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A PROPOSED PROSTHETICS TERMINOLOGY

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This report has been prepared for the Task Force on the Standardization of Prosthetic-Orthotic Terminology established by the Committee on Prosthetic-Orthotic Education of the National Academy of Sciences—National Research Council which first met on January 21, 1971, under the chairmanship of Jacquelin Perry, M.D. Many informed members of the various professions concerned with prosthetics from university, government, and private sectors have over the years contributed to the discussions at a number of meetings under the general chairmanship of Dr. Perry. The proposed terminology presented here was mostly formulated at the two meetings at Rancho Los Amigos Hospital, Inc., Downey, California, and the Rehabilitation Institute of Chicago, Illinois, under the acting chairmanship of Robert G. Thompson, M.D., and Paul R. Meyer, Jr., M.D. The participants of these two meetings are listed in the previous article by Hector W. Kay.

The Task Force on Standardization of Prosthetic-Orthotic Terminology (CPRD-CPOE) has agreed that the accepted nomenclature for amputation and prosthetics levels shall be that devised for transverse congenital deficiencies by the Subcommittee on Nomenclature and Classification in Congenital Limb Deficiency, International Society for Prosthetics and Orthotics, as described by Hector Kay in the preceding article. The nomenclature can be used independently of any terminology of systems, components, or materials. It is currently undergoing field trials in selected centers.

TERMINOLOGY

A descriptive terminology of systems, components, and materials was devised by the Task Force at its meeting on July 9, 1974, in Chicago, and is described here. This terminology can be used with any required degree of detail for prescription, education, fabrication manuals, fee schedules, information retrievals, or component catalogs. It is intended to be used with the nomenclature described in the preceding article, but could also be used independently. It has been proposed that a field trial be started in the fall of 1974, preferably as an international evaluation project through ISPO.

The following is a description of the proposed terminology of *systems*, *components*, and *materials*. It is proposed that a prosthesis be described in an orderly manner, proceeding from the general to the more detailed as follows:

A. General Characteristics
   1. Prosthetics Level
   2. Major Structural Feature
   3. Durability
   4. Cosmetic Treatment

B. Interface Characteristics
   1. Socket
   2. Suspension
   3. Force Distribution

C. Systems and Mechanics
   1. Joints at Each Level from Proximal to Distal
   2. Joint Controls
   3. Power Source of Controls
   4. Alignment Devices
   5. Terminal Devices - Upper Limb

D. Materials

GENERAL CHARACTERISTICS

1. Prosthetics level should be described according to the description in the preceding article by Kay (*2*).
2. Major Structural Feature. By international agreement prostheses are endoskeletal or exoskeletal. In some there may be a hybrid element but one or the other will be the "major" feature. Therefore prostheses are:

   Endoskeletal
   Exoskeletal

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3. Durability. Some indication of temporariness or permanence of a prosthesis is needed and whether it is robust. Some agreement was reached at Heathrow (*1*) about the need for different strengths of prostheses. Durability, therefore, needs two descriptors, one from list "a" and one from list "b."

a	b
Immediate Postsurgical	Geriatric
Training (Diagnostic)	Standard
Definitive	Heavy Duty

4. Cosmetic Treatment. At Chicago it was agreed that "anthropomorphic" and "nonanthropomorphic" were clumsy words, and since "cosmesis" was an acceptable and used term, "acosmetic" was suggested.

   It has been suggested further by Anthony Staros that we do not want to say that a prosthesis is "acosmetic"; that is to say it is ugly. What is intended is to distinguish between special cosmetic treatment and standard procedures.

   Cosmesis should therefore refer to special cosmetic treatment and would be:

   Cosmetic Cover
   Plastic on Wood or Metal
   Plastic Foam and Skin
   None

   To say that there is no special cosmetic treatment does not infer that the prosthesis is necessarily ugly.

INTERFACE CHARACTERISTICS

The reaction of the work load across the interface between prosthesis and patient takes place in the socket and sometimes in the suspension. Where that major reaction occurs must be specified but is recorded in the description of the socket and suspension.

