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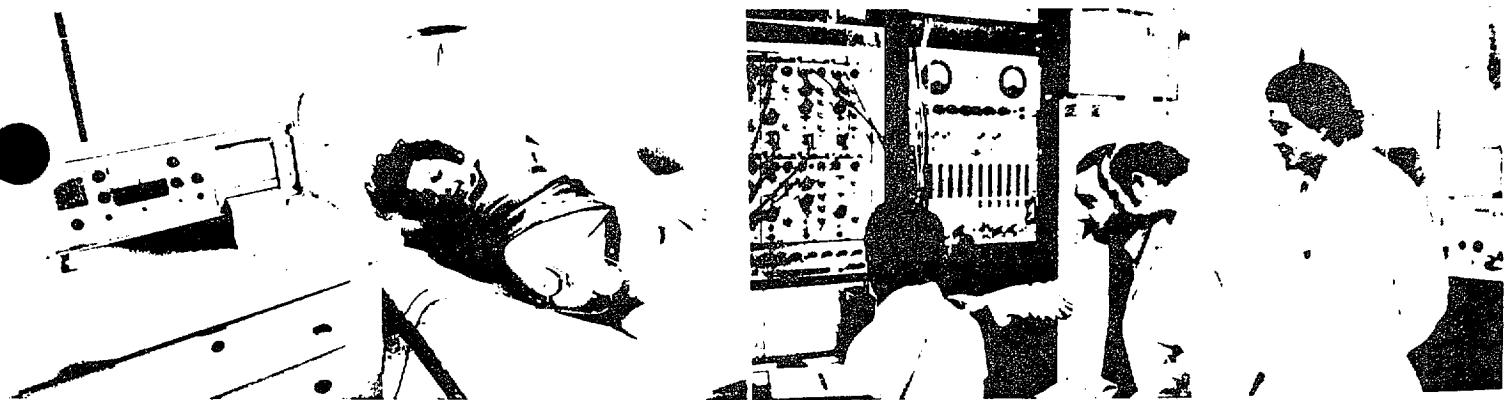
LATIN AMERICAN CENTER FOR PERINATOLOGY
AND HUMAN DEVELOPMENT (CLAP)

1970-1975

Centro Latinoamericano de Perinatología y Desarrollo Humano

C.L.A.P.

1970-1975



Report submitted by the Latin American Center for
Perinatology and Human Development (CLAP) to the 76th Meeting of the
Executive Committee of the Directing Council of the
Pan American Health Organization

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SECTION I

I. INTRODUCTION - (Historical Background)

CLAP was founded by PAHO in January 1970 under an agreement with the Government and the University of Uruguay. Originally a country project (URU-4101), two years later it became a regional project (AMRO-4920, now AMRO-1370).

CLAP was created to stimulate in the Region of the Americas the perinatal approach to maternal and child care which was emerging worldwide and proving to be effective in slowing down perinatal morbidity and mortality rates. The Servicio de Fisiología Obstétrica (SFO) (Obstetric Physiology Service) was chosen as CLAP headquarters, since it was already using the perinatological approach and had the following facilities:

(1) Specialists in perinatal medicine known throughout the Hemisphere for their work in research and teaching.

(2) The appropriate perinatology equipment resources, much of which had been designed and made at SFO, and other equipment obtained as a result of grants from the National Institutes of Health, the Ford Foundation, the Rockefeller Foundation and the Josiah Macy, Jr., Foundation.

(3) A physical plant of appropriate size and design, with good laboratories and adjoining clinical services.

(4) A library specialized in the branches of medicine which make up perinatology and a document center with more than 20,000 author and subject catalog entries.

(5) Abundant audiovisual teaching materials based on research carried out at SFO and other similar centers.

(6) Perinatal clinical materials which had been coded and filed since 1954.

(7) For the creation of CLAP, PAHO received a \$460,000 grant from the Ford Foundation which was to be made at a declining rate over a five-year period with the understanding that PAHO would increase its own contribution annually and meet CLAP's total budget by 1975.

