DESIGNING OF THE STUDY

1. **Collection of base-line data**:

Mass camp conduction was undertaken in various rural areas in coordination with several local and social organisations. (Fig. 1 & 2) The children and their parents were interviewed by a questionnaire method with the help of well oriented volunteers. (Fig. 3) The information thus collected was cross-checked at the time of admission for surgery or registration for physiotherapy and appliances. This data provided an overall picture of the distribution and pattern of orthopaedic deformities in children of the areas under this study conducted between June, 1976 and October, 1981.

2. **Camp organisational techniques**:

Local agencies interested in social service of this nature, were contacted and a decision for holding a camp was taken, approximately two weeks or more in advance. These agencies organised and allotted duties to groups of volunteers. They also ensured adequate dissemination of the information to surrounding villages in order to ensure maximum response and coverage.

**Agencies involved**

- Rotary Clubs
- Zilla Parishads
- Lions Clubs
- Other local agencies
- Giants International
- Medical Association
- Jaycees Clubs & Rotaract Clubs.
ORGANISATIONAL TECHNIQUES
OF THE CAMP

ACTIVE INVOLVEMENT IN THE CAMP FOR INAUGURAL FUNCTION

REGISTRATION COUNTER

WELL ORIENTED VOLUNTEERS ARE TAKING HISTORY OF THE CHILD
3. **Area of coverage**:

A map of Maharashtra was used to show the districts covered by the camps. Village-wise distribution of 75 diagnostic camps could not be done due to overlapping of population in uncovered and covered districts.

4. **Details of disability**

**Information collected**:

(a) **Demographic aspect**:

Only disabilities in the paediatric age group (0 - 16) have been recorded.

The following information was collected.

**(A model proforma)**

Name :
Age :
Sex :
Occupation :
Educational status :
Socio-economic condition :
Place of residence :

(b) **Clinical aspects** (Fig. 4 & 5)

The data under this sub-heading was recorded as shown in the proforma alongside.

- Nature of complaints
- Clinical assessment -
<table>
<thead>
<tr>
<th>Complaints, History, Clinical Findings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis:</td>
</tr>
<tr>
<td>Treatment Advised:</td>
</tr>
</tbody>
</table>

**Impairment**

- 11 Impairment
- 12 Disability

**Orientation**

- 13 Orientation
- 14 Occupation

**Phyindrep**

- 15 Phyindrep
- 16 Soc. integr

**Mobility**

- 17 Mobility
- 18 Ec. Selfsuffi

**Pain**

- 19 Pain
- 20 Swelling

**Deformity**

- 21 Deformity
- 22 Contractu.

**Loss of Power**

- 23 Loss of Power

**Others (Specify)**

- 24 Others (Specify)

**Spine**

<table>
<thead>
<tr>
<th>Site</th>
<th>Lt</th>
<th>Rt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerv.</td>
<td>41</td>
<td>42</td>
</tr>
<tr>
<td>Thora</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lumb</td>
<td>43</td>
<td>44</td>
</tr>
<tr>
<td>Sacrel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Duration**

- 61 Polio
- 62 Cer. Palsy

**Diagno**

- 63 Congenital
- 64 Trammat.

**Received**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Advised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>81</td>
</tr>
<tr>
<td>Appliance</td>
<td>82</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>83</td>
</tr>
<tr>
<td>Drugs</td>
<td>84</td>
</tr>
<tr>
<td>Leave Alone</td>
<td>85</td>
</tr>
<tr>
<td>Investigation</td>
<td>86</td>
</tr>
<tr>
<td>Others (Specify)</td>
<td>87</td>
</tr>
</tbody>
</table>

1. अग्यासंग नवाल समस्थितिका/विनेय नागाङ्की/विनेय फायदा/विनेय फुटांसा मन्द्रिा दिनेवा आद 2. प्रायोगिक सप्ताहिको भारीतेय अग्यासंग सहस्त्रहज निम्नयन कस्तान ध्व 3. भुतोन उत्तेजनाही सम्बंधामा पर्यावरण हो। जेल संबंधौतिकरण, केन्द्रमूल्य गर्ने गर्ने अग्यासंग निम्नयन कस्तान आफ्नो नागाङ्की कस्तान निम्नयन पर्यावरण कराउ 4. समाजिक र आयोजनार यस्तो सम्बंध निपर्यावरण कोष कराउ 5. समाजिक र आयोजनार यस्तो सम्बंध निपर्यावरण कोष कराउ 6. समाजिक नयनसंग निपर्यावरण गर्ने १० वा १२ अप्रेण
Key to Abbreviations used:

