

**International Society for
Prosthetics and Orthotics**



**CONSENSUS CONFERENCE ON
POLIOMYELITIS**

**Hammamet, Tunisia
16-22 November 1997**

CONSENSUS STATEMENTS AND SYNDICATE REPORTS

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In collaboration with WHO





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ON POLIOMYELITIS**

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The consensus statements are the final conclusions of the conference and are based on all of the Syndicate (small group) and plenary discussions that took place.

The Syndicate tasks, reports and the subsequent plenary discussions are reported in full.

FOREWORD

The ISPO Consensus Conference on Poliomyelitis was held on November 1997 in Hammamet, Tunisia.

It brought together experts in the subject and representatives of all the agencies working in the field of poliomyelitis.

Due to delays in producing the final report of this conference, it has been decided, in the meantime, to print the final Consensus Statements from the conference and the Syndicate Reports. The Consensus Statements are the final conclusions of the conference and are based on all of the syndicate the plenary discussions that took place. The syndicate tasks, reports and subsequent plenary discussions are reported in full.

The Society would like to thank the Organising Committee, the participants and the Ministry of Health and Ministry of Social Security of Tunisia for all their efforts in making this conference a success.

Norman A. Jacobs
President, ISPO

CONSENSUS

LOWER LIMB ORTHOTIC TREATMENT IN CHRONIC POLIOMYELITIS

LOWER LIMB ORTHOTIC TREATMENT IN CHRONIC POLIOMYELITIS

The following consensus is based on Syndicates 2D and 2E and the subsequent plenary discussions.

Basic principles

The basic principles which should be observed when developing a lower limb orthotic prescription include:

- a thorough evaluation of the patient is necessary and should include the assessment of muscle strength, joint ranges of motion and limb length;
- the evaluation should include both the spine and the upper limbs since the status of these will influence the lower limb prescriptions.

Impairments

The impairments which are present may be defined as:

- *joint instability* is defined as inability to control the position of a joint. It is generally a consequence of muscle weakness but may also result from secondary damage to the ligaments of a joint.
- *deformity* is defined as a fixed position of a joint which precludes the normally present range of motion. It is generally secondary to instability.

Functional requirements

The functional requirements of orthoses to treat these impairments may be defined as to:

- *correct*, i.e. return an unstable joint to as close as possible to its normal neutral alignment and thereafter either to:
 - *hold* the joint in its corrected position; or
 - *assist or resist* the motion of the joint in a specified manner;

or

- *accommodate*, i.e. hold a joint in a deformed alignment to prevent further deformity arising;

or

- *relieve*, i.e. fully or partially unload a joint;

or

- *compensate* for a limb or segment length discrepancy.

Orthotic solutions

The orthotic design which will provide the specified functions may utilise a number of different materials and manufacturing methods.

The selection of the "appropriate technology" will depend on a number of factors, including:

- the availability of materials;
- the training of available staff;
- the financial ability of the user;
- the age of the user;
- the social circumstances and environment of the user;
- the patient and family acceptance.

D. Lower limb	1	Length discrepancy	<i>Compensate</i>
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NB Combined impairments

It should be noted that the functional requirements for an orthosis for a user who exhibits more than one of the specified impairments may be defined by combining the functional requirements for each individual impairment.

CONSENSUS

LOWER LIMB SURGERY IN CHRONIC POLIOMYELITIS

LOWER LIMB SURGERY IN CHRONIC POLIOMYELITIS

The following consensus is based on Syndicate 2C and the subsequent plenary discussions.

General principles of surgery

1. No surgery is justified in situations where reasonably sufficient pre-operative/intra-operative/ post-operative care cannot be provided.
2. Even in situations where surgical options are justifiable issues of cost, surgical acceptability and resource availability may need to be addressed before recommending surgery.
3. All treatment, including surgery, must be with the aim of enabling the patient to function to the best level possible, in the community and thus improve the quality of his/her life, and as far as possible, become self-sufficient.
4. Surgery must only be undertaken after evaluating whether the patient would :
 - a) have a wheelchair existence
 - b) become ambulant with orthoses, or
 - c) be able to ambulate without orthoses.

The surgery should be tailored to achieve the level of mobility that is envisaged.

5. The sequence of surgical procedures should usually start with the hip, knee and then proceed to the foot.

Aims of surgery on the lower limb

To improve function of the lower limb by:

- a) overcoming the effects of muscle paralysis
- b) correcting deformities
- c) restoring joint mobility
- d) relieving pain
- e) restoring limb length discrepancy.

Surgery of the hip

- a) Tendon transfers around the hip are of doubtful value in restoring muscle power.
- b)
 - i) Soft tissue release should be undertaken if there is a flexion deformity of more than 30° or abduction deformity of more than 15° . Isolated rotation deformities around the hip need not be corrected.
 - ii) Anterolateral subperiosteal soft tissue release from iliac wing (Soutter) is an acceptable procedure to be done as soon as possible but it must not be overdone and, in particular, must leave at least 5° abduction.
 - iii) If soft tissue correction alone is inadequate, add a subtrochanteric osteotomy.
- c) Paralytic subluxation and dislocation in polio ought to be reduced. Under the age of 7, perform an ilio-psoas transfer (Mustard) with femoral osteotomy if the neck is in valgus. Over the age of 7, acetabular reconstructive procedures may also be required.
- d) Painful hips in older adults, are relieved by total hip replacement. Arthrodesis may be considered in certain circumstances taking cultural and functional aspects into account. Amputations may be considered in exceptional circumstances.

Surgery of the knee

- a) Tendon transfers, from the hamstrings to the patella, are appropriate to improve knee extension, if the criteria for such transfers are fulfilled.
- b) If knee flexion deformities are less than 30° surgery is only indicated if wedged casts and/or traction have failed, unless x-rays reveal a bony deformity which warrants a bony correction.

If knee flexion deformities are more than 30° soft tissue releases and/or bony procedures are necessary.

Avoid any procedure which leaves joint surface incongruity, because this will lead to longer term problems.

For genu recurvatum, orthotic control alone is generally recommended. In skeletally mature patients bone block procedures, using the patella or an iliac crest block fused to the anterior upper tibia, an arthrodesis, may be performed. For valgus and varus deformities orthoses are adequate for mild degrees of deformity. For severe valgus and varus deformities corrective osteotomies are required.

- c) Instability of the knee can generally be controlled with orthoses and surgery is not indicated.
- d) If pain is severe, despite an adequate orthosis, arthrodesis may then be the last resort provided the ipsilateral hip and foot are normal. The place of arthrodesis of the knee is however controversial.

Pain in older adults with osteoarthritis can be relieved by a total knee replacement in certain circumstances.

Surgery of the foot

- a) Tendon transfers, for isolated tibialis anterior loss is the transfer of the extensor hallucis longus to the first metatarsal neck (Jones).

For foot drop, transfer of the tibialis posterior tendon is acceptable though it may only work as a tenodesis

The transfer of peroneal tendons, for foot drop, is acceptable provided the sub-talar joint is fused.

Transfer of the tibialis anterior to the tendo Achillis, for calcaneous foot deformity is controversial. Tenodesis of tendo Achillis to fibula for paralytic calcaneous foot deformity (Westin) will prevent dorsiflexion.

- b) Foot deformity corrections

Equinus

- lengthening of the tendo Achillis by any appropriate technique is recommended at any age provided there is sufficient congruency of the subtalar joint
- over lengthening of the tendo Achillis is to be avoided
- a residual 5-10° equinus must be retained in the presence of quadriceps paralysis
- a triple fusion of subtalar, talonavicular and calcaneocuboid joints (Lambrinudi) is acceptable in skeletally mature feet if the equinus cannot be corrected by tendo Achillis lengthening.

Equinovarus

- soft tissue release surgery is recommended in the first instance at all ages
- in the skeletally immature foot residual hindfoot varus may be corrected by a calcaneal osteotomy
- in skeletally mature feet residual deformity may be corrected by a triple fusion.

Equinovalgus

- tendo Achillis lengthening followed by a subtalar extra-articular fusion (Green-Grice) and a peroneal transfer to the dorsum of the foot is an acceptable option in skeletally immature feet
- in the skeletally mature foot a triple fusion is appropriate

Calcaneus/calcaneovarus/calcaneovalgus and calcaneocavus

- in the skeletally immature foot a Westin's tenodesis is recommended for the calcaneus
- the plantar release (Steindler) is the procedure to be adopted for cavus deformity

In older children (skeletally immature) translational osteotomy of the calcaneus is acceptable.

In the skeletally mature foot an osteotomy and/or fusion procedure is recommended.

c) Instability

Instability of the subtalar joint in the skeletally immature foot may be treated by a subtalar extra-articular arthrodesis.

Pantalar fusion and ankle fusion are not recommended for instability in the skeletally immature foot.

In the older skeletally mature child, a triple fusion is recommended.

If an orthosis is required to stabilise proximal joints no surgery is indicated for foot instability.

d) Pain

Triple arthrodesis may be performed for pain originating in the hind foot.

Ankle pain not responding to orthotic measures may be treated by an ankle arthrodesis.

General comments

Mild deformities, such as hip and knee contractures, are generally amenable to conservative management, such as traction or serial plaster casts with wedging and should not therefore need surgery.

Limb length inequality

1. Lower limb length discrepancies of less than 2 cms:
 - a) may be ignored, or
 - b) treated with a shoe raise (for patient's preference or for comfort)
2. Discrepancies of between 2-5 cms may be corrected by:
 - a) percutaneous epiphysiodesis
 - b) open epiphysiodesis
 - c) shortening of the longer limb
 - d) shoe raise
 - e) lengthening of the shorter limb (rarely indicated).
3. Discrepancies of greater than 5 cms may be treated by limb lengthening by callotasis at a centre equipped for close monitoring of the patient throughout the protracted period of limb lengthening to monitor the problems of infection, loosening and secondary contractures. An extension orthoprosthesis may be indicated instead of surgery.

CONSENSUS

THE RELATIONSHIP BETWEEN ORTHOTIC TREATMENT AND SURGERY IN THE MANAGEMENT OF THE LOWER LIMB IN CHRONIC POLIOMYELITIS

THE RELATIONSHIP BETWEEN ORTHOTIC TREATMENT AND SURGERY IN THE MANAGEMENT OF LOWER LIMB CHRONIC POLIOMYELITIS

The following consensus is based on Syndicates 1A, 1B, 1C, 1D, 1E, 1F and 4E and the subsequent plenary discussions.

Orthotic treatment is the preferred method of treatment in every instance unless:

- 1) surgery is needed to facilitate orthotic treatment
- 2) the patient prefers not to use orthoses (including non-compliance)

For special cases of **muscle weakness (instability)** or **deformity (contracture)** further exemptions apply:

- 3) surgery is indicated to reduce or eliminate the need for existing orthoses or footwear
- 4) orthotic treatment considered ineffective or impossible.

Relationship between orthotic treatment and surgery		
Hip	Orthosis	Surgery
Abduction deformity Abduction weakness Adduction deformity	ineffective no consensus ineffective	soft tissue release or osteotomy > 15° soft tissue release
Flexion deformity	ineffective	> 30° soft tissue release > 60° soft tissue release (Yount)
Extensor weakness	no consensus	
Rotational weakness Rotational deformity	effective ineffective	isolated not corrected isolated not corrected if insufficient add osteotomy
Subluxation/dislocation	partially effective	< 7 years iliopsoas transfer possibly osteotomy if valgus > 7 years also acetabular bony reconstruction may be required
Knee	Orthosis	Surgery
Varus/valgus deformity	effective if ineffective	corrective osteotomy
Varus/valgus instability	effective if effective	soft tissue release or corrective osteotomy
Extensor weakness	effective if ineffective	tendon transfer
Genu recurvatum	effective if ineffective	bone block (arthroresis)
Flexion deformity age 2-6 years age 6-12 years age > 12 years	≤ 30° effective > 30° ineffective	soft tissue release and tendon transfer as above plus bony correction all surgical procedures In all age groups soft tissue releases are first performed and residual deformity can be corrected by bone surgery (osteotomy)

Foot	Orthosis	Surgery
Equinus deformity	if ineffective	tendo Achillis lengthening > 12-14 years : subtalar fusion
Equinovarus deformity skeletally immature skeletally mature	if ineffective	soft tissue release at all ages residual hindfoot varus: calcaneal osteotomy subtalar triple fusion
Equinovalgus skeletally immature skeletally mature	if ineffective	tendo Achillis lengthening extra-articular subtalar fusion peroneal transfer to dorsum subtalar triple fusion
Calcaneous deformity	if ineffective	tenodesis or osteotomy
Cavus deformity skeletally immature skeletally mature	if ineffective	plantar soft tissue release osteotomy
Subtalar instability skeletally immature skeletally mature	if ineffective	extra-articular subtalar fusion subtalar triple fusion
Limb length discrepancy	Orthosis	Surgery
< 2 cm		shoe raise, if any
2- 5 cm		growth plate or bone surgery
> 5 cm	orthroprosthesis	limb lengthening

CONSENSUS

THERAPY AND REHABILITATION OF THE LOWER LIMB

THERAPY AND REHABILITATION OF THE LOWER LIMB

The following consensus is based on Syndicates 2F and 2G and the subsequent plenary discussions.

The patient with poliomyelitis has to be approached by a multidisciplinary team according to resources available in each region. The ideal team will be formed by a rehabilitation doctor, physiotherapist, occupational therapist, psychologist, orthotist, orthopaedic surgeon and social worker. It has to be a global approach, including social aspects. It can also be handled in a Community Based Rehabilitation (CBR) programme.

General goals

The general goals of therapy and rehabilitation are to:

- secure and maintain good nutrition and general health;
- maintain airway/respiration;
- prevent further impairments;
- achieve independence for the patient;
- maximise individual potential;
- return patient to school, work or social activities;
- decrease pain;
- maintain or increase ROM;
- improve quality of life;
- help the patient to learn to accept and adapt to his limitations;
- educate and inform society;
- help the patients to be aware of their rights;
- help their inclusion in society and fight architectural barriers;
- promote sport and recreation;
- see they are treated as human beings.

Methods of physiotherapy

During the acute phase (first 2-3 weeks) the goal is to protect and rest:

- teaching very important
 - about disease
 - social/psychological issues
 - parents are especially important since they play a large role
- rest
- positioning
 - to protect skin
 - to prevent deformities
- passive mobilisation by physical therapist only
- pain control – warm packs

During the recovery period (after 2-3 weeks to 2-3 years) the goal is to return to the highest level of function:

- teaching patients/families
- positioning to protect muscles and prevent contractures
- passive mobilisation
- active exercise
 - general exercises
 - water therapy if available
- functional training
 - sitting, transfers, bed mobility
- play
 - standing, balancing, walking, kneeling, crawling – age appropriate activities
 - make sure to have proper alignment and no compensation
- rest important between sets of exercise and between different activities of the day – do not push to maximal levels
- orthoses and night splints can be used to maintain posture and protect muscles during weight bearing and rest

- contracture management: use warmth, massage and soft tissue work, stretching, casting and splinting
- the use of electrical stimulation was discussed without reaching a conclusion
- teamwork is crucial between family, patient and team.

Evaluation

For every goal there should be a measuring indicator. The team should check if goals were achieved or whether they should be changed after assessment of treatment.

CONSENSUS

ORTHOTIC AND SURGICAL TREATMENT OF THE UPPER LIMB

ORTHOTIC AND SURGICAL TREATMENT OF THE UPPER LIMB

The following consensus is based on Syndicates 3A and 3B and the subsequent plenary discussions.

General considerations

1. Evaluate thoroughly and discuss treatment options and goals with patient.
2. Try orthosis when possible to improve function or prevent deformity and/or contracture.
3. Try adaptive equipment to assist ADLs and modifications and adaptation to patients' environment.
4. Surgical intervention should be considered carefully, it is a definitive procedure and could impair function.
5. Orthotic treatment of the upper limb is difficult for several reasons:
 - acceptance of orthosis is low
 - often not enough function to bother with
 - mark of disability with difficult social acceptance
 - lack of technical training to provide functional (dynamic) upper limb orthoses
6. Cosmetic orthoses can be supplied successfully, e.g. shoulder pads or positioning of flail arm.
7. The team approach is important to focus treatment. Orthotic and surgical treatment vary with the different resources available in any given country. The availability of surgical facilities, trained surgeons, trained orthotists, trained therapists, all play a role in treatment protocols and prescription criteria.
8. Members of the team should not disregard available local materials and local craft skills.
9. Improved function is the goal of treatment no matter the type of surgery performed or the orthotic design or specific materials used.
10. The majority of upper limb bone and joint surgery should be delayed until after skeletal maturity. Soft tissue surgery and tendon transfers can be performed earlier. There was no consensus regarding a definite age but views were expressed that surgery should not be performed before 4-7 years of age.

Upper limb surgery and orthotic treatment

Indications and goals of surgery and orthotic treatment of the shoulder, elbow, forearm, wrist and hand are outlined below. Each joint was considered in the following phases:

- acute phase (onset to 3 weeks)
- recovery period (3 weeks to 3 years after onset)
- chronic (late) phase (3 years after onset and beyond)

In the acute phase for the shoulder, elbow, forearm, wrist and hand the goals are to prevent contracture and overstretching through proper positioning – nursing care. No surgery or orthotic treatment is indicated.