1. Sockets. Sockets need three descriptors and may need a fourth for suspension. The first descriptor is the nature of the socket; the second is the nature of the materials constructing the socket; the third is the site of major force distribution. The fourth will be the socket's contribution to suspension. Sockets are therefore:

a	b	c
Total Contact	Rigid	Proximal Bearing
Non-total Contact	Semirigid (e.g., liner)	Distal Bearing
	Compliant	Total Bearing
	Hybrid	

   Materials (see section on Materials) can also be described, for example, the PTB air cushion socket could be "plastic (or even epoxy resin glass fiber) total-contact semirigid distal compliant proximal bearing socket."

2. Suspension. Ideally, suspension is from the socket where it may be "pressure differential" or "suction" or it may be body contour as in the complete tarsus, complete leg, complete hip, some partial leg, and some partial forearm prostheses, etc.

   Many prostheses need additional suspension by a harness, belt, etc. This is called auxiliary harness. The Task Force did not consider that distinction need be made between cuffs, bands, corsets, etc.

   The connection between the suspension and the prosthesis is a "joint" and if it is a strap or straps, it is indicated under the joint at the appropriate level as "flexible."

   When the auxiliary suspension also accepts a work load additional to the forces required to suspend, the anatomical site of that load should be indicated. Suspension is therefore:

   Pressure Differential (socket)
   Body Contour (socket)
   Auxiliary — Thigh Bearing
   Ischial Bearing
   Arm Bearing
   Shoulder Bearing
   etc.

3. Force Distribution. This is a function of the interface but is described in the appropriate place under socket or auxiliary suspension.

The nature of the distribution will itself determine some of the character of the socket and auxiliary suspension, e.g., in a partial leg prosthesis, the presence of uniaxial joints and the need for thigh and ischial bearing require a full length corset or thigh lacer.

SYSTEMS AND MECHANISMS

1. Joints. Joints are described by the number of axes and the number of planes in which they move. There was some discussion about the use of "rigid" where no mechanical joint exists, but it was agreed that where there is no prosthetic mechanical joint at an anatomical joint level, this should be so described. Joints are therefore:

No motion at an anatomical joint level	Rigid
Motion in one plane	
about one axis	Uniaxial
about multiple axes	Polycentric
Motion in two planes	
about two axes	Dual axis
Motion in three planes	
about finite axes	Multiaxial
about infinite axes	Flexible

2. Control Mechanisms. In the lower limb, descriptors from a, b, c, and d, below, will have to be given as required for both stance and swing phases. Since stance is usually a greater requirement than swing, this should be stated first.

   a. Plane and direction of movement (plane need not be stated)

Sagittal
- Extension
- Flexion

Coronal
- Abduction
- Adduction
- Valgus
- Varus

Axial
- Internal rotation
- External rotation
- Pronation
- Supination
- Eversion
- Inversion
- Opposition

   b. Type of control mechanisms

Constant or
Intermittent and are:
- Mechanical linkage
- Hydraulic
- Pneumatic
- Electric
- Other

The term "constant" is necessary to describe certain types of lower-limb swing phase controls and some upper-limb power actuators, etc. "Intermittent" indicates the reverse.

   c. Purpose of control mechanisms at each joint movement

Free	modified as required by
Assist	Variable
Resist	Lock
Stop	
Hold	

   d. Method of controlling mechanisms

- Automatic
- Biomechanical, Direct
- Biomechanical, Transducer
- Bioelectric

3. Power Source

None (e.g., passive terminal devices)
Body
Electric
Hydraulic
Mechanical
Hybrid

4. Alignment

Bench	Mechanical	Single	Integral
		Dual	Removed

Bench alignment is always present and need not be specified. When an alignment device is used, it should have two descriptors to denote whether it is at a single site or is at both ends of a "body" segment. It

must also say whether it remains as an integral part or is removed at completion of fabrication.

5. Terminal Devices

Cosmetic
Functional
  Hook or Special Tools

They may be:
  Voluntary opening
  Voluntary closing
  Both
  Neither

They may be:
  Powered as above
  Passive

MATERIALS.

The need to specify materials depends upon a number of factors. In prescription, it will depend upon the relative knowledge of the physician and prosthetist which varies greatly in the international field. It may also be necessary in some countries to give fabrication details to satisfy governmental specifications. Instructional and fabrication manuals will need far greater detail than are required in ordinary usage.

Terminology for materials can be in general terms or can be specific; it can be a description in general of a whole system or can be applied to a component, e.g., one can refer to a "wooden leg" or "a wooden foot," a "plastic arm" or a "plastic socket." There are three grades of specification: first, general terms; second, semispecific terms; and third, specific terms. The first and sometimes the second grades are usually sufficient for prescription or normal description. The third will be necessary in professional instruction and fabrication manuals. For this third grade of specification, the national or international description and standards should be used.