The basic objectives of SFO, which had been founded by the Medical School in 1950, were original research and advanced teaching. When SFO was turned into CLAP, because of its nature as a multinational center new functions were added, including:

(a) Technical advisory services to countries of the Region in the organization of maternal and child services or perinatalogical services and courses given in the various countries on specific topics requested by the host government.

(b) A substantial increase in the proportion of training programs devoted to maternal and child public health care.

(c) The organization of operational research and cooperative projects with the active involvement of several Hemisphere maternity hospitals in order to spread correct clinical research methodology as well as knowledge generated by its research.

(d) The organization of training courses for paramedic personnel (midwives and obstetric and newborn nurses) in the field of maternal and child care.

CLAP was the first perinatology center created as such in the world. Since 1970, at least six perinatology centers have been in process of organization in Latin America (Caracas, Bahia, Lima, Mendoza, Mexico, Havana), using former CLAP fellows or CLAP's technical advisory services.

II. LONG-RANGE OBJECTIVES

CLAP's long-range objectives are to:

Help reduce morbidity and mortality rates, prevent the birth of low-weight children, children with drug-induced asphyxia or depression, or suffering birth trauma or infections acquired during the mother's pregnancy or at birth; and

Lower the incidence of somatic or neuropsychologic sequelae in the mother and her child, as well as disorders in the child's psychosomatic development. These may come about from malnutrition during gestation, antepartum or intrapartum hypoxia, birth trauma, fetal or newborn infections or other alterations during gestation, delivery or the newborn period.

III. SHORT-RANGE OBJECTIVES

The short-range objectives are to:

1. Upgrade primary prevention methods in maternal, fetal and newborn health care.

1.1 Improve methods for promoting maternal, fetal and newborn health.

1.2 Perfect methods for promoting fetal and newborn development.

1.3 Augment the effectiveness of methods for specific protection applicable to the preceding points.

1.4 Succeed in having each gestation begin at the appropriate time, according to the mother's condition (age, nutrition state, interval between pregnancies, health, predictable physical work during the gestational period, etc.), and also when it is desired by the couple involved.

1.5 Achieve normal full-term development, growth and intra-uterine maturation of the fetus.

1.6 Tend towards spontaneous onset, progress and termination of labor with the mother in a suitable position (seated or walking, and avoiding prolonged periods in a supine position). Expulsion of the fetus to take place in a position resembling squatting, with the obstetrician able to attend the delivery properly. Avoid the use of oxytocic, analgesic or anesthetic medications, or any others unless strictly indicated and absolutely necessary.

1.7 Achieve the birth of normal weight children who have good vitality, no traumatic injury or infections, free from asphyxia or depression because of analgesics, and whose potential for extra-uterine development and growth is intact.

1.8 Encourage an immediate, close and sustained psychosomatic and feeding relationship between the mother and the child; this releases the maternal instinct, facilitates breast-feeding, and demonstrates the mother's love and care, necessary for the optimum immediate- and long-range somatic and psychological development of the child.

1.9 Encourage the active, aware and informed involvement of the mother and father in all the aforementioned processes.

2. Create new methods for early diagnosis and treatment of maternal and fetal-newborn disorders in order to limit the damage resulting from them; this may be very important to the child inasmuch as neuropsychologic sequelae of great magnitude can easily be caused producing serious lifelong functional defects for the newly born baby.

3. Intensify any steps towards maternal and fetal-newborn rehabilitation which can be started during gestation, delivery or in the newborn-puerperal period. Better results are obtained when neonatal rehabilitation is begun early.

SECTION II

CLAP ACTIVITIES DURING ITS FIRST SIX YEARS (1970-1975)

IV. TRAINING (within CLAP)

This section will consider the development of human resources through the training courses held at the Center. Similar tasks undertaken outside CLAP headquarters are described under "Services to the Countries."

In compliance with the agreement under which CLAP was created, the Center has allocated a large part of its personnel and program to training Latin American fellows representing different levels of expertise (obstetricians, neonatologic pediatricians, young researchers, midwives and specialized nurses).

The training program consists of six regular courses, each with different goals and different periods of duration. Emphasis has been given in course content to information and training which is either not available or scarcely developed in Latin American countries. Three courses are organized entirely by the Center, while the others are part of cooperative programs with institutions in other countries of the Region.