In the recovery period for the shoulder, elbow, forearm, wrist and hand the goals are to prevent contractures and overstretching through positioning with orthosis or bandages. Provide environmental adaptations for ADLs and mobility aids.

Indications and goals for surgery and orthotic treatment are:

- Shoulder*
- indication for treatment – pain and instability
 - orthotic trial

- there are a few indications for shoulder surgery:

Arthrodesis:

This is the most common surgery for the shoulder:

- (i) if the patient has no muscles to activate the shoulder but muscles to activate the scapula. The most important muscle needed to achieve shoulder abduction following shoulder fusion is the serratus anterior. If the scapula activators are moderately weak, the patient may achieve prehension between the humerus and trunk if not shoulder abduction;
- (ii) if the elbow flexors are slightly less than grade three and there is an unstable shoulder, fusion may improve the elbow flexion power;
- (iii) if the joint is painful (usually later age).

Muscle transfers:

While possible, these procedures are not widely performed because of their unpredictability. May be done at any age, probably the earlier the better.

Elbow

- orthosis to provide elbow stability;
- environmental adaptations for ADLs;
- limited surgical indications to improve elbow flexion:
 - consider muscle transfer proximal to origin of wrist flexors/extensors from epicondyles to humerus(Steindler)
 - consider a triceps transfer unless need to use crutches or wheelchair

Forearm

There are seldom indications to improve or maintain pronation and supination through surgery or orthotics.

Wrist

- treatment indicators – relieve pain and/or improve functional position;
- prevent contractures and over-stretching through positioning with orthoses;
- orthoses to stabilise wrist;
- adaptive equipment for ADLs;
- arthrodesis is used to free up muscles which could be transferred to enhance the use of the thumb or fingers. The position of fusion is usually 20° to 40° of dorsiflexion, but will need to be varied by the individual patient's needs. The need for crutch or wheelchair use or transfers should be considered in the selection of final position.

Hand/fingers

- prevent contractures and overstretching through positioning with orthosis;
- consider appropriate orthosis to improve function; e.g. thumb opposition, dynamic prehension;
- surgery can be considered to establish and maintain opposition such as an opponensplasty; e.g. sublimis IV;
- surgery can be considered for a flail extensor; e.g. transfer of wrist extensors to finger extensors.

CONSENSUS

**SURGERY AND ORTHOTICS OF THE
SPINE**

SURGERY AND ORTHOTICS OF THE SPINE

The following consensus is based on Syndicates 2A and 2B concerning orthotic and surgical management of spinal deformity secondary to poliomyelitis.

The treatment of paralytic scoliosis is quite different from idiopathic scoliosis.

The Syndicates dealt with questions relating to:

- a) indications and methods
- b) relationship between surgery and orthotics.

These questions were answered with respect to facilities, resources, materials, environment and follow-up. Comment from the plenary discussion on the above two syndicates is included where appropriate.

1. Scoliosis is rarely a reason for referral. It is generally a finding in patients seeking treatment for lower limb problems.
 2. Treatment should be considered in a functional perspective, when problems are present or expected. Do not treat x-rays or progression of deformities by themselves.
 3. In scoliosis the team approach to treatment is mandatory.
 4. The treatment team should include a core group consisting of the:
 - a) therapist
 - b) orthotist
 - c) social worker
 - d) physician/surgeon.
 5. Better education in paralytic scoliosis was advocated for paramedical personnel to be able to better screen for scoliosis. Pre-treatment evaluation should focus on function and be done thoroughly. There is a need for better record keeping and records that go with a patient from their district to central medical care facilities in order that continuity of care is facilitated.
 6. Timing of intervention should aim at prevention of:
 - a) pain;
 - b) pulmonary compromise;
 - c) interference with ability to walk or sit;
 - d) hip dislocation; or
 - e) inability to keep the hands free for function
 7. Spinal orthoses can be used for two indications:
 - a) reduction of progression;
 - b) preservation of function by providing trunk support; e.g. enable sitting.
- Although there is little documented evidence for its effectiveness, there was ample anecdotal evidence for a definite role for orthotic management. Further evaluation is necessary.
8. Surgery is indicated when there is a continued progression of the curve that cannot be controlled by an orthosis, and when trunk balance is lost interfering with function and when deformity is severe enough to compromise pulmonary functions. Surgery should preferably not be done before 12 years of age. Surgical techniques should include segmental fixation. Surgery requires a level of technology not always available. It is very costly and must have proper post-operative care facility, available blood for transfusions and good follow-up care.
 9. If expatriate medical teams are involved they should coordinate their activities with local government health care strategies, return regularly and predictably to ensure follow-up care of patients, and not introduce inappropriate technologies.

CONSENSUS

POST POLIO SYNDROME

POST POLIO SYNDROME

The following consensus is based on Syndicates 4A and 4B and the subsequent plenary discussions.

1. No consensus was reached on terminology but it was generally agreed that the term post polio syndrome should be used to describe the long term effects of poliomyelitis related to ageing.
2. Special attention should be paid to the patient's changing needs with regard to assessment, orthotic provisions and environment. In certain cases, corrective surgery may be indicated.

CONSENSUS

INTERNATIONAL COOPERATION

INTERNATIONAL COOPERATION

The following consensus is based on Syndicates 3E and 4D and the subsequent plenary discussions.

1. The recipient government or executing organisation must be involved in the identifying and planning of a project which should be legalised by an agreement.
2. Clear goals and objectives should be established which consider the long term integration of services into the Government structures.
3. A clear plan of action should be adhered to by both parties which would include:
 - timescale
 - resources
 - identifying a monitoring mechanism
 - identifying areas of action
4. Services to patients should be provided by qualified professionals in order to guarantee the medical and functional requirements.
5. Quality is of paramount importance and takes priority over quantity.
6. Data collection and exchange of information should be part of every project in order to establish a national register to help achieve the overall objectives.
7. Recipients of orthopaedic services should be encouraged to contribute to the costs of the services provided taking account of the social policy of the country being assisted.
8. A team approach is mandatory in the management of the polio patient.
9. It is preferable for professionals going to a low-income country to have a period of orientation and specific training prior to taking up their responsibilities.

SYNDICATE 1

SYNDICATE GROUPS 1A AND 1B: SURGERY AND ORTHOTICS OF LOWER LIMB (FOOT)

The Syndicate group should discuss the subject with reference to the points listed below.

1. What are the goals of surgical intervention and orthotic treatment of the foot/ankle with regard to age and timing?
2. What are the recommended methods of surgical intervention of the foot/ankle with regard to age and timing?
3. What are the recommended methods of orthotic treatment of the foot/ankle with regard to age and timing?
4. What are the interactions between surgical intervention and orthotic treatment at the foot/ankle level?

In the discussion consideration should be given to the following matters:

- a) What is the desired position of the foot in the relation to age, timing and limb length inequality?
- b) Indications for wooden clogs, shoe modifications, insoles and orthopaedic shoes?
- c) Considerations about footwear and ankle joints.
- d) To which extent does surgical intervention at the foot/ankle level interact with the function at the knee and hip?

REPORT OF SYNDICATE 1A

Chairman: H. Shangali
Rapporteur: P. Bracken

Members: M. Lamine
D. Hohmann
H. Burger
A.N. Keyer
E. Pupulin
P.C. Tuan
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K. Kpandressi
J. van Rollegheem
H. Jaibi-Fransen
W. Seyoum
J. Fisk
A.N. Kaadan

1. Recommended that surgery not be considered before 2 years after the infection.

The child should be psychologically prepared prior to admission to the hospital.

Surgery should be the last resort.

Further considerations should be:

- the person gains independence
- to restore the functions of the foot to a normal state
- an anatomical alignment for stability
- the foot fits into the shoe and has function
- to prevent loss of sensation
- to be able to place the foot flat on the ground
- to correct deformity.

The early provision of orthoses. Provision of orthoses before and after surgery.

Not necessary to treat the leg if the discrepancy is less than 2 cm unless there is a noticeable limp.

Monitor leg length discrepancy to be able to predict length at maturity.

If there is a larger discrepancy surgery may be necessary twice.

2. Surgical intervention is necessary if there is muscle imbalance or a deformity.

- Tenodesis may be done;
 - treated by tendon transfer, according to which muscle is paralysed
 - correct deformity first and prevent further deformity through tendon transfer
 - when you can no longer control the deformity then surgery must be a consideration
 - arthrodesis/fusion necessary when stability is lost.

3. Provide orthoses as soon as possible.

Orthoses may be plastic or whatever is appropriate to the person and country:

- plastic : fitted immediately
- : custom made
- shoes : cannot treat deformities - only protect foot

- insoles : accommodate deformities, etc.

4. Correct the deformity before prescribing orthoses:

- prevention of further deformity
- stabilise the joint before surgical intervention.

Follow-up the surgery in developing countries at regular intervals.

Patients surgically treated should be encouraged to return to the centres for check up.

Must be remembered that a shoe is not meant to correct a deformity and cannot stabilise the ankle.

WHO interested in developing strategies for transferral of knowledge to help ensure medical follow-up.

We wish to encourage a consensus on terminology such as:

- deformity
- contracture
- paralysis
- weakness.

Recommend syndicate for surgeons to hammer out a series of surgical indications and techniques.

REPORT OF SYNDICATE 1B

Chairman: H. Watts
Rapporteur: D.N. Condie

Members: B. Persson
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H. Gassenschmidt
F. Lønnberg
C. Schiappacasse
R. Jované
R. Chokani
W. Raab
W. Hessing
A. Relf
B. Lake

The syndicate commenced its task by developing a list of general objectives (for the treatment of the ankle/foot) in chronic poliomyelitis. These included:

- to compensate for muscle weakness
- to achieve function
- to permit walking
- to prevent deformity
- to achieve a plantigrade foot position
- to position and control the foot
- to improve body alignment
- to relieve local pressure on the foot
- to prevent further deformity
- to relieve pain.

After some discussion it was agreed that firm objectives related to two distinctly different clinical situations:

- when the problem is confined to muscle weakness
- when there are established deformities.

The syndicate then proceeded to look at what would be the principal objectives in each of these situations and how these would affect the choice of treatment method.

Firstly it was agreed that in both situations the patient should be receiving appropriate continuing therapy.

Turning firstly then to muscle weakness. The group considered a number of specific forms of ankle/foot weakness and concluded although different orthotic or surgical methods might be employed in each case the general objectives remained the same. That is:

- to compensate for the muscle weakness and thereby
- attempt to prevent deformities occurring.

It was agreed that in general orthotic treatment was the first choice for this situation except when:

- the patient could not afford an orthosis
- there were no orthotic facilities, and/or
- the patient preferred surgery.

Excluding these situations orthotic treatment would be continued until:

- the orthotic treatment became ineffective, or
- it was considered to be the "best time" to employ a surgical solution. This timing would vary depending on the type of weakness, the degree of weakness and the age of the patient.

Considering "fixed deformities" the Group firstly reviewed their objectives and agreed that that these should include:

- to compensate for limb length discrepancy
- to prevent deterioration
- to relieve pain
- to relieve foot pressure.

A number of situations were identified which would cause surgery to be the immediate choice of treatment methods. These included:

- certain specific deformities, eg, cock-up toe
- when the deformity is untreatable orthotically because of its severity
- when surgical treatment is inevitable or when any delay might jeopardise the result
- when orthotic facilities are not available
- when it is the patients choice
- to permit orthotic treatment

With these exceptions in all other cases the choice of treatment method would be an orthosis and it was noted that this might be:

- as a temporary measure to complement therapy treatment of the deformity, or
- until it was appropriate to perform corrective surgery, or
- indefinitely either by patient choice or because the patient's general medical condition precludes surgery, or
- until the orthotic treatment became ineffective.

In the latter case obviously the patient would then proceed to surgery.

In some instances, however, after surgery the patient might return to orthotic treatment either:

- because the purpose of the surgery was to permit orthotic treatment or
- because of failed surgery.

SYNDICATE GROUPS 1C and 1D : SURGERY AND ORTHOTICS OF LOWER LIMB (KNEE)

The Syndicate group should discuss the subject with reference to the points listed below:

1. What are the goals of surgical intervention and orthotic treatment of the knee with regard to age and timing?
2. What are the recommended methods of surgical intervention of the knee with regard to age and timing?
3. What are the recommended methods of orthotic treatment of the knee with regard to age and timing?
4. What are the interactions between surgical intervention and orthotic treatment at the knee level?

In the above discussions consideration should be given to the following matters:

- a) To what extent can shortening and lengthening procedures of the lower limb have an adverse affect on function?
- b) Considerations should be given to flexion contracture, hyperextension, recurvatum, valgus/varus.
- c) Considerations about footwear, ankle joints and knee joints.
- d) To which extent does surgical intervention at the knee level interact with the function at the foot/ankle and hip?

REPORT OF SYNDICATE GROUP 1C

Chairman: V. Bhanti
Rapporteur: I. Stephens

Members: R. Garst
E.M. Kessi
B. Camara
C. Marincek
C. Simonnot
G. Neff
A. Henriksen
W. Odhiambo
M. Löwenhjelm
I.M. Carrick

1. Briefly the group defined the goals of surgical intervention at the knee as being:

- to straighten or maintain alignment
- to provide stability
- to control movement
- to reduce need for orthoses/surgery.

It was felt that in general terms surgery should be carried out as early an age as possible but the following must be taken into account:

- the child's development
- individual, personal, social and family situation
- other options having been first explored.

2. For knee surgery the recommended methods were thought to be:

2-6 years

- soft tissue release
- muscle and tendon transfers

6-12 years

- soft tissue release
- muscle and tendon transfers
- limited bony correction (ensuring saving growth plates)
- consider bone lengthening

12-18 years – adolescents

- soft tissue release
- tendon transfers
- bony corrections for flexion contractures, genu varum, genu valgum deformities

Adults

Surgery could be considered to be the same as for adolescents but should osteoarthritis have developed also to be considered were arthroplasty or, as a last resort, arthrodesis.

3. It was emphasised that orthotically it was essential to consider the whole child, the extent of their disability and their needs and situations.

Within the general principles of orthotics, we would start distally to provide stability and alignment.

Knee joints would not be provided until the age of school entry, if required.

The need to use as light materials as possible for the young child.

Always when considering orthoses a team approach was required and together discuss function, independence, daily living activities, overall posture and stability.

4. Surgery should always be the last option. If all other options have been investigated and tried then we would refer for orthopaedic opinion. Surgery would be considered if the following contractures were present at the knee:

- flexion 25° +
- valgus 20° – 25°
- varus 20° – 25°

If there was a severe contracture at the knee of 100° or more, we would consider a wheelchair.

General

- a) The knee could not be considered in isolation
- b) When considering surgery the availability of appropriate follow-up such as walking re-education on orthoses must be assured
- c) Consider the difference between bilateral and unilateral cases
- d) Always consider non-surgical options where possible.

SYNDICATE 1D

Chairman: V. Smith
Rapporteur: H. Trebbin

Members: E. Goudote
J.C.T. Church
B.C. Hoanh
F. Nollet
T. Van Tran
D. Forbes
H.R. Lehneis
S. Langon-Bash
B. Mworio
J. Hughes
J. Nagels

To answer the following questions we have to consider the region or country we are working in. It is not possible to give a unique statement without considering the specific circumstances of a country and the existing rehabilitation services and overall resources.

1. The goals of surgical intervention and orthotic treatment are:
 - to improve function in the daily living circumstances of the patient
 - an articulation should never be treated in isolation without considering neighbouring joints and the overall physical situation
 - reduction of pain if it is present (usually found only in previously surgically treated patients)
 - we have to evaluate each patient individually and then treat him/her in a team approach,
 - any surgery, which can reduce or replace the use of an orthosis, should be applied if possible.
2. If the deformity is too extreme to make the use of an orthosis, a possible surgical intervention is considered.

The recommended methods of surgical intervention of the knee are:

- if there is more than 8° of genu varus or valgus the following should be done in order to prevent future osteoarthritis

- first soft tissue releases, if more correction is needed bony corrections should be considered
- arthrodesis of the polio knee should not to be considered
- consider first conservative treatment and then decide whether a bony surgery is necessary according to the x-rays.

3. The recommended methods of orthotic treatment of the knee with regard to age and timing are:

- young children (0-6). If the patient does not have the means to buy a expensive device, orthotic joints should be only considered from school age on
- wedging cast to reduce flexion contraction in children from 40 – 60° up to full extension. The use of a simple polypropylene brace with the same function should be explored, in order to reduce costs and improve the treatment,
- Dr. Sethi's floor reaction AFOs should be further investigated in order to see in which cases they could be used. However, they should only be used in the proper environment (a level surface)
- AFOs should not be used in bilateral polio patients
- wedging cast to reduce flexion contracture in children from 40 – 60° up to full extension. The use of a simple polypropylene brace with the same function should be explored, in order to reduce costs and improve the treatment.

SYNDICATE GROUPS 1E and 1F : SURGERY AND ORTHOTICS OF LOWER LIMB (HIP)

The Syndicate group should discuss the subject with reference to the points listed below.