1) P. P. P. - Post Paralytic Poliomyelitis
2) C. P. - Cerebral Palsy
3) C. T. E. V. - Congenital Talipes Equinovarus
4) — — - Fracture
5) L. L. L. - Left Lower Limb
6) R. U. L. - Right Upper Limb
7) S. T. R. - Soft Tissue Release
8) T. A. L. - Tendon Achilles Lengthening
9) E. P. H. to M. - Tendon Transfer
10) A. K. - Above Knee
11) B. K. - Below Knee
CHILDREN ARE SEEN WAITING FOR THEIR TURN

CONSULTANT IS EVALUATING THE DISABILITY
- Nature of deformity and its severity.
- Loss of power
- Sites of affection
- Disability pattern
- Duration of illness
- Past history of immunisation aggravating factors e.g. injection, massage, treatment received elsewhere.
- Diagnosis - Anatomical and aetiological
- Affection of activities of daily life.

(c) **Environmental profile** :

<table>
<thead>
<tr>
<th>Physical barriers</th>
<th>At home e.g. uneven floors, high threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At school e.g. steps without bannisters, sitting arrangements on floor.</td>
</tr>
<tr>
<td>Attitudes of parents towards their disabled children</td>
<td>Liability</td>
</tr>
<tr>
<td>Frequency of consultation with practitioners</td>
<td>Worry about future</td>
</tr>
<tr>
<td></td>
<td>Congenial atmosphere</td>
</tr>
<tr>
<td></td>
<td>Practitioners in different systems of medicines like allopathy, Ayurveda, Integrated and Homoeopathy.</td>
</tr>
</tbody>
</table>

5. **Statistical considerations** :

The information collected in the above manner was precoded and punched in computer cards and statistical analysis was done. This was used to categorise orthopaedically disabled children depending on the nature of treatment they needed.
**Aim - 2**

In order to categorise orthopaedically disabled patients by clinical and environmental assessment, for therapy in the form of surgical interventions, physiotherapy or technological appliances all the records were analysed and the registers were prepared separately.

**Aim - 3 : Treatment and general follow-up protocol :**

A brief outline is stated below, of the path followed by patients who visited the paediatric rehabilitation clinic for obtaining the benefit of the treatment that they were advised at the camp.

(a) **Corrective surgery group :**

Patients under this category were re-examined and the findings were cross-checked with the data already gathered during the first examination in the camp. Aims of surgery were correction of deformity and improvement in locomotion in lower limbs and improvement of functional ability of the hand in upper limbs.

The patients were admitted and all necessary investigations e.g. x-rays, blood and urine examination were done. The commonly done procedures were soft tissue release surgery for contractures and deformities around hip, knee and foot, triple arthrodesis, supra-condylar osteotomies, Grice-Green's procedure, tendon transfers, etc. The necessary operations were thus done and corrective plaster casts were given. These
were changed over the next few days to obtain maximum correction. The average hospital stay of these patients was 10 days. The patients were asked to come for follow-up 3-4 weeks after discharge.

During successive follow-up visits a careful record was kept of the patient's progress and the physiotherapists played a prominent role in training the patients in ambulation with or without crutches and also in posture and exercises. Measurements were then taken to fit the prescribed appliances after careful reassessment of the patients' post operative results.

(b) Appliance group:

Once corrective surgery was done, or if no surgery and only appliances were required, the orthotist and surgeon decided the type of orthoses to be designed for the individual patients. The patients were admitted in the ward for 4 to 5 days. They visited the Rehabilitation Department for gait training under the supervision of the physiotherapists and occupational therapists. The therapists did regular muscle power charting and also recorded progress of contractures and deformities. The patients also visited the O.P.D. once every 2-3 months for assessment of use of the prescribed appliances and for repairs of damaged, worn or outgrown orthoses. At the time of fitting the appliances and during follow-up the following advice was given.
- Counselling of parents regarding proper use of the calipers and importance of their regular use. Training the disabled child in the religious use and care for his appliance.

- Importance of regularity in follow up programme.

(c) Physiotherapy group:

There was considerable overlap between this and the previous two categories. Sometimes, convalescent patients were admitted for passive, active and active assisted exercises. The occupational therapist trained the patient fitted with calipers and corrective shoes in achieving independent gait and optimum postures. This was done both on O.P.D. and Indoor patient basis depending on individual cases.