1. General
   Wood
   Leather
   Metal
   Webbing
   Rubber
   Plastic
     etc.

   are often sufficient to distinguish between comparable prostheses or prosthetic components which are made to a known specification once the major grade has been decided.

2. Semispecific

Willow	Nylon webbing
etc.	Coutil
	etc.
Box calf	Silastic
Chamois	Polypropylene
Block leather	Polycarbonate
etc.	Glass fiber
	etc.
Aluminum	
Stainless Steel	
etc.	

   These terms are rather more specific and are sometimes desirable in description and prescription.

3. Specific. When specific materials need to be detailed, there are specific terminologies which are in use either internationally or nationally. Most of these terminologies are also given specific mechanical standards, an exception being leather which has not yet been successfully standardized.

   Each nation should use its own national specification first; if none is available, it should be the international standard; and if neither is available, it should choose from another nation's terminology.

   Forms that have been proposed for use in the field trials are shown in Appendixes A and B.

LITERATURE CITED

1. Department of Health and Social Security, England and Wales, *Report of Conference on Physical Testing of Prostheses*. Skyway Motel, Heathrow, London, England, March 25-27, 1974 (in press).

2. Kay, Hector W., A proposed nomenclature for limb prosthetics, *Orth. and Pros.*, 28:4, December 1974.

APPENDIX A

PROSTHETICS FORM/Upper Limb

PATIENT DATA

Name _____ Age _____ Institution _____
Address _____ Sex M/F _____ Record Number _____
_____ Amputation Cause _____
_____ Date of Amputation _____
Date of 1st Prosthesis _____

OCCUPATION

Work _____ Fee-Paying Agency _____
Leisure Physician _____
1 _____ Prosthetist _____
2 _____ Therapist _____
3 _____

PROSTHETICS DATA

A. GENERAL

Level _____ Side Rt/Lt
Durability _____ Structure Endo/Exo Skeletal
Material _____ Cosmetic Treatment _____

B. INTERFACE

SOCKET

Type _____ Force Distribution _____
_____ _____
Character _____ Material _____
_____ _____

SUSPENSION

Socket _____ Force Distribution _____
Auxiliary _____ Material _____

C. SYSTEMS

JOINT TYPE	SHOULDER		ELBOW		WRIST	
MOTION	Control Intent	Mechanism	Control Intent	Mechanism	Control Intent	Mechanism
Flexion						
Extension						
Abduction						
Adduction						
Rotation In						
Rotation Out						
POWER Source						
Control						

D. TERMINAL DEVICES

HANDS					
Cosmetic Passive	1	2	3	4	5
Functional Power Source					
HOOKS, TOOLS, ETC. Passive					
Power and Source					

APPENDIX B

PROSTHETICS FORM/Lower Limb

PATIENT DATA

Name _____ Age _____ Institution _____
Address _____ Sex M/F _____ Record Number _____
_____ Cause of Amputation _____
_____ Date of Amputation _____
Date of 1st Prosthesis _____

PROSTHETICS DATA

A. General

Level _____ Side Rt/Lt
Durability _____ Structure Endo/Exo Skeletal
Material _____ Cosmetic Treatment _____

B. INTERFACE

SOCKET

Type _____ Force Distribution _____
_____
Character _____ Material _____
_____

SUSPENSION

Socket _____ Force Distribution _____
Auxiliary _____ Material _____

C. SYSTEMS

HIP

JOINT TYPE	STANCE		SWING	
MOTION	Control Intent	Mechanism	Control Intent	Mechanism
Flex				
Extend				
Abduct				
Adduct				
Rotate In				
Rotate Out				
POWER Source				
Control				

KNEE

JOINT TYPE	STANCE		SWING	
MOTION	Control Intent	Mechanism	Control Intent	Mechanism
Flex				
Extend				
Abduct				
Adduct				
Rotate In				
Rotate Out				
POWER Source				
Control				

ANKLE/FOOT

JOINT TYPE	STANCE		SWING	
MOTION	Control Intent	Mechanism	Control Intent	Mechanism
Flex				
Extend				
Abduct				
Adduct				
Rotate In				
Rotate Out				
POWER Source				
Control				