1. What are the goals of surgical intervention and orthotic treatment of the hip with regard to age and timing?
2. What are the recommended methods of surgical intervention of the hip with regard to age and timing?
3. What are the recommended methods of orthotic treatment of the hip with regard to age and timing?
4. What are the interactions between surgical intervention and orthotic treatment at the hip level?

In the above discussion consideration should be given to the following matters:

- a) Considerations about footwear, ankle joints, knee joints and hip joints.
- b) What degree of leg length discrepancy would indicate surgical intervention.
- c) What are the recommended bone shortening procedures in leg length discrepancy, giving indications, contraindications and timing?
- d) What are the recommended bone lengthening procedures in leg length discrepancy, giving indications, contraindications and timing?
- e) To which extent does surgical intervention at the hip level interact with the function at the foot/ankle and knee?
- f) Describe the minimum requirements for material properties and selection for lower limb orthoses in the developing world.

REPORT OF SYNDICATE 1E

Chairman: J.N. Wilson
Rapporteur: T. Gavin

Members: M.H. Chen
S. Willner
L. Halstead
B. Nandjui
D. Schmidt
L. Essafi
T. Madonko
V. Naik
A. Ahmad
M. Muscat
P. Pierron

The group geared the discussion towards these issues for developing countries. Consensus was met on general issues that are not geographic/medical practitioner variable (subject to decisions based on preference).

1. The primary surgical/orthotic concern for the hip is flexion deformity due to contracture. Surgical intervention preference is early subcutaneous release (flexion contractures $<60^\circ$). Prevention of contracture with conservative treatment including orthotic management was thought to be the best, when possible. The issues of contracture release precede knee, ankle and other managements.

The primary goals of treatment are to attain and maintain an upright posture for ambulation, if possible. The hip procedure is also felt to initiate musculoskeletal treatment. Resolving any hip dislocations, subluxation and pain are also primary goals. Achieving these goals will also help in planning other treatment alternatives. The group also felt that addressing the social issue of consulting the patient and family regarding the treatment plans is a primary goal that should be accomplished before any treatment begins. Assuring that a level pelvis results is also a primary goal in the treatment of the hip.

2. Whereas flexion contractures of $<60^\circ$ may be resolved by early subcutaneous release contractures $>60^\circ$ should be released by an open procedure, inclusive of Yount's procedure (dividing iliotibial band at supracondylar level together with soft tissue release at the hip level). These procedures are best to be done as early as possible.

Consideration of the Indian "Camp Model" for high volume subcutaneous releases was recommended pending outcome analysis of this method. Also, procedures to assure that the pelvis is level are recommended as a possible measure to prevent dislocation. Reduction procedures for dislocation should be performed if necessary, with surgeon preference of procedure type. Once the hip procedures are complete, other necessary procedures for balance and ambulation should be carried out. Extraordinary procedures to improve ambulation should be done at the surgeons discretion.

3. The group recommends the usage of a hip-knee-ankle-foot orthosis:

- to be used post-operatively after cast removal, to prevent a return of the contracture
- to assist with ambulation.

Pelvic component may be removed later at the surgeon's discretion. Ideally, this orthosis will consist of a pelvic band, thigh bands, calf band and footplate, all articulated with lockable joints and fitted to accomplish contracture control and to optimise ambulation. Material and component selection will be based on:

- cost availability
- durability
- ease of climate and terrain adjustability

- be as lightweight as possible
- easy to don and doff
- and will be of a basic technology

For low availability, solid, non-articulated splints and low cost calipers may be used. Material should be stiff enough to minimise 3-joint motions and left to the regional preference of the orthotist.

REPORT OF SYNDICATE GROUP 1F

Chairman: D. Hay
Rapporteur: M.L. Stills

Members: B. Joseph
 A. Loro
 S. Gandema
 A.K. Ndao
 M.S. Ayika
 J.M. Gomez
 R. Mukalazi
 A.V. Vela
 H.D. Møller
 C. Ung
 J. Scheer
 V. Slypen

1. Goals of surgical intervention and orthotic treatment of the hip with regard to age and timing:

- upright ambulation with or without orthopaedic aids, or
- facilitate functional use of wheelchair
- improvement in activities of daily living and quality of life.

If surgery is done in one setting, do all involved joints. If staged or more than one surgery is required, do proximal to distal.

In a child, deformity and contracture are more important to deal with than joint instability or limb length discrepancy.

Surgical priority:

- contractures of greater than 30° flexion, 15° or more abduction, 5° or more adduction
- joint instability
- limb length discrepancy.

Age and timing:

Child: when child is of ambulatory age for soft tissue releases, after child has been seen for the first time and non-operative procedures have been exhausted.

Adult: when it is convenient to carry out procedures.

Contraindications to surgery:

- when health system is not adequate
- infection likely
- patient's muscle involvement is so extensive that surgery would be of no benefit

2. Recommended surgical interventions of the hip with regard to age and timing:

Children:

- deformity : soft tissue release Soutter type (anteriolateral subperiosteal release of shortened soft tissue from iliac wing)
done only until minimal abduction contracture of 5° is left – do not overdo, or perform femoral extension osteotomy if cannot achieve the above
- no hip fusion.

Adult:

- same as above
- may do hip fusion.

Hip joint instability /subluxation - attempt orthotic control.

Methods of treating joint subluxation:

- restore muscle balance
- tenotomy of adductors
- lengthening of iliopsoas.

Methods of treating dislocations:

- restore muscle balance
- tendon transfers
- osteotomy
- acetabular procedures.

Hospital course:

- 10-14 days hospitalisation – varies with procedures
- immobilisation and/or protection also varies with procedures.

4. Interactions between surgery and orthotics:

- physical therapy
- orthotics to maintain gains
- surgery to correct alignment
- orthotics to maintain position and enhance function
- physical and occupational therapy to maximise outcome
- team approach is essential.

Consensus indicates ideal approach but we realise some will not be possible and modifications will be needed in developing countries.

Surgical procedures should not be attempted unless there is an orthopaedic technician available. Ideally, an entire team should be available.

PLENARY DISCUSSION ON SYNDICATE 1 REPORTS

Chairman: J. Hughes
Rapporteur: B. Joseph

Syndicates 1A and 1B : Foot

Watts:

An objective discussed at the syndicate was the desire to eventually get rid of the orthosis.

Persson:

Both syndicate groups recommended that orthoses should be the first choice for foot problems in polio. However surgeons may prefer surgery as the first option in several situations.

Neff:

Should we defer surgery for two years?

Watts: Yes, this is desirable.

Fisk:

Arthrodesis may be needed to correct deformity apart from correcting instability.

Pupulin:

Availability of appropriate resources should be addressed. Surgery would only be feasible if resources are available. Outcomes should be evaluated in terms of quality of life as mere restoration of function may not necessarily be synonymous with improvement in the quality of life.

Is it acceptable that an expatriate group of surgeons come and perform surgery in a third world country and then leave? There is no follow-up. A community-based system is essential.

A multidisciplinary approach to rehabilitation is needed and the family should be taken into consideration.

Fisk:

This group is truly multidisciplinary and all the specialists respect each other. However, we need to decide the preferred optimal time of treatment and then see if the necessary infrastructure can be provided to give this treatment.

Bhanti:

A total assessment to the patient, including the home situation, before providing an orthosis should be carried out.

Loro:

A patient might be sent from the village to a larger centre for surgery and, after surgery, brought back to the community.

Ung:

When patients come back after surgery they seem to have a lot of pain.

Fisk:

If long-standing pain occurs, following surgery, it may be that the surgery was inappropriate.

Church:

Pain after surgical procedures can be adequately managed. I would recommend a post-operative "pain chart" to be maintained.

Syndicates 1C and 1D : Knee

Henriksen:

A greater emphasis should be placed on the team approach.

Pupulin:

What do you mean by "team".

Trebbin:

This includes the surgeon, the physiotherapist, the occupation therapist, the orthotist and the social worker.

Nollett:

Tendon transfers were not recommended for paralysis around the knee.

Smith:

Tendon transfers may actually be effective around the knee.

Persson:

I do not agree that patients with flexion deformity of over 100° need to be confined to a wheelchair necessarily.

Garst:

I do not think that a 90° flexion deformity cannot be corrected surgically.

Watts:

What is the role of orthoses for correcting knee flexion contracture?

Fisk:

Casting and orthoses for correcting a fixed flexion deformity of the knee are different. The cast merely holds the correction obtained.

Stills:

Serial casting can be used to correct flexion deformity of the knee.

Ung:

I have had a lot of experience with serial casting for correcting fixed flexion deformity.

Trebbin:

I suggest a change of material from plaster of Paris to polypropylene to simplify and reduce the cost of serial casting.

Condie:

There is no evidence that shows that an orthoses can correct a fixed flexion deformity. Biomechanically how can an orthoses correct a fixed flexion deformity?

Ayika:

We should consider the problem of genu recurvatum.

Stills:

Can we accept as high a genu varum/varus as 25°. I would not accept such a high degree of deformity.

Neff:

A 20-25° varus or valgus is the upper limit that can be accommodated in an orthosis. However if it increases then surgery should be carried out.

Gomez:

An articulated AFO can provide an extension moment at the knee.

Watts:

A floor reaction orthoses can produce an extension moment at the knee.

Syndicates 1E and 1F : Hip

Neff:

Pelvic obliquity also needs to be addressed while planning surgery of the hip.

Fisk:

Should tendon transfers be considered around the hip?

Ayika:

Arthrodesis of the knee is a great disability in several developing countries. Even a hip arthrodesis should also be avoided as it prevents sitting in a wheelchair. We also need to address the availability of surgery.

Watts

If staged surgery is being planned I would start from the foot and work upwards.

Stills:

Why should surgeons start with the foot? External rotation of the hip should also be addressed.

Fisk:

External rotation does not occur in isolation. It usually occurs with abduction and therefore correction occurs simultaneously.

Neff:

You cannot say that you would always start at the foot. The sequence of surgery would depend on the deformity at the various levels.

Garst:

Surgery on the foot can be restricted only for contracture correction if the knee is so weak as to risk instability.

Shangali:

We should re-examine the orthotic possibilities.

Kessi:

Very few surgeons are available in Tanzania. Some of the surgical procedures may have to be done in gravely sub-standard situations.

Church:

I do not agree with the concept of us and them with reference to the tropics and the West. However, we must come to a consensus on the optimal treatment.

Pupulin:

I agree with the views expressed regarding the lack of resources in Tanzania. One has to be aware of the realistic problems.

Simonnot:

As an option for severe fixed flexion deformity of the knee, wheelchairs and tricycles must be offered.

Edwards:

We must have a consensus on how to educate the community.

Condie:

We also need to identify specific problems and define specific solutions to the problems.

SYNDICATE 2

SYNDICATE GROUPS 2A and 2B : SURGERY AND ORTHOTICS OF SPINE

The Syndicate groups should discuss the subject with reference to the points listed below.

1. What are the indications and goals of surgical intervention and orthotic treatment of the spine with regard to age and timing?
2. What are the recommended methods of surgical interventions of the spine with regard to age and timing?
3. What are the recommended methods of orthotic treatment of the spine with regard to age and timing?
4. What are the interactions between surgical intervention and orthotic treatment of the spine?
5. To what extent does surgical intervention at the spine interact with the function of the lower limb?

In the above discussion consideration should be given to the following matters:

- a) Facilities, resources and materials available.
- b) Environment.
- c) Aftercare.

REPORT OF SYNDICATE 2A

Chairman: J. Fisk
Rapporteur: W. Hessing

Members: N. Sliman
E. Goudote
H. Burger
A.N. Keyer
J.M. Gomez
T. Madonko
M. Lamine
W. Seyoum
I.M. Carrick

1. Treatment should be by a team approach.

Personnel

1. Community-based health worker
2. Nurse
3. Therapist
4. Orthotist
5. Social worker
6. Physician/surgeon
7. Patient – most important member of the team :
their needs are the reasons for the team.

2. There is a need for an understanding of value of the team approach.

All initially said teams were available in their countries but some acknowledged that they were not available to those who could not afford it. These were issues of national distribution of resources that were not likely to be solved by internal political reforms. Therefore the only source of health care resources in some regions is NGOs. Support for community-based health workers was felt to be of value.

3. Scoliosis was rarely a reason for referral and was generally a secondary finding in patients seeking treatment for lower limb problems. Many countries simply said they could not afford scoliosis surgery. They are totally dependent on outside (expatriate) resources.

Dissenting opinions : Scoliosis treatment is very important because its natural history can lead to great morbidity and even mortality.

4. Treatment indications :

The group advocates better education of paramedical personnel to be able to better screen for scoliosis. The forward bend test is very easy to teach and perform.

Better record keeping is advocated perhaps as done in Zimbabwe with records kept in the district and made available to travel with the patient when receiving medical care outside the community.

The incidence of scoliosis (approximately 25%) is far greater than indicated by those seeking treatment. More effective screening and record keeping will allow us to understand incidence and natural history better.

Specific treatment recommendations :

1. Spinal orthotics may be helpful in delaying curve progression but there is no evidence that it alters the long term natural history. They are not a form of definitive treatment. They are a waste of resources when used as an alternative to surgery when surgery is not otherwise available.
2. Harrington Rods by themselves are unsatisfactory. Segmental fixation performed economically with unit rods and sublaminar or intraspinal wires is best. High technology costly devices utilise resources better spent for other activities.
3. We need standardised data gathering to document effectiveness of therapies, ie:
 - a) pulmonary functions in brace wearers
 - b) muscle grading – standardised
 - c) standardised x-ray techniques and record keeping to better document natural history and treatment effectiveness.

Recommend

ISPO Home Page provide standardised clinical data recording sheets for better records and sharing of data with other sites. Also Home Page to provide educational resources for patients and all the health personnel.

While discussing treatment alternatives of scoliosis some concerns were identified. Whereas some countries said that there would be no scoliosis surgery unless it was done by outside (expatriate) medical teams, others felt this approach was disruptive.

They (medical teams) conveyed feelings of inadequateness to local health care providers. They relieved local physicians from a responsibility for caring for the indigent population. Frequently inappropriate technologies are used that introduce confusion to local personnel about what they should be doing. Such efforts were felt to be disruptive.

Recommend

Teams needs to:

1. plan better
2. use appropriate local technologies
3. involve local physicians
4. ensure follow-up care and emphasise education of local personnel.

ISPO needs to make specific recommendations for medical team activities and approaches to providing assistance in medically underserved areas.

REPORT OF SYNDICATE 2B

Chairman: S. Willner
Rapporteur: F. Nollet

Chairman: H. Watts
B. Camara
F. Lønnberg
T. Van Tran
T. Gavin
H. Shangali
V. Naik
B. Mworio
P. Bracken
J. Scheer

1. The opinion was that treatment should be considered in a functional perspective, when problems are present or being expected in the short or the long term. Not to treat x-rays or progression of deformities by itself. Timing of intervention should aim at prevention of :
 - i) pain
 - ii) pulmonary compromise
 - iii) interference with the ability to walk or to sit
 - iv) hip dislocations, and
 - v) to keep the hands free for hand function.

Treatment may imply curve correction. Pre-treatment evaluation should focus on function, be done thoroughly and preferably be done in a multidisciplinary team approach. With regard to age, it was the opinion that in children, treatment goals are considered more from a preventative point of view while in adults these are considered from a functional perspective, assessing what gains and losses may be expected from different treatment options.

2. This was considered for two categories : thoracic together with thoracolumbar scoliosis and lumbar together with lumbosacral scoliosis. In the group there were few surgeons present so consensus was reached rather easily. In general the choice of techniques may depend on local circumstances and there was a preference to use the simplest but effective type of stabilisation on thoracic scoliosis such as Harrington rods with wires.

For lumbar scoliosis of more than 60°, if operated on, also an anterior release should also be performed.

With regard to operations, aspects of cost effectiveness, local circumstances such as post-operative care facilities, availability of blood transfusions should be taken into account.

It was the impression that scoliosis in children stays mobile for a long time and operations should preferably not be done before the age of 12 years. Extrapolation of experience in idiopathic scoliosis may not be valid in scoliosis due to polio and further research is recommended.

3. Spinal orthotics are used for two indications :
 - i) the prevention of progression
 - ii) for functional reasons, for example, to enable sitting.

Although there is no documented evidence that it is effective, the experience in the group is that spinal orthotics seem effective to prevent progression, and should be continued with exercise. Further evaluation is necessary.

Preferably thermoplastic materials should be used. The need for careful follow-up was stressed as well as the need for education programmes for orthotists.

4. Although there appears in general to be no consensus on the use of braces after spinal surgery, bracing is only necessary if bone quality is poor.

5. Two statements were made on this point :

- a) Firstly in operative and orthotic treatment care should be given to the fact that in stance the centre of gravity should stay behind the hips so as not to flatten out the lumbar lordosis.
- b) Secondly that spinal orthotics and leg orthotics should not be combined into one orthotic device because of the inconvenience.

In general, treatment should take place in a scoliosis team where braces can be made, operations can be done and attention is given to patient education.

SYNDICATE GROUPS 2C : LOWER LIMB SURGERY

The Syndicate groups should discuss the subject with reference to the points listed below.