In the six-year history of CLAP, 26 training courses have been given for 279 professionals.

Summarized information on CLAP's educational program and the countries of origin of fellowship holders who have attended the courses is found in Tables I and II.

A. Scientific Basis for the Integral Care of the Mother, the Fetus and the Newborn Child

Four courses, designed for young doctors with at least one year of specialization in obstetrics or pediatrics, have been held for 61 fellows, from Argentina, 12; Bolivia, 2; Brazil, 9; Colombia, 2; Chile, 3; Ecuador, 1; El Salvador, 1; Guatemala, 2; Nicaragua, 1; Mexico, 3; Panama, 1; Paraguay, 2; Peru, 2; Uruguay, 11; Venezuela, 5; Spain, 3; and Puerto Rico, 1.

The program is scheduled to last 12 months and has the following goals:

1. To train professionals to go out into medical care, teaching and original research in the field of maternal, fetal and neonatal medicine;
2. To develop the scientific side of the participants and accustom them to multidisciplinary teamwork.

3. To train the participants so that, by the end of the course, they can carry out the following tasks in their countries of origin:

3.1 Apply the knowledge they have acquired to improving the quality of perinatal care.

3.2 Train other professionals using active teaching methods and audio-visual materials similar to those employed in the course.

3.3 Undertake or direct original clinical or experimental research projects, applying scientific methodology in planning and implementation, analysis of results, and drawing of conclusions.

3.4 Draw up, review and evaluate standards of perinatal care employing objective criteria consistent with local needs and available resources.

3.5 Cooperate in the organization of perinatal services and maternal and child health care and preventive medicine programs.

The training methodology is intended to strengthen the scientific background of the participants by teaching them (1) the scientific foundations of medical knowledge concerning normal and high risk pregnancy and newborns and its importance in maternal and child health care; (2) scientific methodology, including biostatistics, experimental design, computation elements and application to clinical and experimental research, medical care and preventive medicine; (3) teaching methodology based on supervised practical execution of clinical, experimental and standardized tasks; and (4) the fundamentals of preventive medicine and public health as regards obstetric and newborn problems. Knowledge of environmental, social, economic and cultural factors as related to maternal and child health.

The course program is intended to bring the students up to date on advances in the perinatal field (physiology, physiopathology, biochemistry, genetics and pharmacology), and allow them to carry out clinical tasks with pregnant women in the high risk outpatient area and the wards of the maternity clinic. Specialized diagnosis during pregnancy and attention during labor and of the newborn from high risk gestations, using biochemical and electronic monitoring equipment. Care of normal newborn and puerperas, instruction in child care and encouragement of breast feeding in the rooming-in ward. Work in the growth and development unit, participation in somatic-psychoneurologic monitoring of high risk newborns. Bibliography review; preparation of seminars and audiovisual teaching materials; participation in planning of research projects, and cooperation in CLAP projects.

B. Advanced Tutorial Training in Research in Perinatal Medicine

This program, which last from 6 to 24 months, has been planned to train professionals in a broad field of perinatal medicine and provide advanced training in scientific and teaching methodology.

The objective of the course is to train a group of young physicians who can work as researchers in perinatology and act as project directors in their countries of origin. There is little available manpower of this type in Latin America. Participants are selected from applicants who have completed CLAP courses A or C (second part) and from among other candidates with a sound background in the field.

In compliance with program goals, fellowship holders cooperate from the outset with some of the Center's multidisciplinary research groups and assist in training programs and in CLAP's specialized courses. During their stay at the Center they are placed in charge of a research project, at the end of which they must present a monograph or thesis. All activities are carried out in collaboration and under the tutorial supervision of members of CLAP's permanent team of experts.

By late 1975, there had been 24 fellows in this program, from Argentina, 6; Brazil, 3; Colombia, 1; Ecuador, 1; El Salvador, 1; Honduras, 1; Mexico, 1; Paraguay, 1; Uruguay, 6; Canada, 2; and the United States of America, 1.

