe trainee prioritise adjustments/modifcations with patient and clinic MDT. Review clinic report/notes	RE-1-C-1, RE-1-C-15
		Train a patient and/or carers in the use of a piece of AT, recognising the need to communicate with people having a range of physical and cognitive abilities.	Observe trainee provide training to patient and fmaily/carers on use of a piece of AT. Observe trainee using different communication strategies as appropriate.	RE-1-C-15
		Lead or take an active role in a multidisciplinary clinical event, such as a case conference or patient assessment which may include a ward environment; understand the intervention in the wider clinical setting.	Observe trainee lead or take an active role in an MDT assessment or case conference and the effect of the intervention in the wider clinical setting.	RE-1-C-1, RE-1-C-2
		Explain the relevant and critical findings of the assessment to the patient, related to the reason for referral and the patient aims, and resolve any conflicting requirements	Observe trainee explain the relevant critical findings of the assessment to the patient or family/carer if appropriate. Relate these findings to the reason for the referral, stated aims of the patient. Observe trainee resolve any conflicitng requirements	RE-1-C-3, RE-1-C-4, RE-1-C-5, RE-1-C-6, RE-1-C-7
		Report to the patient detailed recommendations and rationale based on the data obtained	Observe trainee explain in appropriate detail the recommendations and rational based on the data obtained. Review clinic report.	RE-1-C-6
		Set up a piece of AT for a patient, making the necessary adjustments and modifications to meet the previously agreed objectives	Observe trainee set up a piece of AT for a patient and make adjustments accordingly	RE-1-C-15

Clinical Gait Analysis		Review the information contained in the referral to determine the reason for referral, clarify this with the patient and identify their personal aims/objectives	Observe trainee review the information contained in the referral to determine the reason for referral, clarify this with the patient and identify their personal aims/objectives	
		Gain consent from a patient for the assessment; explain to the patient the steps to be taken during the assessment.	Observe trainee gain consent from a patient for the assessment; explain to the patient the steps to be taken during the assessment.	
		Take a patient history relevant to the modality	Observe trainee take a patient history relevant to the modality	
		Carry out a physical assessment of a patient, following SOPs, to inform the assessment.	Observe trainee carry out a physical assessment of a patient, following SOPs, to inform the assessment.	
		Place markers on patients in the correct positions according to the laboratory's SOP	Observe trainee place markers on patients in the correct positions according to the laboratory's SOP	
		Collect gait data, as relevant to the referral and the patient's abilities and physical limitations.	Observe trainee collect gait data, as relevant to the referral and the patient's abilities and physical limitations.	
		Lead or take an active role in a multidisciplinary case conference, leading to recommendations for future treatments; understand this in the wider clinical setting.	Observe trainee lead or take an active role in a multidisciplinary case conference, leading to recommendations for future treatments; understand this in the wider clinical setting.	
		Explain the relevant and critical findings of the assessment to the patient, related to the reason for referral and the patient aims	Observe trainee explain the relevant and critical findings of the assessment to the patient, related to the reason for referral and the patient aims	
Medical Engineering Design		Present to the project team and other healthcare professionals the final piece of equipment produced, including compromises in the design, risk assessment, test results and competitor analysis.	Observe trainee present to the project team and other healthcare professionals the final piece of equipment produced, including compromises in the design, risk assessment, test results and competitor analysis.	
		Provide training to healthcare professionals and/or patient in the use of the equipment, using both verbal and written communication	Observe trainee provide training to healthcare professionals and/or patient in the use of the equipment, using both verbal and written communication	RE-3-C-10
		Lead a meeting to produce a risk assessment for the piece of equipment being commissioned.	Observe trainee lead a meeting to produce a risk assessment for the piece of equipment being commissioned.	RE-3-C-4
		Obtain a patient history from a normal volunteer or typical patient referred to your service and present the findings to a colleague or peer.	Observe trainee obtain a patient history from a normal volunteer or typical patient referred to your service and present the findings to a colleague or peer.	RE-1-C-1