1. What are the accepted lower limb surgical procedures in chronic poliomyelitis with reference to indications, timing and staging?
2. What are the controversial procedures?
3. What procedures are regarded as inappropriate?

REPORT OF SYNDICATE 2C

Chairman: B. Joseph
Rapporteur: J.C.T. Church

Members: H. Chen
S. Edwards
R. Garst
D. Hay
D. Hohmann
A.N. Kaadan
E.M. Kessi
A. Loro
G. Neff
B. Persson
V.B. Smith
J.N. Wilson

General principles of surgery

1. No surgery is justified in situations where reasonably sufficient pre-operative/intra-operative/ post-operative care cannot be provided.
2. Even in situations where surgical options are justifiable issues of cost, surgical acceptability and resource availability may need to be addressed before recommending surgery.
3. All treatment, including surgery, must be with the aim of enabling the patient to function to the best level possible, in the community and thus improve the quality of his/her life, and as far as possible, become self-sufficient.
4. Surgery must only be undertaken after evaluating whether the patient would :
 - a) have a wheelchair existence
 - b) become ambulant with orthoses, or
 - c) be able to ambulate without orthoses.

The surgery should be tailored to achieve the level of mobility that is envisaged.

5. The sequence of surgical procedures should usually start with the hip, knee and then proceed to the foot.

Aims of surgery on the lower limb

To improve function of the lower limb by:

- a) overcoming the effects of muscle paralysis
- b) correcting deformities
- c) restoring joint mobility
- d) relieving pain
- e) restoring limb length discrepancy.

Surgery of the hip

- a) Tendon transfers around the hip are of doubtful value in restoring muscle power.
- b) i) Soft tissue release should be undertaken if there is a flexion deformity of more than 30° or abduction deformity of more than 15°. Isolated rotation deformities around the hip need not be corrected.

- ii) Anterolateral subperiosteal release of shortened soft tissue from iliac wing (Soutter) is an acceptable procedure to be done as soon as possible but it must not be overdone and, in particular, must leave at least 5° abduction.
- iii) If soft tissue correction alone is inadequate, add a subtrochanteric osteotomy.
- c) Paralytic subluxation and dislocation in polio ought to be reduced. Under the age of 7, perform an ilio-psoas transfer (Mustard) with femoral osteotomy if the neck is in valgus. Over the age of 7, acetabular reconstructive procedures may also be required.
- d) Painful hips in adults, are relieved by total hip replacement. Arthrodesis and amputation may be considered in exceptional circumstances.

Surgery of the knee

- a) Tendon transfers, from the hamstrings to the patella, are appropriate to improve knee extension, if the criteria for such transfers are fulfilled.
- b) If knee flexion deformities are less than 30° surgery is only indicated if wedged casts and/or traction have failed, unless x-rays reveal a bony deformity which warrants a bony correction.

If knee flexion deformities are more than 30° soft tissue releases and/or bony procedures are necessary.

Avoid any procedure which leaves joint surface incongruity, because this will lead to longer term problems.

For genu recurvatum, orthotic control alone is generally recommended. In skeletally mature patients bone block procedures, using the patella or an iliac crest block fused to the anterior upper tibia, an arthrodesis, may be performed. For valgus and varus deformities orthoses are adequate for mild degrees of deformity. For severe valgus and varus deformities corrective osteotomies are required.

- c) Instability of the knee can generally be controlled with orthoses and surgery is not indicated.
- d) If pain is severe, despite an adequate orthosis, arthrodesis may then be the last resort provided the ipsilateral hip and foot are normal. The place of arthrodesis of the knee is however controversial.

Pain in an adult with osteoarthritis can be relieved by a total knee replacement.

Surgery of the foot

- a) Tendon transfers, for isolated tibialis anterior loss is the transfer of the extensor hallucis longus to the first metatarsal neck.

For foot drop, transfer of the tibialis posterior tendon is acceptable though it may only work as tenodesis

The transfer of peroneal tendons, for foot drop, is acceptable provided the sub-talar joint is fused.

Transfer of the tibialis anterior to the tendo Achillis, for calcaneus, is controversial. Westin's tenodesis, for calcaneus is good.

- b) Foot deformity corrections

Equinus

- lengthening of the tendo Achillis by any appropriate technique is recommended at any age
- over lengthening of the tendo Achillis is to be avoided
- a residual 5-10° equinus must be retained in the presence of quadriceps paralysis

- a Lambrinudi type of triple fusion is acceptable after the age of 12-14 years if the equinus cannot be corrected by tendo Achillis lengthening.

Equinovarus

- soft tissue release surgery is recommended in the first instance at all ages
- in the skeletally immature foot residual hindfoot varus may be corrected by a calcaneal osteotomy
- in skeletally mature feet residual deformity may be corrected by a triple fusion.

Equinovalgus

- tendo Achillis lengthening followed by a subtalar extra-articular fusion and a peroneal transfer to the dorsum of the foot is an acceptable option in skeletally immature feet
- in the skeletally mature foot a triple fusion is appropriate

Calcaneus/calcaneovarus/calcaneovalgus and calcaneocavus

- in the skeletally immature foot a Westin's tenodesis is recommended for the calcaneus
- a plantar release (Steindler) is the procedure to be adopted for cavus deformity

In older children (skeletally immature) an osteotomy of the calcaneus (Mitchell) is acceptable.

In the skeletally mature foot the osteotomy and/or fusion procedure is recommended.

c) Instability

Instability of the subtalar joint in the skeletally immature foot may be treated by a subtalar extra-articular arthrodesis.

In the older skeletally mature child, a triple fusion is recommended.

Pantalar fusion and ankle fusion are not recommended for instability.

* No indication for surgery for foot instability if an orthosis is required to stabilise proximal joints.

d) Pain

Triple arthrodesis may be performed for pain originating in the hind foot.

Ankle pain not responding to orthotic measures may be treated by an ankle arthrodesis.

General comments

Mild deformities, such as hip and knee contractures, are generally amenable to conservative management, such as traction or serial plaster casts with wedging and should not therefore need surgery.

ADDENDUM TO SYNDICATE 2C

Limb length inequality

Rapporteur : JCT Church

1. Lower limb length discrepancies of less than 2 cms :
 - a) may be ignored, or
 - b) treated with a shoe raise (for patient's preference or for comfort)

2. Discrepancies of between 2-5 cms may be corrected by :
- a) percutaneous epiphysiodesis
 - b) open epiphysiodesis
 - c) shortening of the longer limb
 - d) shoe raise
 - e) lengthening of the shorter limb (rarely indicated).
3. Discrepancies of greater than 5 cms may be treated by limb lengthening by callotasis at a centre equipped for close monitoring of the patient throughout the protracted period of limb lengthening to monitor the problems of infection, loosening and secondary contractures.

SYNDICATE GROUPS 2D and 2E : ORTHOTIC TREATMENT OF THE LOWER LIMB

The Syndicate groups should discuss the subject with reference to the points listed below.

1. Specify the functional requirements of appropriate lower limb orthoses for each of the impairments of the foot/ankle, knee and hip commonly encountered in chronic poliomyelitis.
2. What factors determine the types of technology utilised?

REPORT OF SYNDICATE 2D

Chairman: D. Forbes
Rapporteur: A. Henriksen

Members: R. Chokani
R. Jované
W. Odhiambo
J. van Rollegem
H. Trebbin
O. Pierron
D.N. Condie
A. Ahmad
S. Heim

1. During the initial discussions the group found that some basic assumptions could be made. These were related to the procedure of approaching the evaluation and treatment of a patient starting distally and working towards the proximal. It was emphasised that a thorough examination is needed and that joints cannot be considered in isolation but must be seen as part of the whole.

It was also found that there was a need for clarification of terminology, hence the following definitions of terms used in the session :

Correct	-	return to neutral, as close as possible
Accommodate	-	to hold and prevent deterioration and establish functional alignment (eg, a fixed equinus foot must have a base of support which allows tibia to be perpendicular to the ground)
Hold	-	put in a certain position and keep in that position
Assist	-	help motion

In addition, it was emphasised that the goal of orthotic treatment is that it must achieve the functional requirements, whatever the material and technology is used.

Bearing these assumptions, definitions and the common goal in mind, each of the areas : foot/ankle, knee and hip were looked at in isolation.

For each of the areas the approach was to look at the initial weakness or instability around the joint and then consider the fixed deformities that can subsequently result.

For each 'problem' the functional requirement of orthotic action is listed below:

Foot Ankle

ML instability (ankle or subtalar)

Action : correct

Subsequent deformity : valgus/varus deformity

Action : accommodate

Dorsiflexor weakness

Subsequent deformity : drop foot

Action : correct, assist dorsiflexion/resist plantar flexion

Subsequent deformity : equinus deformity

Action : accommodate

Subsequent deformity : clawing of toes

Action : accommodate

Plantar flexion weakness

Subsequent deformity : calcaneal gait (talus gait)

Action : correct + control excessive dorsiflexion + permit plantar flexion

Subsequent deformity : calcaneal deformity
Action : accommodate

Pes planus
Action : correct
Action : accommodate

Pes cavus
Action : accommodate

Combined functional deficiencies
Action : combine requirements

Knee

Genu varum/valgum instability
Action : correct + hold
No consensus on action : Valgus only held in extension
Subsequent deformity : varus/valgus deformity
Action : hold

Extensor weakness
Subsequent deformity : unstable knee
Action : hold
Subsequent deformity : knee flexion contracture
Action : correct + hold
Subsequent deformity : genu recurvatum
Action : control hyperextension in optimal functional position

Hip

Abductor weakness
Subsequent deformity : Trendelenburg gait
No consensus on action : hold – control adduction + abduction

Extensor weakness
No consensus on action : assist extension
Subsequent deformity : flexion contracture
Action : refer to therapy/surgery

External rotation
Action : correct

Hip subluxation
Action : partially unload

2. Due to the time limitations the question about factors determining use of technology was only briefly addressed and a brief list was made:

- economic limitations
- environmental influences (social living conditions, climate)
- availability of trained manpower
- availability of materials
- age of patient.

REPORT OF SYNDICATE 2E

Chairman: J. Nagels
Rapporteur: S. Langdon-Bash

Members: V. Bhanti
 K. Dittmer
 K. Kpandressi
 R. Mukalazi
 W. Raab
 A. Vela
 M.L. Stills
 H. Gassenschmidt
 J. Hughes

Before addressing the questions some broad remarks were made.

- action at one joint will affect joints proximately including spine and arm
- all orthotic designs must take the other joints and limbs into consideration
- a good evaluation is primary (muscle strength and joint range)
- good standing locomotion is the goal.

The purpose of an orthosis is to:

- prevent deformity
- control to increase mobility
- relieve pain.

Biomechanical approach of the orthosis should be in overview of:

- accommodation
- correction
- stabilisation
- fixation
- compensation
- mobilisation : vertical – leg length discrepancy
 : horizontal – toe filler

Consideration should be made of:

- muscle weakness
- muscle inbalance
- deformity

1. Foot / ankle

Impairments	Functional Requirements
Dorsiflexion weakness	Dorsiflexion assist Plantar stop, Spring assist / resist Polypropylene
Plantar flexion weakness	Limit dorsiflexion
In general :	Correct deviations Accommodate the deformity to achieve a vertical tibia and plantar weight bearing surface
Valgus	Correct and/or accommodate to achieve a weight bearing surface
Varus	Correct and/or accommodate
Equinus	Accommodate Heel lift increase weight-bearing surface.

Cavus	Accommodate to increase even distribution of forces to avoid decrease pressure and pain; custom made insert
Flail foot	Limited or controlled ROM Limited solid ankle, control pain, needs however good quadriceps.

Knee

Impairments	Functional Requirements
Flexion contracture	Dynamic-> dial lock to decrease contracture -> drop out cast Passive -> KAFO with lock -> pre-tibial shell Surgical intervention if higher than 20°, or reduce with brace until 20°
Recurvatum	Offset knee joint to permit flexion Articulated ankle, no solid distal section
Extension weakness Valgum /varus	Locked KAFO Accommodate -> bony Correct-> tissue

Hip

Impairments	Functional Requirements
contracture	Surgery if it is a deformity / disability.
Weak hip flexion	●*
Dislocation - subluxation	Proximal brim design control
Abduction	Pelvic band and joints
Adduction	Pelvic band and joints
External rotation	Pelvic band and joints
Internal rotation	Pelvic band and joints
extension	Passive and dynamic – not often used

3. Factors determining types of technology used include:

- a) appropriate technology
- b) skill/training
- c) financial ability
- d) job opportunity
- e) age
- f) design of orthosis
- g) circumstances of life-social environment
- h) availability of materials
- i) provide fit and appropriate function
- j) patient and family acceptance
- k) sustainable course

SYDNICATE GROUPS 2F and 2G : THERAPY AND REHABILITATION OF THE LOWER LIMB

The Syndicate groups should discuss the subject with reference to the points listed below.

1. What are the accepted methods of physiotherapy of the lower limb in poliomyelitis?
2. What are the controversial procedures?
3. What measures can be used to evaluate the functional outcome of treatment of the lower limb in chronic poliomyelitis?

REPORT OF SYNDICATE 2F

Chairman: D. Schmidt

Rapporteur: A. Relf

Members: H, Jaibi-Fransen
H.D. Møller
C. Ung
L. Halstead
C. Marincek
A.K. Ndao
P.C. Tuan
P. Thuy

1. METHODS OF PHYSIOTHERAPY

Acute phase - first 2-3 weeks – goal to protect and rest.

- Teaching very important
 - about disease
 - social/psychological issues especially important since parents play large role
- Rest
- Positioning
 - to protect skin
 - to prevent deformities
- Passive mobilisation by physical therapist only
- Pain control – warm packs

General good nutritional/general health needs to be secured and maintained
maintain airway/respiration

Recovery period within chronic phase – 2 weeks ≡ plateau ~ 2-3 years
Goal – to return to highest level of function

- teaching patients/families
- positioning to protect muscles and prevent contractures
- passive mobilisation
- active exercise: general exercises
water therapy if available
- functional training – sitting, transfers, bed mobility
play:
 - standing, balancing, walking, kneeling, crawling – age appropriate activities
 - make sure to have proper alignment and no compensation
- rest important between sets of exercise and between different activities of the day – do not push to maximal levels

Orthotics

- To maintain posture and protect muscles during weight bearing and rest
- Contracture management – use warmth (massage and soft tissue work), stretching, casting and splinting

Team work is crucial between family, patient and team.

2. CONTROVERSIAL PROCEDURES

- Electrical stimulation
- Conditions of weight bearing – are there standards on when safe 2° weakness (less than 3+ muscles)
- Use of ice

3. MEASURES OF FUNCTIONAL OUTCOMES

Range of motion

Does use of particular stretching technique affect range of motion (hyperextend knee)

Functional status

Sit

Stand

Transfer

Ambulate – velocity, distance, assistance levels (safety), devices needed, terrain achieved, wheelchair mobility

Does early weight bearing have effect on ambulation later ?

Manual muscle test/strength testing

Does electrical stimulation have effect on strength gains?

Discussed about having unified measurement forms to report on outcomes.

REPORT OF SYNDICATE GROUP 2G

Chairman: I. Stephens

Rapporteur: C. Schiappacasse

Members: M. Löwenhjelm

M. Muscat

S. Gandema

B.C. Hoanh

B. Nandjui

C. Simonnot

B. Lake

The polio patient has to be approached by a multidisciplinary team according to resources available in each region. The ideal team will be formed by rehabilitation doctor, physiotherapist, occupational therapist, psychologist, orthotist, orthopaedic surgeon and social workers. It has to be a global approach including social aspects. It can also be handled on a CBR programme.

The general goal would be:

- to prevent further impairments
- to achieve independence for the patient
- to maximize individual potential
- to return patient to school, work or social activities
- to decrease pain
- to maintain or increase ROM
- to improve quality of life
- to help the patient to learn to accept and adapt to his limitations
- to educate and inform society
- to help the patients to be aware of their rights
- to help their inclusion in society and fight architectural barriers
- to promote sports and recreation
- to see they are treated as human beings

Stages of rehabilitation treatment:

1. Assessment (which should be according to resources and individual patient)

- a) global function
- b) muscle strength
- c) range of motion
- d) contracture and deformities
- e) pain
- f) mobility
- g) technical aids
- h) daily life activities
- i) social environment and particular situation
- j) general state of health and nutrition
- k) lab, EMG. X-ray etc.

2. Setting goals for individual patients

Combination of age, sequelae, stage of the disease.

Needs of the patient and resources available should be taken into account for this setting.

Pre and post operative goals should be also set.

3. Methods and means

- a) physical modalities used to:
 - decrease or relieve pain
 - relax muscles
 - increase superficial circulation.

- b) manual activities such as:
 - stretching
 - strengthening
 - relaxing
 - increasing circulation
 - exercising and training
 - positioning.

- c) hydrotherapy

4. Follow-up of patients to assess results in short, medium and long terms according to resources.

The controversial issues that came up were:

- a) electrical stimulation
- b) massage
- c) strengthening regime
- d) should people be trained to work as occupational and physical therapists

EVALUATION

For every goal there should be a measuring indicator. The team should check if goals were achieved or should be able to change initial goals if necessary according to assessment in different treatments.