RESEARCH PROJECTS IN SURGICAL REHABILITATION

Evaluation of results of modified Jones' Operation for clawing of Great toe

Selection of Cases:

This study consisted of 28 children between 6-12 years of age, examined in the diagnostic camps. The cases were admitted and detailed clinical assessment including muscle charting was done. Twenty cases had primary clawing due to weak dorsiflexors, essentially tibialis anterior. Eight cases had persistent clawing of the great toe following Steindler's release for cavus foot deformities. The selected cases had essentially non-fixed
cavus deformity of the foot, a pre-requisite for this operation. [51] Deformities like equinus and cavus were corrected prior to Jones' operation. [52] Principles used in Jones' operation for claw foot i.e. attachment of extensor Hallucis longus tendon in the first metatarsal and hammer toe (i.e. resection and arthrodesis of interphalangeal joint) were combined to correct the deformity of the great toe. [53] Four cases, below the age of 8 years were not subjected to arthrodesis of interphalangeal joint instead tenodesis using part of the distal tendon of extensor hallucis longus was done.

Plaster immobilisation was given to hold the Metatarsophalangeal joint flexed and interphalangeal joint extended. Three weeks after surgery foot-wear with arch support and metatarsal bar were provided, and patients were ambulated. Periodical follow up to assess the correction of cavus and improvement in active dorsiflexion were done. Results were evaluated based on following criteria:

Objective improvement -

(a) Correction of deformity.
(b) Improvement in dorsiflexion.

Subjective improvement -

Comfort in footwear usage

Volkmann's Ischemic Contracture an epidemiological review and management study:

Material and Methods:

The study on 25 cases of Volkmann's Ischemic Contractures was done
at the Hastimal Sancheti Memorial Trust' Centre for Orthopaedically Handicapped Children. The cases hailed from all over rural Maharashtra, detected at the diagnostic camps conducted by the Centre. On admission, history elicitation and socio-economic study were done. The cases were subjected to thorough clinical scrutiny. The upper limb affected cases were graded according to the severity of the contractures and associated complications.

All upper limb affected cases were initially subjected to conservative treatment in the form of manipulation under anaesthesia and corrective casts. The deformities yielded to this treatment in three cases. These cases were then fitted with dynamic splints. Surgical correction was necessary in 18 cases. The plan for the lower limb affected cases was soft tissue release with corrective osteotomies followed by plaster immobilisation.

After the requisite duration of immobilisation, the respective cases were either given dynamic splints or corrective foot wear. Periodic follow up was made and at each sitting the degree of correction, functional status of the limb, development of complications such as infection, oedema, pain, loss of correction etc. were charted. The results were evaluated based on the degree of correction obtained and functional usefulness of the limb.

**Modified post-operative management techniques in case of post polio hip and knee contractures by groin to toe cast & spinal exercises.**

A study was undertaken to find out an ideal improvised way of post-
operative management for cases from rural areas wherein domiciliary management could be relied on by the surgeon.

The conventional procedures of hip spica immobilisation after soft tissue release surgery in unilateral or bilateral cases of poliomyelitis with contractures in the hip and/or knee joints have been evaluated.

**Aims:**

1. To find out usefulness of modified post operative management techniques from patient's point of view and simple nursing care available in the village homes.

2. To evaluate the results of non-institutionalised early rehabilitation.

**Methodology:**

The study group constituted 93 cases and control group was formed by 28 cases.

All the cases hailed from various rural areas and were comparable in demographic characteristics such as age, duration of illness and severity of deformity and socio-economic status, etc. Following problems in both groups were studied:


2. Period of hospital recumbency and repeated follow-up.

3. Nursing problems at home.

The cases were treated by necessary soft tissue release procedures for contractures around the joints of lower limbs in both the groups. In
the study group, cases were managed by groin to toe plaster cast and the control group cases by immobilisation in hip spica. Patients enrolled for study group were made to sleep in prone position from second post operative day and active spinal extension exercises and hip extension exercises were started. The parents were trained to get these exercises done and reproducibility was ensured before the patients were discharged. After three weeks of immobilisation plaster cast was removed and braces were fitted to the patients who were trained to use them for their independent activity.

A comparative study of utility of cane caliper:

Retrospective studies were done on 100 patients who were using conventional calipers. Various reasons for discontinuation of the use of calipers like uncomfortable gait, high cost, interference with activities of daily living encouraged the necessity for research in orthotics.