The FIM (Functional Independent Measurement) was the elective method chosen by the group to assess functionality and independence.

Measurement of the ROM with adequate tools.

Survey:

- internal survey
- external survey
- to get the feed-back from the patient and family and to see their integration to productive society.

PLENARY DISCUSSIONS ON SYNDICATES 2 REPORTS

Chairman: J. Hughes
Rapporteurs: H. Watts (*Syndicates 2A, 2B, 2C*)
D.N. Condie (*Syndicates 2D, 2E, 2F, 2G*)

Syndicates 2A and 2B : Spine

Garst :
The 'true' incidence of scoliosis in polio patients was given by Syndicate 2A as about 25%. I believe that is a wild guess. Where does the figure come from ?

Fisk :
It is a guess based on our collective impression. It is certainly higher than the 2% usually reported. This is an area that needs study.

Vela :
When you guess at 25% does this refer to paralytic polio ?

Fisk :
We mean in patients with clinically evident polio.

Gavin :
The reports have stressed the lack of proven value of spinal orthoses. I have patients who are long term users of spinal orthoses who report that they get relief from pain.

Condie :
The reports point out the lack of benefit from spinal orthoses yet in the presentations yesterday we were shown many examples of their use.

Fisk :
The presentations showed that wearing a brace can reduce the spinal curve, if it is flexible, but in the long run does it prevent the curve from progressing ? We do not know.

Watts :
It needs to be stressed that polio scoliosis is not the same as adolescent idiopathic scoliosis and we should not transfer the information from AIS to polio. There is no evidence that orthosis alone can alter the natural history of a polio patient with scoliosis. That needs to be studied.

Stills :
Does loading assymmetrically on immature bone not cause deformity ?

Fisk :
Yes, but it is not proven that using a brace can prevent it.

Persson :
On the recommendation to use simple surgical segmental fixation, which types are you thinking of ?

Fisk :
Luque rods or "unit rods". The unit rod is the most effective in managing pelvic tilt and is also the cheapest.

Willner :
We should stress the possibility of neurologic complications with sublaminar wires and recommend the use of wires which penetrate the base of the spine processes (eg – Drummond or Wisconsin wires).

Fisk :
I fully agree.
I caution against the recommendation of Syndicates B in the use of Harrington rods since they frequently break at the lowest notch in the ratchet.

Watts :

I disagree. With the current rods the breakage is rare.

Fisk :

The change in the rod fabrication which has decreased the breakage is probably not due to changes in metallurgy but to decreasing the length of the ratchet portion of the rods.

Smith :

I question the recommendation against the use of outside surgical teams coming in for one to two week focus. Without them, surgery just is not available.

Hughes :

We should perhaps cover this by words of warning that such activity can be disruptive.

Smith :

Is the disruption worse than nothing ?

Fisk :

I have only reported the discussion in our group. However, there was no consensus.

Jacobs :

We should recommend that these in-and-out programmes would be less disruptive if they are part of an overall plan.

Neff :

World Orthopaedic Concern has always had as its central goal that of teaching. Sometimes the physicians in the local regions may not cooperate and the visitor is left alone. It must be a cooperation on both sides.

Hughes :

We should include a word of warning to supplement the in-and-out activity.

Wilson :

If you are to bring high tech into a country you must have preparation locally. The local doctors want it and must want to use it. They need to be prepared to set aside time. In Tanzania we had a hand surgeon come for six weeks. The local doctors geared everything up. There were many hand surgeries and much teaching which the local doctors carried on. If not it may be a disaster.

Syndicate 2C : Lower Limb Surgery

Neff :

We should use proper anatomic names for the operations we mention rather than people's names. For example there is a Steindler procedure for the elbow as well as one for the foot.

Jensen :

Why is there such reluctance to do hip arthrodesis.

Church :

We are concerned about the rest of the patient's locomotor system – the back and knee which are frequently abnormal in polio.

Further to hip arthrodesis, there are few societies that permit a person to function well with an arthrodesis. Most of the world does not sit in chairs or use raised toilets for example.

Persson :

Fifty percent of the total knee arthroplasties in patients with polio had to be redone because the need for some hyperextension was not provided for. The statement about TKAs should be clarified on this point.

Neff :

We should point out that a tendo- Achilles lengthening is not always indicated. There are occasions where the ankle joint surface is flat and a tendon lengthening will not alter the ankle joint position.

Garst :

It was unclear to me when we should do ankle fusions.

Joseph :

We recommended not to do ankle fusions except when pain leaves no other choice. This is usually in older patients. Some younger patients who have had a mid-foot wedge osteotomy develop pain because the talus gets jammed against the tibia. We have been forced to do an ankle fusion.

Watts :

It was reported that no surgery on the foot is needed if an orthosis is needed to control the proximal joints. What about a calcaneus deformity which can cause pain?

Church :

We were referring only to instability not to deformity.

Syndicates 2D and 2E : Lower Limb Orthotics

Question:

Is the use of a pelvic band with a hip joint effective in treating hip problems?

Answer:

View expressed maybe effective in controlling some weakness (particularly rotation) early but if deformities present is not effective. Still area of controversy.

Question:

Many questions regarding use/efficacy of night orthoses.

Answer:

- Most useful in young/until growth stops
- Can be used in conjunction with therapy or following serial casting to try and hold correction obtained
- General view do no harm but must try and collect scientific evidence to demonstrate effectiveness
- Some people use day orthosis for night use also but must be designed appropriately if this is intention.

Question:

With regard to a secondary equinovarus deformity when should surgery be used?

Answer:

Refer to Syndicate 1B Report.

Syndicates 2F and 2G : Therapy/Rehabilitation

Question:

Are there any generally accepted scales for measuring the functional outcome of treatment for poliomyelitis?

Answer:

Some available, eg – FIM, but not generally accepted.

Question:

What to do when PT resources limited.

Answer:

PT assess and then instruct parents or carers – even when PT available too expensive for family to stay near to hospital while treatment provided.

Question:

General discussion about rehabilitation team/members/communication/etc.

Answer:

- Patients and parents definitely most important members
- Where there are more than one agency involved in treatment good communication is essential
- Most often the PT acts as the link between the various carers and the patient and family
- When PT resources are limited a nurse or social worker may perform this role but must be properly trained for the task (perhaps even better because releases PT to do therapy)

Question:

Can anybody provide information on experience with electrical stimulation in poliomyelitis?

Answer:

No – all scientific data either outdated or not appropriate. Probably only applicable in selected case to try and strengthen muscles when function is impaired by increasing weakness.

SYNDICATE 3

SYNDICATE GROUPS 3A and 3B : UPPER LIMB

The Syndicate groups should discuss the subject with reference to the points listed below

1. What are the indications and goals of surgical intervention and orthotic treatment of the upper limb with regard to age and timing?
2. What are the recommended methods of surgical intervention of the upper limb with regard to age and timing?
3. What are the recommended methods of orthotic treatment of the upper limb with regard to age and timing?
4. What are the interactions between surgical intervention and orthotic treatment of the upper limb?
5. What are the recommended priority of surgery of shoulder, elbow and hand before and after skeletal maturity?

In the above discussions consideration should be given to the following matters:

- a) Facilities, resources and materials available.
- b) Environment.

REPORT OF SYNDICATE GROUP 3A

Chairman: J.C.T. Church
Rapporteur: J.M. Gomez

Members: H. Watts
H.D. Möller
D. Schmidt
T. Gavin
M. Lamine
R. Jované
A. Relf
B. Lake

1. GENERAL REMARKS:

- a) the patients' situation needs to be evaluated fully before any intervention is taken
- b) team approach is important (if available) to focus treatment
- c) members of the team should not disregard *available local* materials and local craft skills, eg, cane frames, leather workers, woven basket-type materials

2. GOALS OF SURGERY:

to enhance the use of the entire upper limb to allow the patient to be as independent as possible.

the role of the upper limb should include not only function of the hand but also its role in ambulation, eg crutch use or wheelchair use.

3. INDICATIONS FOR SURGERY:

This was reviewed anatomically from proximal to distal

- a) scapula – thoracic joint:
surgery to fuse the scapula to the thorax is rarely, if ever, indicated in managing poliomyelitis

- b) shoulder (ie gleno-humeral joint):

Arthrodesis:

This is the most common surgery for the shoulder:

- (i) if the patient has no muscles to activate the shoulder but muscles to activate the scapula. The most important muscle needed to achieve shoulder abduction following shoulder fusion is the serratus anterior. If the scapula activators are moderately weak, the patient may achieve prehension between the humerus and trunk if not shoulder abduction.

- (ii) if the elbow flexors are slightly less than grade three and there is an unstable shoulder, fusion may improve the elbow flexion power.

- (iii) if the joint is painful (usually later age)

Comments: if the angle of the humerus with the thorax post-operatively is found to be inappropriate, it can be corrected with a later humeral osteotomy
shoulder arthrodesis may, in later life, lead to dropping of the scapula or pain if the rhomboids or other scapula activators are stressed beyond their capacity.

Age: early fusion can lead to improved function but risks growth arrest of the proximal humerus. Surgery can be done at any age but preferably not before age 6.

In the unusual event that excessive shortening occurs, the humerus can be lengthened.

Muscle transfers:

While possible, these procedures are not widely performed because of their unpredictability. May be done at any age, probably the earlier the better.

Shoulder arthroplasty:

The absence of muscles precludes the use of current total shoulder prosthesis.

c) **Elbow:**

Tendon transfers to enhance elbow flexion strength.

e.g. Proximal transfer of forearm flexor origin (Steindler).

There are a variety of techniques, the choice of which will be determined by the muscles of adequate strength available for transfer.

Comment: If doing transfers (eg transfer of triceps anteriorly to gain flexion) the team must consider the potential negative effect on the patient's ability to use crutches or transfer to and from a wheelchair.

Age: these can be done at any age, but usually after age 4-6 years.

d) **Forearm**

Tendon transfers to enhance rotation (ie supination or pronation is found lacking)

Comment: The choice of final position (ie degree of supination or pronation) will be affected by factors of cultural setting, job performance, etc.

Age: usually done after age 4-6 years.

Osteotomy:

To place the hand into a more satisfactory position.

e) **Wrist**

Arthrodesis:

Used to free up muscles which could be transferred to enhance the use of the thumb or fingers.

Comment: the position of fusion is usually 20° to 40° of dorsiflexion, but will need to be varied by the individual patient's needs. The need for crutch use or wheelchair use or transfers should be considered in the selection of final position.

Age: early surgery can lead to improved function but risks forearm shortening with growth arrest of the distal radius. Usually done after age 9 years but may be done after age 6 years.

f) **Thumb**

Tendon transfers to enhance opposition:

Many techniques are recommended, the choice of which depends on the muscles of adequate strength available for transfer.

Comment: Many of the transfers can stretch out beyond use due to the patient's need for crutches and/or transfers to/from a wheelchair.

While these operations can achieve excellent technical results they are frequently disappointing in their ability to enhance the patient's daily functioning.

Age: usually after the age of 4-6 years.

Bone bridge fusion between metacarpals 1 and 2:

- to gain and maintain thumb opposition
- does not stretch out
- can enhance use of crutches and wheelchair to increase endurance in their use.

g) Fingers

Tendon transfers and releases.

These are less frequently done and will need to be based on the specific functional needs of the patient.

4. **ORTHOTIC TREATMENT** separate from ADL assistive devices:

These periods in the patient's course need to be considered:

- a) early
- b) chronic during childhood
- c) chronic during adulthood

a) Early

Goals: to prevent deformity and over-stretching of joints and muscles.

Preference should be given to using these orthoses at *night* rather than the day to allow the infant use of the hands for sensation and normal development.

- These orthoses are usually simple splints
- Primarily the joints needing protection and the wrist and digits and sometimes the elbow
- The use of splints to protect the shoulder is not of value

b) Chronic during childhood

- Left to their own devices, children will not use functional orthoses (eg a flexor hinge hand orthosis)
- Therefore it is a waste of resources (even in highly developed countries) to provide them.

c) Chronic during adulthood

i) *Functional orthoses*

- Shoulder: there is no evidence that orthoses to stabilise the shoulder joint are effective.
- If the patient desires, orthoses may be used to replace muscle losses
- The choice of orthosis will be dictated by the patient's specific needs and available muscle power.

ii) *Pain relief:*

- Orthoses can be used to achieve relief of pain in the elbow, wrist or fingers
- Orthoses to relieve pain in the shoulder are not effective, usually

iii) *Cosmesis:*

- Shoulder pads to fill out the area of the paralysed deltoid muscle are frequently requested and used with success
- Occasionally, adults request an orthosis to flex the arm and forearm against the body. Such orthoses are effective.

5. **ASSISTIVE DEVICES** (such as enlarged handles on spoons)

- Goals: i) to improve specific hand functions
ii) to make mobility safe and possible

Comments: These devices are focussed on specific (usually single) functions. A patient may need several to perform ADL. This is a grey area where the choices may be fabricated and provided by occupational therapists, physical therapists or orthotists.

6. **ADDITIONAL OVERALL COMMENTS**

a) Single limb vs double limb weakness

- while double limb weakness increases the demand for orthoses and assistive devices, "gadget tolerance" can easily be exceeded.

b) while the problems of the lower limb are more numerous, the importance of upper limb functions cannot be overstated.

c) Order of surgery and/or orthotic treatment

- i) early stage – no place for surgery, therefore, orthoses
- ii) chronic stage (childhood) while orthoses can be made which enhance function, children do not wear them, therefore, surgery first
- iii) chronic stage (adulthood) patients choice provided they are truly informed.

REPORT OF SYNDICATE 3B : UPPER LIMB

Chairman: G. Neff
Rapporteur: D. Forbes

Members: K. Dittmer
H.R. Lehneis
J. van Rollegem
H. Jaibi-Fransen
C. Ung
O. Pierron

Discussion of the upper limb

In general:

- evaluate thoroughly and discuss treatment options and goals with patient.
- try orthosis when possible to improve function or prevent deformity and/or contracture.
- try adaptive equipment to assist ADLs and modifications and adaptation to patients environment.
- surgical intervention should be considered carefully. It is a definitive procedure and could impair function.

Orthotic treatment of the upper limb is difficult for several reasons:

- acceptance of orthosis very low
- often not enough function to bother with
- mark of disability with difficult social acceptance
- lack of technical training to provide functional (dynamic) upper limb orthoses.

Orthotic and surgical treatment vary with the different resources available in any given country. The availability of surgical facilities, trained surgeons, trained orthotists, trained therapists, all play a role in treatment protocols and prescription criteria.

That improved function was the goal of treatment no matter the type of surgery performed or the orthotic design or specific materials used.

The majority of upper limb bone and joint surgery should be delayed until after skeletal maturity. Soft tissue surgery and tendon transfers can/should be performed earlier but not before age 6-7.

Upper limb surgery and orthotic treatment

The group discussed at length indications and goals of surgery and orthotic treatment of the shoulder, elbow, forearm, wrist and hand. Each joint was considered in the following phases:

- acute phase (onset to 3 weeks)
- sub-acute phase (3 weeks to 3 years after onset)
- chronic (late) phase (3 years after onset and beyond)

Shoulder

Acute:

- prevent contracture and overstretching through proper positioning – nursing care.
- no surgery or orthotic treatment indicated provided no other indications.

Sub-acute:

- prevent contractures and overstretching through positioning with orthosis or bandages.
- Provide environmental adaptations for ADLs and mobility aids.

Late-chronic:

- indication for treatment – pain and instability.
- orthotic trial
- there are few indications for shoulder surgery.
- shoulder arthrodesis – may be necessary for use of crutches on stabilisation to improve active elbow flexion
- in some limited instances may consider replacing the function of the deltoid.

Elbow

Acute:

- prevent contractures and overstretching through proper positioning – nursing care.
- no surgery or orthotic care indicated.

Sub-acute:

- prevent contractures and overstretching through positioning with orthoses.
- orthotic assistance when hand function available.
- environmental adaptations for ADLs.

Chronic:

- orthosis to provide elbow flexion assistance

environmental adaptations for ADLs

limited surgical indications to improve elbow flexion:

- consider muscle transfer proximal to origin of wrist flexors/extensors from epicondyles to humerus (Steindler).
- consider a triceps transfer unless need to use crutches or wheelchair

Forearm

There were no indications or goals to improve or maintain pronation and supination.

Wrist

Acute: - prevent contracture and overstretching through proper positioning – nursing care.

Maintain position of function according to affected muscles.

- No surgical indications.

Sub-acute: - prevent contractures and overstretching through positioning with orthoses.

- orthoses to maintain position of function and improve prehension.

Chronic: - treatment indicators – relieve pain and/or improve functional position.

prevent contractures and over-stretching through positioning with orthoses.

- orthoses to stabilise wrist.

- surgically consider wrist fusion and/or tendon transfers to improve prehension

- adaptive equipment for ADLs.

Hand/Fingers

Acute: - prevent contractures and overstretching through proper positioning.

- no surgery indicated.

Sub-acute: - prevent contractures and overstretching through positioning with orthosis.

- adaptive equipment for ADLs.

Chronic: - goal is to improve function.

- prevent contractures and overstretching through positioning with orthosis

- consider appropriate orthosis to improve function, eg thumb opposition, dynamic prehension.

- surgery can be considered to establish and maintain opposition such as an opponensplasty, eg sublimis IV.

- surgery can be considered for a flail extensor, e.g. transfer of wrist extensors to finger extensors.

SYNDICATE GROUP 3C : MANAGEMENT SYSTEMS AND CBR

The Syndicate groups should discuss the subject with reference to the points listed below.

1. Identify those features of national management systems which are effective and successful in the treatment of poliomyelitis.
2. Identify common problems deserving attention.
3. Identify the significant features of CBR in relation to the management of poliomyelitis patients.

REPORT OF SYNDICATE 3C

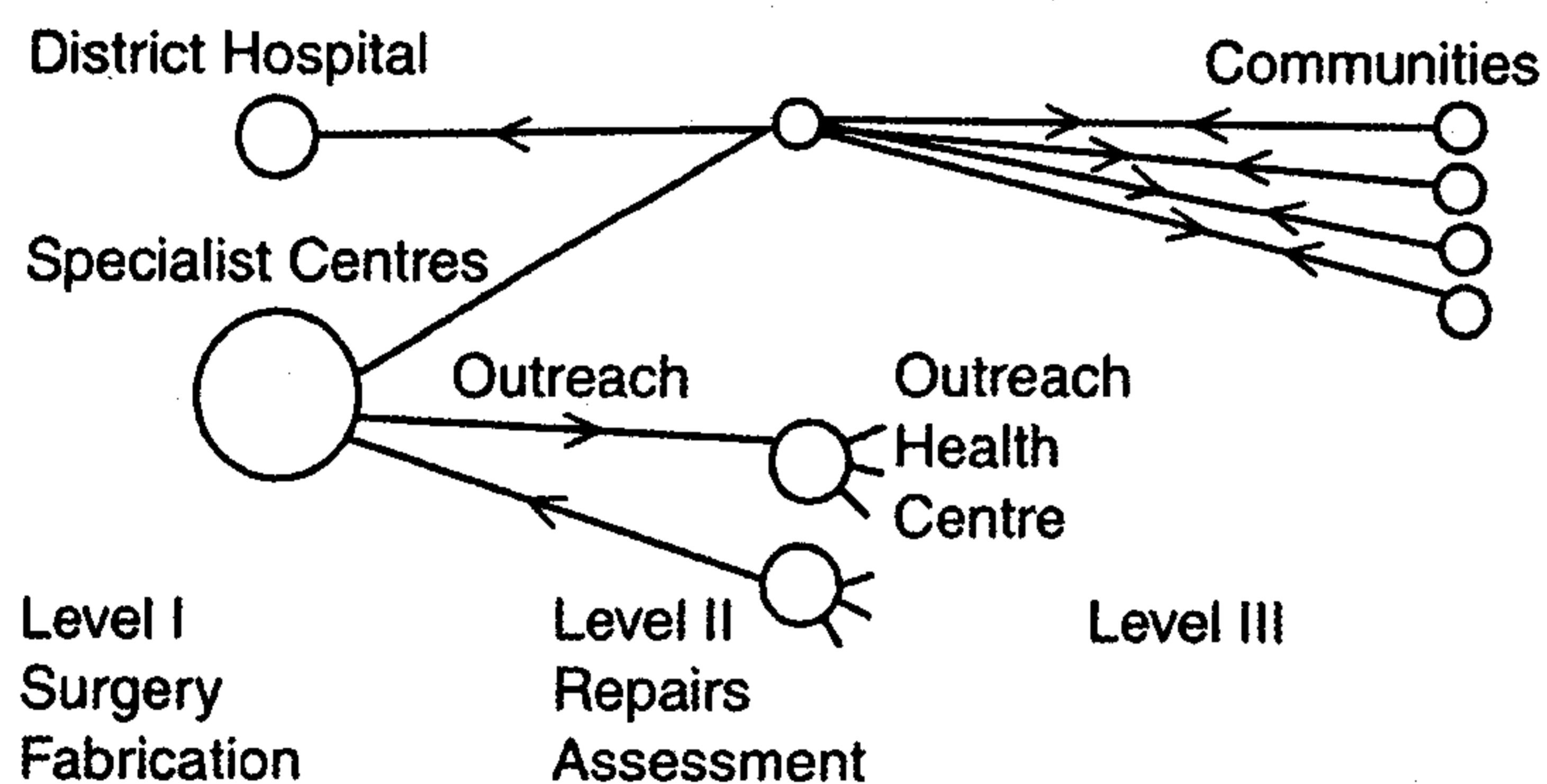
Chairman: H. Trebbin

Rapporteur: D. Hay

Members: B. Mworia
S. Gandema
B. Joseph
E. Goudote
H. Chen
A. Vela
V. Naik
B. Camara
T. Van Tran
P.C. Tuan
T. Madonko
A.K. Ndao
V. Bhanti
K. Kpandressi
R. Mukalazi
D.N. Condie

1. CBR programme – good case finding and follow-up
OUTREACH programme – good service delivery
MEDIA - help with publicity
CIVIL ADMINISTRATION - help with publicity (including schools, churches, district + village leaders, health centres and hospital, etc)
Good back-up service within organisation tree
Rehabilitation professionals to fulfil their proper roles
Dovetailing with immunisation programmes

A flow chart of CBR/OUTREACH interaction:



- Resource deficiency (including money)
- Risks of NGO non-sustainability
- Lack of coordination between Government and NGOs
- Low priority for rehabilitation services set by Government (contra curative and preventative)
- NGOs not always attuned to national needs but to their own
- Absence of data bases for facilities and of disability demography
- Brain drain of national trained personnel (need for bonding – 1st world countries could cooperate)
- Variability of imported skills
- Need for professional accreditation and registers (to ensure quality) for both nationals and importations
- Variability of deployment of trained personnel
- Purchasing of material sometimes tied too tightly to donor country

(felt that: - appropriate technology not necessarily primitive
- internal supply does not necessarily ensure lower costs due to economies of manufacture size but, if possible, purchase locally)

3. Penetrative case finding and service delivery
Access to follow-up
De-centralisation of services
Close liaison with civil administration systems
High set up cost : low running costs
Effective use of facilities at each level
Achieves high public awareness

There was much discussion, with everyone contributing but, as usual, it was sometimes difficult to keep to the point under discussion.

SYNDICATE GROUP 3D : FUNCTIONAL AND OUTCOME MEASURES

Proposed indications for individual patient assessment and for patient group studies in chronic poliomyelitis with regard to:

1. Physical factors (muscle strength, range of motion, etc)
2. Functional factors (eg walking, activities of daily living, etc)
3. Social factors (eg living environment, working capacity, etc)

Chairman: S. Edwards
Rapporteur: S. Langdon-Bash

Members: S. Willner
 A.N. Kaadan
 H. Burger
 F. Lønnberg
 F. Nollet
 C. Schiappacasse
 R. Chokani
 W. Odhiambo
 W. Hensing
 M. Muscat
 H. Gassenschmidt
 H.D. Möller

REPORT OF SYNDICATE 3D : FUNCTIONAL OUTCOME

Functional and outcome measures
<p>Make a proposal for</p> <p>Patient assessment and Patient group studies</p> <p>in chronic poliomyelitis</p> <ol style="list-style-type: none"> 1. physical factors 2. functional factors 3. social factors
Consensus No 1
<p style="text-align: center;">Let's Do it!</p> <ul style="list-style-type: none"> ◆ How? ◆ Start basic? <ul style="list-style-type: none"> - What is a leg? - Is in a total paralytic muscle strength grade O?
Disability
<p style="text-align: center;">ICIDH WHO</p> <p style="text-align: center;">meaningful actions at the level of the individual</p>

Functional and outcome measures
<p style="text-align: center;">A piece of cake !</p> <ul style="list-style-type: none"> ◆ Nothing about facilities, local circumstances or available resources ◆ Summarise the whole field of rehabilitation medicine within 1.5 hr
Consensus No 2
<p style="text-align: center;">Let's do it different!</p> <ul style="list-style-type: none"> ◆ Functional perspective ◆ Relevant for patient assessment ◆ No time consuming ◆ Easy to apply ◆ Not re-invent the wheel <p style="text-align: center;">Consider patient group studies separately!</p>
Disability assessment
<p style="text-align: center;">D-code 5 fields of functioning Somatic Activities of Daily Living Social Psychological Communicative</p>

Disability assessment				
Somatic transfers lying sitting standing walking inside walking stairs walking outside endurance positioning manipulating carrying	ADL eating washing clothing toilet	Social cooking working school transport family life leisure and so on	Psychological orientation thinking behaviour acceptation motivation	Communicative writing reading understanding spoken language speaking

Disability assessment				
Somatic	ADL	Social	Psychology	Communicative
<ul style="list-style-type: none"> ◆ Use a known adapted list ◆ Adapt your list to local needs ◆ Describe and/or rate ◆ Add the problem magnitude 				

Physical factors
<ul style="list-style-type: none"> ◆ Muscle strength ◆ Range of motion passive and active ◆ Joint stability ◆ Length and alignment ◆ Scoliosis ◆ Pain ◆ Past surgery ◆ Orthotics ◆ Long function (VC)

Individual patient assessment
<ul style="list-style-type: none"> ◆ Anamnesis ◆ Disability assessment ◆ Physical examination ◆ Functional observation ◆ Conclusion <p>∅ Treatment choice Follow-up evaluation</p>

Patient group studies
<p>A big problem</p> <ul style="list-style-type: none"> ◆ What specific purpose? ◆ What is achievable? ◆ What is the validity of the instrument (different cultures)? ◆ What are the properties of the instrument (reliability & sensitivity to change)?

Patient group studies
<p>For this big problem</p> <p>a small taskforce is recommended</p>

SYNDICATE GROUP 3E : INTERNATIONAL COOPERATION

The Syndicate groups should discuss the subject with reference to the point listed below.

1. With reference to the treatment of poliomyelitis patients, identify the strengths and weaknesses of international cooperation projects involving agencies, organisations and individuals.

REPORT OF SYNDICATE 3E

Chairman: E.M. Kessi
Rapporteur: P. Bracken

Members: J. Fisk
V.B. Smith
B.C. Hoanh
W. Raab
H. Shangali
A. Loro
C. Marincek
B. Nandjui
C. Simonnot
A. Henriksen
W. Seyoum
I. Stephens
A. Ahmad
J. Hughes
I.M. Carrick
J. Nagels
J.N. Wilson

Criteria

An ideal setting would be for the international organisation or NGO to be invited by a country to provide assistance in developing a polio programme.

Some of the essential criteria prior to establishing a project would be to:

1. conduct a feasibility study
2. assess current situation and level of services available
3. the local partner/counterpart/Governmental official must be identified and involved in preliminary discussions, planning and establishing needs
4. there should be a consensus on activity to be undertaken
5. an agreement should be signed by all parties concerned and a programme of action prepared
6. the programme of action should contain benchmarks and indicators which would provide information on the direction the project is taking – any necessary corrective action should be taken
7. plans should indicate commitments to teaching, equipping, etc and a commitment from the host country to contribute towards the project with the understanding that it will take over the project at an agreed date
8. objectives should be defined which should be achievable and measureable
9. a monitoring and evaluation programme should be set in place and should be conducted according to the funding criteria
10. the project should aim for quality of orthoses which will encourage a high user rate
11. recipients of orthoses should be encouraged to contribute towards the device in order to have ownership or if the Government is paying for the device then the system should be in place whereby the Government can check on user satisfaction, quality, etc via a consumer group

12. inter-sector cooperation should be facilitated
13. the level of knowledge and skill of semi-skilled and unskilled technicians of the host nation should be substantially increased to enable the continuity of the project, long term
14. those who have been assisted with orthoses should be encouraged via vocational training, sheltered workshops, etc to eventually contribute to the economy
15. the importance of data collection should be emphasised
16. expatriates should be chosen well and only those with the right intentions should be given responsibility in the host country
17. trainees should be given adequate orientation prior to appointment in the host country.

The strengths and weaknesses of international cooperation projects largely rest with the characteristics of the agencies involved. Below some of the positive and negative attributes are highlighted.

POSITIVE	NEGATIVE
Project funds available	Lack of funds
Expertise in field	Inadequate training
Ability to prioritise	Lack of priorities by Government
Good coordination and networks formed between agencies involved	Lack of coordination between Government NGOs and International Organisation
Good communications	Lack of communication
Culture sensitivity and understanding	Language and cultural barriers

PLENARY DISCUSSION ON SYNDICATE 3 REPORTS

Chairman: J. Hughes
Rapporteur: A. Henriksen

Syndicates 3A and 3B : Upper limb

Points of clarification

Neff:

Did I understand correctly that you always do surgery before providing orthoses.

Watts:

Orthoses should be tried first but usually surgery is needed.

Neff:

In early stages there should be no surgery. Later consideration of the individual requirements is paramount.

Watts:

This group said that orthosis should always be used first – is this for the child or chronic patient?

Neff:

This is for all patients – modifications to daily living should be made first.

Watts:

At first there are few indications for shoulder surgery. Later it is possible to do arthrodesis. Soft tissue surgery is not indicated.

Fisk:

Can I ask that we speak in the proper anatomical terms. When talking about tendon transfers for wrist extension, the options for which to transfer depends on which muscles are functional.

I would like the final report to mention the alternatives.

Discussion:

Watts:

When discussing whether bone surgery should be done after skeletal maturity, it should be said that around the world arthrodesis is done in order to have an early function. The risk of shortening is only 3-4 cm.

I would also like to raise the question about the effectiveness of shoulder orthoses.

Neff:

Regarding the timing of surgery. Surgery is definitive and should only be used for patients using crutches. A wheelchair user may have the use of a flail shoulder. The growth plate is always damaged during surgery. The proximal growth plate accounts for 80% of the humeral growth. We should postpone surgery and involve the individual and the parents in the discussion.

Watts:

A wheelchair user needs shoulder stability so they can put the elbow down and enhance use. The surgery is a simple procedure and the maximum growth arrest reported is 6 cm.

Church:

If the growth plate is "tampered with" and wrong growth results – arthrodesis can redeem this. What was the recommendation on position of fusion for children and adults?

Watts:

With children there is some loss of abduction (dropping down) with growth before healing. The position of fusion is the same for adults and children.

Joseph:

Upper limb orthoses are uncomfortable. I contest that we should use orthosis before surgery.

Fisk:

The individual needs should be considered first.

Watts:

We need to recognise that a child's orthosis is not used unless forced on the child, therefore, it is a waste of time.

Neff:

We need to consider the individual patient and the local situation.

Forbes:

As an orthotist I usually just see the failures of surgery and therefore do not feel I can recommend it – but as different professionals we have different perspectives.

Stills:

The use of shoulder orthosis is difficult but other upper limb orthosis have a use.

Watts:

Children will not use an orthosis unless they are forced to, this is important to know.

Nollet:

We should be reluctant to make final recommendations as we still lack evidence.

Syndicate 3C : Management systems and CBR

Points of clarification:

Nagels:

The donors want indicators, is it possible to make other/different indicators than number outputs.

Bracken:

There are ways of getting around the problem of aid money tied to Government policies.

Discussion:

Fisk:

Concerning the problem of braindrain, I have two comments:

1. The money in the US for training foreign medical students is greatly decreasing; and
2. International American graduates must have the commitment to go back to their countries – governments should encourage this.

Watts:

The problem is not so big for physicians as it is for nurses.

Kessi:

We should train people in their own country to prepare them for the future working situation.

Neff:

Some countries are very happy with many of their professionals working outside the country as this contributes to the economy.

Trebbin:

Jobs should be secured before sending students out and an acceptable salary is also important.

Church:

- a) Governments with limited resources cannot monitor or control all NGO activity within that country;
- b) NGO activity, for instance in rehabilitation, may be isolated, overlapping, disproportionate and ultimately inappropriate and competitive;
- c) All NGOs working in some field within a given region, should identify, contact each other and harmonise their activities. Otherwise the outcome at hand will be sub optimal and at worst will be detrimental to the communities they seek to serve.

Condie:

We should look at how patients travel through the system. Should orthoses be available at an intermediate level – the district type unit – so that we use resources efficiently?

Stephens:

In Arabic countries women are not usually allowed to travel from their village so this will be impractical.

Wilson:

The cost of travel is too high in some places. We should consider outreach activities, though it requires a high level of organisation.

Joseph:

Conventionally orthotics is managed at the district level.

Syndicate 3D : Functional and outcome measures

Condie:

This topic is very important. I had hoped we could have reached a conclusion on which parts of the documentation are relevant. We should look at a subset of items which are relevant to that particular situation.

Marinsek

We should appreciate the terminology brought into our profession – talk about people/persons with disability.

Fisk:

Amplifies importance of importance of patient assessment. Should remember the functional requirements.

Jensen:

We need simple measures of outcome.

Watt:

This is a huge task – need proper testing to be able to be effective – large costs.