While designing new calipers, following points were taken into consideration:

1. Availability of indigenous material.
2. Cost factor.
3. Maintenance facilities.
4. Functional usefulness.

Aim of the study:

1. To develop new calipers in tune with socio-economic way of life.
2. To increase the acceptability of the caliper by reducing cost and repair.
Selection of cases:

Designing of Study:

For comparative study, children between 2 to 15 years of age with bilateral affection were selected. The children who fulfilled following criteria have been included.

1. Age group between 2 to 15 years.
2. Duration of illness more than 2 years.
3. Contractures of hip and knee of moderate and severe degree (moderate: 10-45 degrees; severe: more than 45 degrees).

Analysis of daily activities was done on following score.

1. Independently and easily.
2. Independently but with difficulty.
3. Can perform with some assistance.
4. Cannot perform without major and substantial assistance.
5. Activities cannot be performed at all.

Formation of Group:

All the children with bilateral polio affection of lower limbs were comparable in socio-economic and demographic characteristics. Control group consisted of 25 children and 20 children formed the study group. The control group was given bilateral full length calipers prepared from metal bar and study group was supplied with same type of caliper where metal
bars were substituted by cane. A proforma was designed and pre-tested and was filled up during routine follow up visits. Clinical assessment was done by an Orthopaedic Surgeon.

Shoulder Capsule:

A new device for flail shoulder:

Provision of shoulder capsule in the paediatric age group to cases of post-polio flail shoulder helps in execution of shoulder movements to a certain extent. Splinting of the humeral head to the scapula is obtained by the device. The functional periscapular muscles can transmit power to the humerus while the capsule anchors the head of the humerus to the glenoid. This factor helps in the functional development of the periscapular muscles till the time the patient attains skeletal maturity for shoulder fusion surgery. Twenty patients between the age group 7 to 15 years were selected.

Modified knee joints in above knee calipers:

Orthotics should be designed scientifically only to support and enhance the execution of an erstwhile limited activity. Many factors render these devices cumbersome for use. One important function that an above knee caliper lacks is allowing the patient to squat and sit cross legged, an uncompromisable habit in rural India. Limitation of this activity in a conventional caliper is one major cause of the high defaulter rate.

A study was designed to evaluate the utility of an above knee caliper with a modified knee joint to allow flexion beyond $130^\circ$ in 20 cases of residual poliomyelitis.
Plan of study:

Twenty selected cases of residual poliomyelitis were included in the study. The patients hailed from rural Maharashtra and were initially seen in the diagnostic rural camps. Deformities of joints were corrected by suitable surgical procedures. After the stipulated duration of plaster immobilisation, vigorous physiotherapeutic measures were instituted to restore mobility to joints and build up strength in the spinal and gluteal muscles. Simultaneously above knee calipers were fabricated with incorporation of the modified knee joints. The calipers were pretested prior to their fitting on the patients. Alongwith gait training, performance of activities of squatting and sitting cross-legged with the caliper in situ were demonstrated to the patients and their relatives. Once the operation of the caliper was well understood, the patient was discharged.

A follow up postal enquiry on the ensuing proforma was conducted and observations were evaluated.

Proforma:

1. Name:
   Camp:
2. Age of the child:
3. Duration of illness:
4. Unilateral or Bilateral lower limb affection:
5. Could the child walk independently before fitting of appliance?
6. Was the child using caliper prior to the present ones?
7. Sitting arrangements in school: Floor/Chair/Desk
8. Sitting arrangements at Home: Floor/Chair/Desk
9. When was the caliper fitted?
10. Is the child using the caliper regularly?
11. Is the child able to walk independently with the help of caliper?
12. Is the school attendance regular?
13. Does the child go independently to school?
14. Does the child usually reach school in time?
15. Can the child squat with calipers on?
16. Can the child sit cross-legged with calipers on?
17. Does the child remove the caliper at school?
18. (a) Can the child wear the caliper independently?
   (b) Can the child operate the joint locks by itself?
19. (If applicable) Compared to the previous caliper is the present design of caliper more useful?
20. Does the child complain of pain or swelling of joints after the use of caliper?
21. Is there an overall improvement in the mobility and activity of the child, after fitting of calipers?
22. Are you prepared to make new calipers for your child after the present one wear off?
23. Is your child contented with the appliances?
24. Are you satisfied with your child's performance?