Hessing:

This group found no simple measures, but a general survey of the patient is always possible and use common sense. A simple scheme could contain such measures as, eg forward bending for scoliosis assessment using blocks to assess leg length differences, etc.

Syndicate 3E : International Cooperation

Bracken:

These are the characteristics needed to be considered before NGOs move in – if NGOs cannot follow these they should be discouraged.

Stills:

Should look at the funding parameters.

Bhanti:

ISPO should function as a coordinating body and help to facilitate projects.

SYNDICATE 4

SYNDICATE GROUPS 4A and 4B : POST-POLIO SYNDROME

What lessons have we learnt from post polio syndrome that will help us deal with future needs with reference to:

- (i) new orthotic prescriptions
- (ii) life style alterations
- (iii) educational resources for healthcare providers and patients

REPORT OF SYNDICATE 4A

Chairman: L. Halstead
Rapporteur: A. Relf

Members: B.Persson
D. Forbes
H. Burger
H. Chen
A.N. Kadaan
S. Willner
A.N. Keyer
D. Schmidt
P.C. Tuan
V. Bhanti
S. Langdon-Bash
J. van Rollegem
M. Löwenhjelm
H. Gassenschmidt

We make a strong plea to clarify terminology so that at least when we are together we know what we are talking about.

Orthotic recommendations

- Need complete evaluation of patient including history
- Involve the patients in the decision making process and give them control to choose between the appropriate choices
- Do not interfere with compensations that work
- Orthotists should not make just what they are comfortable with – need to meet patient needs
- Expect to have to modify the brace several times for fit or setting before the patient and orthotist are happy
- Tell the patient that it will need modifications ahead of time
- Listen to the patient
- Lightweight using moulded plastic, if practical and comfortable, and aluminum joints
- Cosmetic.
- In general want to facilitate controlled motion – so use articulated joints when possible
- Use articulated ankle joints – in general solid ankle is contraindicated
- Use posterior offset knee joints instead of locked joints for genu recurvatum

Life style modifications

Goal: adapting life to save energy and halt the overuse. Specific techniques can be used in combination with rest.

Home:

- arrange work surfaces to cut down on walking and other repetitive motions
- move hard to reach items closer, eg commonly used plates put low on shelves, cooking utensils within easy reach, etc
- Use a stool when need to stand for a long time
- Elevate beds, chairs, sofa if having problems with sitting to standing
- Change living arrangements so can live on one floor
- Get and use family support

Use of equipment:

- Grab bars
- Toilet seat riser or pull up stool in parts of the world where squatting is the norm
- Adaptive devices

- Walking devices
- Electric stair climber to go upstairs or elevator in the house

Comment:

Use of medicine – want to avoid using/prescribing painkillers – patients will be masking the over-use symptoms.

Work:

- Sit in chair with correct positioning
- Arrange work site into ergonomically correct space
- Arrange work itself so do not have to repeat actions
- Filling out time schedules/decreasing hours, taking time midday, working from home

General:

- Use of electric mobility when available, Wheelchair, scooter – modified to allow support
- Use of elevator instead of stairs

Education:

Internet: Polio home pages
Possibilities of list of helpful devices or services
List of treatment centres, resources

- Start teaching about post-polio syndrome in medical and therapy schools
- Develop centres of expertise/use of polio teams
- Additional training - specialised fellowship training (international)
 - rotary
- Simple information on post polio syndrome and treatment sent to journals
- Multimedia
 - instructional commercials
 - entertainment, TV, drama or movie with a character with post-polio syndrome

REPORT OF SYNDICATE 4B

Chairman: G. Neff
Rapporteur: W. Hessing

Members: F. Lønnberg
K. Dittmer
C. Marincek
B. Lake
D. Hohmann
N. Sliman
B.C. Hoanh
F. Nollet
T. Van Tran
R. Chokani
H.R. Lehneis
H.D. Möller
O. Pierron
J. Scheer
M. Muscat

In the group were representatives from Germany, Denmark, Slovenia, Australia, Vietnam, Netherlands, Malawi, France and USA.

1.
 - a) Listen to the consumers
 - b) Listen to the consumers expectations of the devices, the orthosis is an integral part of the consumer's body, not only an aid for better ability
 - c) Consumers assessment – discussions. Time consuming information as an interaction of consumer and professional. Motivation to cooperate in the process
 - d) Checklist for new orthosis

Discussion:

Even if the new orthosis is the same prescription as the previous one, it will never give the consumer the same feeling - because – or due to the fact that it is new.

An altered new orthosis should improve function - otherwise use the well known model in the new one.

- e) Adequate follow-up is essential to both parts in the process.

Discussion:

The consumer may have great resistance to use new devices because of soreness with a new orthosis. It might take up to a year of acceptance in a new one. Spend time to work together for acceptance.

- f) Team approach in a special clinic is the best.
- g) Fear

Discussion:

Polio survivors should not fear post polio syndrome. There is no evidence of rapid progression in the post polio condition. Treatment is available for the condition if the diagnosis can be made.

2. Personal factors affecting lifestyle:

- a) Weight
- b) Alcohol
- c) Drug abuse
- d) Smoking
- e) Business
- f) Activities reduce/pace
- g) Family adaptations
- h) Accommodation (help from others)
- i) Cultural values
- j) Disability to establish a range of new conditions to the consumer
- k) Psychology of the consumer
- l) Personal history

Physical changes:

- a) Walking ability with aids
- b) Wheelchair/scooter
- c) Identify shift
- d) Special exercises and sport
- e) Industrialised programmes

Working conditions:

- a) Resting – frame
- b) Work occupation and retirement
- c) Social life – adapting over lifetime

3. Transfer of knowledge, education material available:

- a) Language barriers – translation of existing material
- b) Handouts
- c) Videos
- d) Computer/Internet
- e) Primary health care, CBR includes: midwives, nurses, general practitioners, medical and paramedical staff

Public Actions:

- a) Network on consumers and professionals such as self care groups different from National Handicapped Associations which are able to raise money and raise funds
Professional organisations should work with the associations
- b) Political and Government open to public relations awareness activities
- c) Discipline barriers

Discussion:

Discipline barriers should be overcome through education. Important to update the medical staff to be able to give a qualified team approach

SYNDICATE GROUP 4C : TRANSFER OF INFORMATION AND EDUCATION

The Syndicate groups should discuss the subject with reference to the points listed below.

1. Identify methods that could be employed to improve the dissemination of information and good surgical, orthotic and therapeutic practice to be used in the treatment of poliomyelitis.
2. What are considered to be the most urgent training and education needs?

REPORT OF SYNDICATE 4C

Chairman: B. Joseph
Rapporteur: H. Trebbin

Members: J. Fisk
B. Mworia
M. Lamine
T. Madonko
A. Ahmad
H. Jaibi-Fransen
J. Hughes
J.C.T. Church
E.M. Kessi
W. Odhiambo
C. Ung
I.M. Carrick
A.V. Vela

1. Target the groups, which would need information.

- Clinic Team
- CBR team
- Needs to provide information to all levels: patient, CBR, Region/District, Centre
- Individual professionals at all the levels

a) What kind of information is needed?

Built a database on the following:

- Best methods of treatment
- Human Resources available such as surgeons, orthosists, physiotherapists, CBR specialists, etc
- What kind of centres/infrastructures are available
- Information on available materials and equipment
- Organisations working in the field in order not to duplicate the efforts

b) Information between countries

- Use of the Internet – Email, by setting up a WEB PAGE on poliomyelitis in order to have a worldwide system of questions and answers.
- Make information available to all organized and interested groups
- Be aware of language barriers
- Setting up of databases on professionals and experience made

c) *Information within the country*

- *Dissemination of information on all levels that are involved in the treatment of poliomyelitis*
- Investigating the needs of the patient
- Translation and dissemination of information and expertise from outside
- Use manuals/pamphlets with good illustrations in order to encounter language problems and illiterate people
- Use the already existing health system for dissemination of material
- Use all available levels and kinds of communication tools such as TV, radio, newspapers, schools, churches, etc.
- Establishing a system of information and communication from the bottom to the top and vice versa.
- All training schools for formation of health care professionals should be provided with material about the treatment of poliomyelitis.

- Good flow of information between the people of the multidisciplinary team should be ensured

2. The most urgent training and education needs.

- Have to be identified for each country or region depending on the individual situation of the professionals involved in order to improve the situation of the patients
- Organization of seminars and conference of the different professionals involved on a continuing basis
- Information on where training courses are going on or planned
- Consideration should be given to find the means to give incentives to trained professionals in order to keep them in the country

Countries should be encouraged to develop their own training activities in all fields, based on the identified needs.

SYNDICATE GROUP 4D : INTERNATIONAL COOPERATION

Based in the report of Syndicate 3E make recommendations as to how International Cooperation could improve the delivery of service.

REPORT OF SYNDICATE 4D

Chairman: J.N. Wilson
Rapporteur: J. Nagels

Members: P. Bracken
V.B. Smith
H. Shangali
A. Loro
A. Henriksen
I. Stephens
S. Heim
W. Raab
P. Thuy
E. Goudote
S. Gandema
A.K. Ndao
W. Seyoum

Recommendation 1

The recipient Government or executing organisation must be involved in the identifying and planning of a project which should be legalised by an agreement.

Recommendation 2

Clear goals and objectives should be established which consider the long term integration of services into the Government structures.

Recommendation 3

A clear plan of action should be adhered to by both parties which would include:

- timescale
- resources
- identifying a monitoring mechanism
- identifying areas of action

Recommendation 4

Services to patients should be provided by qualified professionals in order to guarantee the medical and functional requirements.

Recommendation 5

Quality is of paramount importance and takes priority over quantity.

Recommendation 6

Data collection and exchange of information should be part of every project in order to establish a national register to help achieve the overall objectives.

Recommendation 7

Recipients of orthopaedic services should be encouraged to contribute to the costs of the services provided taking account of the social policy of the country being assisted.

Recommendation 8

A team approach is mandatory in the management of the polio patient.

Recommendation 9

It is preferable for professionals going to a low-income country to have a period of orientation and specific training prior to taking up their responsibilities.

SYNDICATE GROUP 4E : SURGICAL/ORTHOTIC INTERACTION

Discuss the relationship between orthotic treatment and surgery in the management of the lower limb in chronic poliomyelitis.

SYNDICATE 4E

Chairman: D. Hay
Rapporteur: T. Gavin

Members: H. Watts
S. Edwards
R. Garst
R. Jované
R. Mukalazi
M.L. Stills
D.N. Condie
B. Camara
B. Nandjui
C. Schiappacasse
J.M. Gomez
K. Kpandressi
V. Naik

The group followed the format of Group 2D and began distally and moved proximally. We considered muscle weakness (also considered instability) and deformity (considered fixed deformity) separately. We developed and tested the following algorithm which fit all combinations.

Orthotic treatment was recommended unless:

Muscle weakness:

- a) no orthotic facilities available
- b) funding for orthoses unavailable
- c) patient chose not to use orthoses (including non-compliance)
- d) orthoses considered ineffective
- e) physician decided it was ideal time for surgery
- f) surgery was considered to eliminate orthosis and/or shoe lift

Deformity:

- g) deformity has progressed to a point where it is no longer able to be treated with an orthosis
- h) deformity not originally indicated for orthotic treatment
- j) no orthotic facility available
- k) patient chose not to use orthosis (including non-compliance)
- l) funding unavailable for orthosis
- m) best time to perform surgery is determined with delays possibly leading to poor surgical outcome
- n) surgery necessary to facilitate orthosis
- p) failure of surgical procedure } *other alternatives such as wheelchairs for these patients*
- q) orthotic treatment impossible }

This model was applied to:

Ankle/foot

1. ML muscle weakness (instability)
Varus/valgus deformity
2. Dorsiflexor muscle weakness
Equinus deformity
3. Plantar flexor weakness
Calcaneus deformity

4. Pes planus flexible (muscle weakness)
Pes planus rigid deformity
5. Pes cavus – rigid deformity

Knee

1. Genu varum/valgus (weakness) instability
Genu varus/valgus deformity
2. Extensor weakness
Instability
Flexion deformity > ~ 30°
Genu recurvatum instability

Hip

1. Abduction muscle weakness
Abduction deformity
Adduction deformity
2. Extensor weakness
Flexion deformity
3. Rotation muscle weakness
Rotational deformity
4. Subluxation
Instability

Exceptions common to all cases were:

1. A,J - no orthotic facility available
2. B,L - funding for orthoses unavailable
- e. B,C - patient chose not to use an orthosis or not to be compliant with orthosis wearing

Specific exceptions were:

For foot and ankle:

1. for ML instability - unless E and F
2. for varus/valgus deformity - unless H and M
3. dorsiflexor muscle weakness – none
4. equinus deformity - unless E and F
5. pes cavus - unless H

For knee:

1. Genu varus/valgus correctable instability - unless D,E and F
Fixed varus/valgus - unless H, M
2. Extensor weakness – none
3. Flexion deformity - unless H,M,K (~ 30°)
4. Genu recurvatum instability - unless D

For hip orthoses unless:

1. Adduction deformity (abduction weakness) - D always
2. Extensor weakness - unless D
3. Flexion deformity - H always
4. Rotational weakness - unless D
5. Rotational deformity - unless G and H

Guidance on specific conditions

Guidance on specific conditions when orthotic treatment becomes impossible or ineffective is contained in Sydicate Reports 1A-1F and Plenary Discussion of Syndicate 1 Reports.

Guidance on specific timing/indicators

Guidance on specific timing/indicators when surgery is "best" performed is contained in Syndicate Reports 1A-1F and 2C and Plenary Discussions of Syndicate Reports 1 and 2.

PLENARY DISCUSSION ON SYNDICATE 4 REPORTS

Chairman: J. Hughes
Rapporteur: J.C.T. Church

Syndicate 4A : Post-polio syndrome

Dr B. Persson:

1. It was discussed if spinal anaesthesia added risk of lasting loss of power in polio patients having surgery. If this were the case, should such anaesthesia be avoided?
2. General anaesthesia, using curare as a muscle relaxant would, in some cases, create a risk of lasting loss of power in polio patients. Should such a possibility be avoided?
3. Polio limbs, after 30-50 years, can develop osteoporosis. This could create special problems after surgery, with loss of fixation and secondary fractures near instrumental fusions and osteotomies.

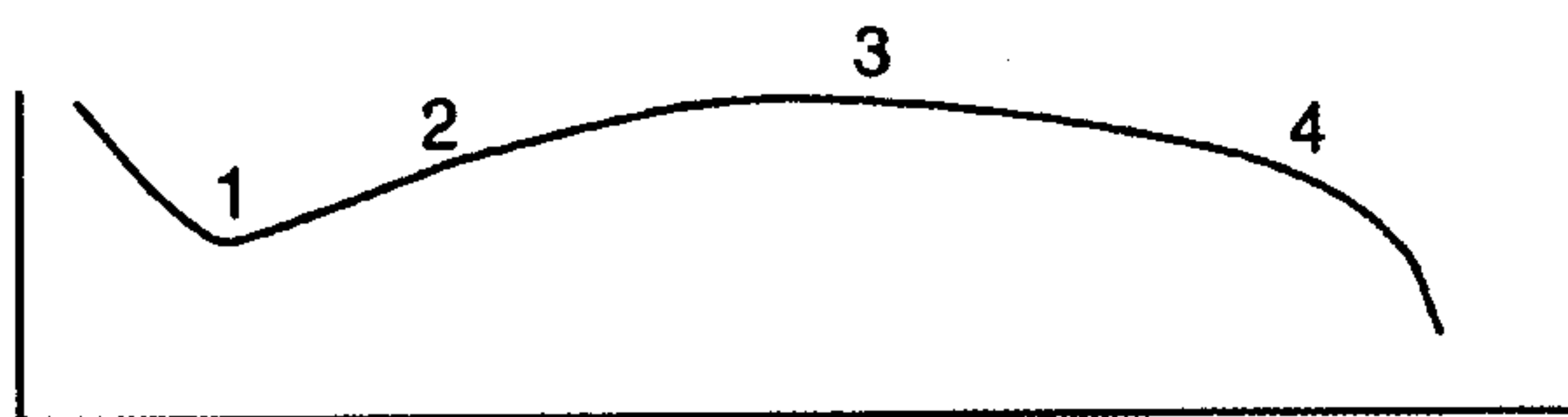
Mr V. Bhanti:

1. Polio patients should be regularly assessed for the development of symptoms of post polio syndrome so that these symptoms can be treated appropriately.
2. Patients should be made aware that they may need revision of their orthoses (eg extension) in future.
3. Special follow-up clinics should be established for post polio syndrome in medical centres.
4. In this context, clinical psychologists should be part of the rehabilitation team.
5. With regard to the exchange of expertise between countries, Rotary International could be approached.

Syndicate 4B : Post-polio syndrome

Drs F. Nollet, F. Lønnberg and Dr L. Halstead:

Addressed the question of terminology for the different stages of polio.



1. 'Acute' or subacute phase
2. 'Recovery' phase, up to ± 2 years
3. 'Sequelae' phase.
There is nothing 'chronic' as in a chronic disease. This is a static phase with functional stability, although in the muscle there is a continuous process of remodelling.
4. 'Late onset sequelae' phase, with the term post polio syndrome being used for a set of symptoms, as described by Dr Halstead.

F. Nollet:

Also added that many doctors do not see this condition (post polio syndrome) enough to be able to discuss the question of definition or nomenclature. Many researchers, not at this conference, readily accept the term 'post polio syndrome'.

G. Neff:

Suggested the term 'post polio late effects' rather than 'post polio syndrome'.

B. Persson:

Suggested the term 'post polio' for general symptoms and 'post polio syndrome' for late symptoms.

C. Marinsek:

In developing countries where post polio syndrome is not yet recognised as a separate entity, PHC, CBR and families should be informed of its existence, problems and solutions. The term 'patient' should be avoided as much as possible and replaced with terms such as – 'person', 'consumer', 'client', 'children with', 'people with', 'people having' etc.

J.N. Wilson:

Many people fear the 'post polio syndrome' because it has come to be considered as a new disease, a view taken up by the media. The word 'syndrome' should be dropped from the term.

J. Hughes:

The term 'post-polio syndrome' should be retained but the confusion should be explained to those concerned.

Syndicate 4C : Transfer of information and education

J. Fisk:

ISPO should assist in the dissemination of e-mail addresses to delegates to this conference.

I. Carrick:

ISPO should consider providing a web page to which delegates at this conference and other could contribute.

N. Jacobs:

ISPO plans to provide such a web page.

J.N. Wilson:

Would an ISPO web page would clash with Professor Ron Huckstep's web page.

J. Church:

Saw no conflict as Professor Huckstep's page is primarily concerned with trauma and polio, whereas ISPO would be primarily related to orthotics and prosthetics.

Syndicate 4D : International cooperation

D. Condie:

Asked about approaches for help being made directly to ISPO from NGOs.

J. Wilson:

If NGOs within a recipient country sought help directly from ISPO the Government concerned should be informed in all cases.

ADDENDUM

TRADITIONAL HEALTH CARE SYSTEMS

Mr J.C.T. Church

I have recently visited India as the guest of some traditional health care professionals to look at their management of poliomyelitis. I was impressed by what I saw.

In a consensus conference such as this we need to acknowledge not only the existence of often very long standing indigenous health care systems, but the significant part they play in the care of patients with musculo-skeletal trauma and disease. Whilst recognising each other's shortcomings, we must seek to establish contact, dialogue and eventually collaboration. In this way, the patient will cease to be a 'shuttlecock' but rather the two systems together will be able to offer the patient far more than either could do alone.

Discussion

B. Joseph:

Traditional health care systems, such as the ayurvedic system, already exist alongside allopathic institutions and there is a place for further collaboration.

E.M. Kessi:

Traditional healers are well established in Tanzania and their role is recognised by Government. There are plans to invite traditional healers to conferences and seminars to enhance collaboration.

H. Chen:

Stated that the Chinese had only traditional medicine until 100 years ago with the advent of western medicine. Acupuncture is good for certain aspects of poliomyelitis management and in anaesthesia.

V. Bhanti:

Indicated that doctors in parts of India are treating poliomyelitis cases. Muscle wasting persists but the need for orthoses is eliminated. Studies are being conducted by the Medical Council and will be reported on. Prospective scientific studies should be undertaken.

D. Condie:

Cautioned that there is no firm evidence yet that traditional systems are effective in the management of the after-effects of poliomyelitis.

T. Gavin:

Supported the need for further controlled studies.

J.N. Wilson:

Indicated that 80% of the population live in rural areas while 80% of western trained doctors are in urban areas. CBR workers in rural areas should be asked to seek factual evidence for the efficacy of traditional health care systems in the management of poliomyelitis.

H. Trebbin:

Agreed that the practice of yoga would help some polio patients.

J. Hughes and N.A. Jacobs:

Recommended an investigation into the role and efficacy of traditional health care systems in the management of musculoskeletal disease and, in particular, poliomyelitis.

APPENDICES



Polio Consensus Conference 16-22 November 1997, Hammamet, Tunisia

Programme

Sunday 16 November				
08.00	S.1		<u>Introduction</u> Opening and introduction (N.A. Jacobs, ISPO)	20 mins
			Chairman: C. Marincek Rapporteur: H. Watts	
08.20	S.3.	Overview:	<u>Background</u> Epidemiology and prevention (E. Mohsni and H. Triki, Tunisia)	30 mins
08.50	S.4		Epidemiology and prevention: Zaire project (C. Simonnot, France)	20 mins
09.10	S.5	Overview:	Pathophysiology (F. Hentati and M. Besbes, Tunisia)	30 mins
09.40			Questions of clarification	15 mins
09.55	S.6	Overview:	Management of the acute phase, diagnostics, pain, respiration (D. Schmidt, Germany)	30 mins
10.55			Discussion: Acute phase	25 mins
10.50			Coffee Break	30 mins
11.20			Official Opening: N. Sliman : Chairman N.A. Jacobs : ISPO E. Pupulin : WHO C. Simonnot : HI H. Watts : WOC H. Trebbin : GTZ Minister of Health	60 mins
12.20			Lunch	100 mins
			Chairman: G. Neff Rapporteur: B. Joseph	
14.00	S.7	Overview:	Management of the sub-acute phase, prevention of deformities (M. Ayika, Sierra Leone)	30 mins
14.30			Discussion: Sub-acute phase	30 mins
15.00			Coffee break	30 mins
15.30	S.8		Tunisian experience 1970-1995 (N. Sliman, M. Douik, T. Litaiem, T. Moula, M. Zlitni, M. Zouari and S. Karray, Tunisia)	60 mins
16.30			Questions of clarification and discussion	30 mins

17.00

Adjourn

1900-
1945

Reception at American Bar in Hotel Sol Azur
(Sponsored by Caisse Nationale Sécurité Social (CNSS))

Monday 17 November

Chronic phase

Chairman: J. Steen Jensen
Rapporteur: J. Wilson

Lower limb surgery

08.00 M.1 Overview Limb length inequality 40 mins
(lengthening and shortening procedures)
(J. Fisk, USA – 20 min);

(N. Sliman, A. Gargouri, O. Zouari, M.S. Daghfous, R.
Hadidane, M. Douik, T. Litaïem, M. Zouari and S. Karray,
Tunisia – 20 min)

08.40 M.2 Overview: Standing stability 60 mins
(tendon transfer, osteotomy, arthrodesis)
(K. Rankin, S. Africa – 30 min; G. Neff, Germany – 30 min)

09.40 Coffee break 35 mins

10.15 M.3 Overview: Deformity and pain 60 mins
(osteotomy, arthrodesis, arthroplasty)
(B. Persson, Sweden – 30 min; J. Fisk, USA – 30 min)

11.15 Discussion: Lower limb surgery 45 mins

12.00 Lunch 90 mins

Chairman: S. Heim
Rapporteur: D.N. Condie

Lower limb orthotics

13.30 M.4 Overview: Use of lower limb orthoses: goals, indications, 25 mins
contraindications
(M. Stills, USA)

13.55 M.5 Lower limb orthotic management: 20 mins
Tunisian experience
(M. Lamine, Tunisia)

14.15 M.6 Lower limb orthotic management: 20 mins
Pakistani experience
(A. Ahmad, Pakistan)

14.35 Coffee break 30 mins

15.05 M.7 Lower limb orthotic management 20 mins
Rancho Los Amigos experience
(S. Langdon-Bash, USA)

Orthopaedic shoes

15.25 M.8 Overview: Use of orthopaedic shoes: goals, indications, 20 mins
contraindications
(H. Gassenschmidt, Germany)

15.45	M.9		Use of orthopaedic shoes in Africa (A. Schneider, Sierra Leone – <i>presented by H. Shangali</i>)	20 mins
<u>Lower limb physical therapy</u>				
16.05	M.10	Overview	Maintenance and improvement of physical function (L. Essafi, Morocco)	15 mins
16.20	M.11	Overview	Maintenance and improvement of physical function (M. Löwenhjelm, Denmark)	15 mins
16.35			Discussion: Lower limb orthotics, orthopaedic shoes and physical therapy	45 mins
17.20	Syn.1	Syndicates:	Lower limb surgery, orthotics, orthopaedic shoes and physical therapy	90 mins
18.50			Adjourn	

Tuesday 18 November

06.30			Depart to Tunis	
07.30			Arrive Institut d'Orthopédie M. Kassab, Kassar Said, Tunis	
08.00			Syndicate reports and discussion Lower limb surgery, orthotics, orthopaedic shoes and Physical therapy	120 min

10.00 Coffee break 30 mins

10.30			Visit to hospital complex <ul style="list-style-type: none"> ◆ Hospital - outpatient activities <li style="padding-left: 20px;">- physiotherapy department <li style="padding-left: 20px;">- cerebral palsy department <ul style="list-style-type: none"> ◆ Orthopaedic Workshop Unit d'Appareillage Orthopédique (UAO) ◆ Institut de Promotion des Handicappes (IPH) ◆ Centre des Grandes Accident de la Vie 	120 min
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12.30 Lunch (Sponsored by INOKS) 90 mins

14.00			Surgical techniques – experiences presented by teams from Institut National d'Orthopédie M. Kassab (INOKS)	30 mins
14.30			Case presentations by INOKS and UAO	120 min
16.30			Departure for the Old City of Tunis. Guided walk through the Soukh in groups of 8-10 and strolling along Avenue Bourguiba	180 min
19.30			Departure for Hammamet	
20.30			Late dinner at Hotel Sol Azur	

Wednesday 19 November

<u>Spinal surgery</u>				
08.30	W.1	Overview:	Spinal surgery (S. Willner, Sweden)	30 mins

09.00	W.2	Overview:	Spinal surgery (N. Sliman, M.S. Daghfous, O. Zouari, A. Gargouri, R. Hadidane and A. Mrabet, Tunisia)	30 mins
09.30		Discussion:	Spinal surgery	30 mins
10.00			Coffee break	30 mins
			<u>Spinal orthotics</u>	
10.30	W.3	Overview:	Use of spinal orthoses: goals, indications, contraindications (T. Gavin, USA)	30 mins
11.00	W.4		Spinal orthotic management: Zimbabwe experience (T. Madonko, Zimbabwe)	10 mins
11.10	W.5		Spinal orthotic management: Colombian experience (J. Gomez, Colombia)	10 mins
			<u>Physical therapy</u>	
11.20	W.6	Overview:	Physical therapy management of the paralytic spine (W. Helsing, Denmark)	15 mins
11.35			Discussion: Spinal orthotics and physical therapy	25 mins
12.00			Lunch	90 mins
13.30	Syn.2	Syndicates:	Spinal surgery, orthotics and physical therapy	90 mins
15.00			Coffee break	30 mins
			<u>Upper limb surgery</u>	
15.30	W.7	Overview:	Upper limb surgery (H. Watts, USA)	30 mins
16.00	W.8		Upper limb surgery; Indian experience (B. Joseph, India)	15 mins
16.15	W.9		Upper limb surgery: German experience (D. Hohmann, Germany)	15 mins
16.30			Discussion: Upper limb surgery	30 mins
17.00			Adjourn	
Thursday 20 November				
08.00			Syndicate reports and discussion Spinal surgery, orthotics and physical therapy	120 mins
10.00			Coffee break	30 mins
			<u>Upper limb orthotics</u>	
10.30	Th.1	Overview:	Use of upper limb orthoses: goals, indications, contraindications (H.R. Lehneis, USA)	20 mins
10.50	Th.2		Upper limb orthotics: Tanzanian experience (H. Shangali, Tanzania)	10 mins
11.00	Th.3		Upper limb orthotics: Pakistani experience (A. Ahmad, Pakistan)	10 mins

Upper limb physical and occupational therapy

11.10	Th.4	Overview:	Upper limb physical and occupational therapy (H. Jaïbi-Fransen, The Netherlands)	20 mins
11.30			Discussion: Upper limb orthotics and physical and occupational therapy	30 mins

12.00 Lunch **90 mins**

National systems of management

13.30	Th.5		Reports on national systems of management, including community-based rehabilitation (CBR), where applicable, and social services (10 min + 5 min discussion period each)	
13.30	Th.5.1		Malawi (D. Hay)	15 mins
13.45	Th.5.2		Tanzania (B. Mworio)	15 mins
14.00	Th.5.3		Burkina Faso (S. Gandema)	15 mins
14.15	Th.5.4		El Salvador (H. Trebbin)	15 mins

14.30 Coffee break **30 mins**

15.00	Th.5.5		India (B. Joseph)	15 mins
15.15	Th.5.6		Vietnam (B.C. Hoanh)	15 mins
15.30	Th.5.7		Benin (E. Goudote)	15 mins
15.45	Syn.3	Syndicates:	Upper limb surgery, orthotics, occupational and physical therapy and national systems	90 mins
17.15			Adjourn	
19.00			Conference Dinner (Sponsored by Otto Bock)	

Friday 21 November

08.00			Syndicate reports and discussion Upper limb surgery, orthotics, therapy and national systems	120 mins
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10.00 Coffee break **30 mins**

Post-polio syndrome

10.30	F.1	Overview:	Post-polio syndrome (L. Halstead, USA)	30 mins
11.00	F.2		Post-polio syndrome: Scandinavian perspective (F. Lønnberg, Denmark)	20 mins
11.20		Discussion:	Post-polio syndrome	40 mins
12.00			Lunch	90 mins

13.30	F.3		The Rancho Los Amigos principles for the treatment of lower limb problems in post-polio (M. Baumgarten, USA – presented by B. Persson)	20 mins
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13.50	F.4	Overview:	Surgical treatment in post-polio syndrome (G. Neff, Germany)	20 mins
14.10	F.5	Overview:	Orthotic treatment in post-polio syndrome (D. Forbes, USA)	20 mins
14.30	F.6	Overview:	Orthotic treatment in post-polio syndrome (K. Dittmer, Germany)	20 mins
14.50			Coffee break	30 mins
15.20	F.7	Overview:	Rehabilitation medicine – considerations in post-polio syndrome (H. Burger and C. Marincek, Slovenia)	20 mins
15.40	F.8	Overview:	Therapy considerations in post-polio syndrome (A. Relf, USA)	20 mins
16.00	F.9	Overview:	Consumer considerations in post-polio syndrome (B. Lake, Australia)	20 mins
16.20		Discussion:	Post-polio syndrome	30 mins
16.50	Syn.4	Syndicates:	Post-polio syndrome	90 mins
18.20			Adjourn	

Saturday 22 November

08.00			Syndicate reports and discussion: Post-polio syndrome	120 mins
10.00			Coffee break	30 mins
10.30			Presentation of provisional/preliminary consensus statements	90 mins
12.00		Closing Ceremony:	ISPO Director CNSS Minister for Social Welfare	60 mins
13.00			Adjourn	



CONSENSUS CONFERENCE ON POLIOMYELITIS

HAMMAMET, TUNISIA, 16-22 NOVEMBER 1997

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POLIOMYELITIS

LIMB INEQUALITY (M1)

(Selected Reading for a Consensus Conference on Poliomyelitis)

Prepared May 1997

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POLIOMYELITIS

STANDING STABILITY (M2)

(Selected Reading for a Consensus Conference on Poliomyelitis)

Prepared May 1997

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POLIOMYELITIS

DEFORMITY AND PAIN (M3)

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POLIOMYELITIS

LOWER LIMB ORTHOTICS (M4)

(Selected Reading for a Consensus Conference on Poliomyelitis)

Prepared May 1997

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POLIOMYELITIS

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(Selected Reading for a Consensus Conference on Poliomyelitis)

Prepared May 1997

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POLIOMYELITIS

LOWER LIMB PHYSICAL THERAPY (M10)

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POLIOMYELITIS

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(Selected Reading for a Consensus Conference on Poliomyelitis)

Prepared May 1997

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POLIOMYELITIS

SPINAL ORTHOTICS (W3)

(Selected Reading for a Consensus Conference on Poliomyelitis)

Prepared May 1997

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POLIOMYELITIS

PHYSICAL THERAPY OF THE PARALYTIC SPINE (W6)

(Selected Reading for a Consensus Conference on Poliomyelitis)

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POLIOMYELITIS

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(Selected Reading for a Consensus Conference on Poliomyelitis)

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POLIOMYELITIS

UPPER LIMB ORTHOTICS (THI)

(Selected Reading for a Consensus Conference on Poliomyelitis)

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UPPER LIMB PHYSICAL AND OCCUPATIONAL THERAPY (TH4)

(Selected Reading for a Consensus Conference on Poliomyelitis)

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POST-POLIO SYNDROME (F1)

(Selected Reading for a Consensus Conference on Poliomyelitis)

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POLIOMYELITIS

SURGICAL TREATMENT OF POST-POLIO SYNDROME (F3+4)

(Selected Reading for a Consensus Conference on Poliomyelitis)

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POLIOMYELITIS

POST-POLIO SYNDROME ORTHOTICS (F5 + 6)

(Selected Reading for a Consensus Conference on Poliomyelitis)

Prepared May 1997

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POLIOMYELITIS

PHYSIATRIC AND PHYSICAL THERAPY IN POST-POLIO SYNDROME (F7 & 8)

(Selected Reading for a Consensus Conference on Poliomyelitis)

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