C. Perinatal Aspects of the Biology of Reproduction

This program is part of the Latin American course on the biology of reproduction, also known as the "Three Nations Course" because it is carried out in five centers located in Argentina, Chile and Uruguay. The course is made up of two successive stages:

First stage: Of six months duration, during which the fellows pass through the participating centers where they are informed on current developments in reproduction and on research in courses at each institution. In addition, they take part in practical demonstrations of new methodologies and new techniques which each center is using.

Four courses on the perinatal aspects of the biology of reproduction were held at CLAP, lasting from four to six weeks, with a total of 32 participants from Argentina, 13; Brazil, 3; Colombia, 2; Chile, 3; Ecuador, 1; El Salvador, 1; Mexico, 1; Paraguay, 1; Peru, 2; Dominican Republic, 1; Uruguay, 3; and Venezuela, 1.

Second stage: This last 18 months. To be admitted, the fellowship holders must submit a research project to the course's central committee. Eight fellows, from a group of 32, chose CLAP as the place to carry out their projects once they were approved. These young researchers came from Argentina, 3; Chile, 1; Colombia, 1; Ecuador, 1; El Salvador, 1; and Uruguay, 1.

During their stay at the Center, the fellows received complete technical and manpower support for their projects. The program's goal is to complete training in research on human reproduction.

D. Seminar on Recent Advances in the Biology of Reproduction:
Perinatal Aspects

This program is carried out in cooperation with centers in Argentina (ILAFIR) and Chile (CEBRE). Lasting six weeks, for one of which CLAP is responsible, the seminar is aimed at updating knowledge and teaching methods for medical school professors whose field is the biology of reproduction. Participants also witness demonstrations of modern research methodologies used at the participating centers. The purpose of the seminar is to increase participant interest in aspects of reproduction which are little developed in Latin America.

Subjects covered at CLAP were: perinatal risk, fetal distress, intensive care of the mother, the fetus and the newborn, and data processing aspects applicable to perinatology.

Five seminars were held under this program, with 97 participants from Argentina, 8; Brazil, 21; Colombia, 24; Costa Rica, 2; Chile, 3; Ecuador, 9; El Salvador, 2; Honduras, 4; Guatemala, 4; Nicaragua, 3; Panama, 2; Paraguay, 3; Peru, 8; and Venezuela, 4.

E. Seminar on Nursing and Obstetric Care in Maternal and Child Health Programs

This seminar, which is sponsored by PAHO, is for midwives and nurses working particularly in obstetrics or neonatology; it is carried out in cooperation with centers in Colombia and Chile. CLAP contributes one of the three program modules: "Nursing and Obstetric Care in High Risk Pregnancy, Labor and of Newborns."

The objectives of the stay at the Center are (1) to acquire current knowledge on high-risk pregnancies; (2) become acquainted with the indications, limitations and risks in biochemical and electronic monitoring now used in perinatal intensive care units; (3) underline the importance of multidisciplinary teamwork to improve results in perinatal care; (4) standardize nursing and obstetric care in handling normal deliveries and involvement in premature deliveries and premature newborns.

Two courses were given under this program with 37 seminar participants (25 midwives and 12 nurses) from Argentina, 1; Colombia, 5; Chile, 12; Ecuador, 7; Peru, 4; and Uruguay, 8.

F. Intensive Course in Perinatology. Electronic and Biochemical Monitoring

This program, introduced in 1975, is intended to provide rapid training for specialized professionals (in obstetrics or neonatology) in order to initiate or improve specialized diagnostic and perinatal intensive care units.

The course is for young professionals working in institutions which have such units or are about to set up this type of service.

The two-week course is based on actual practice and for this reason the number of participants is limited. The first time the course was given, 6 obstetricians and 3 neonatologic pediatricians from Argentina (5) and Chile (4) were trained.

G. Short-term Fellowships

Under this title are grouped requests received from institutions located in countries of the Region for qualified personnel to visit CLAP for a specific purpose. Generally, their stays are short, from one to four weeks, and involve the organization of services.

In each case, personnel from the Center prepared a schedule designed to cover the specific interest of the visitor. Eleven fellows visited the Center from Argentina, 2; Cuba, 3; Chile, 2; Guatemala, 1; Mexico, 2; and Venezuela, 1.

TABLE I

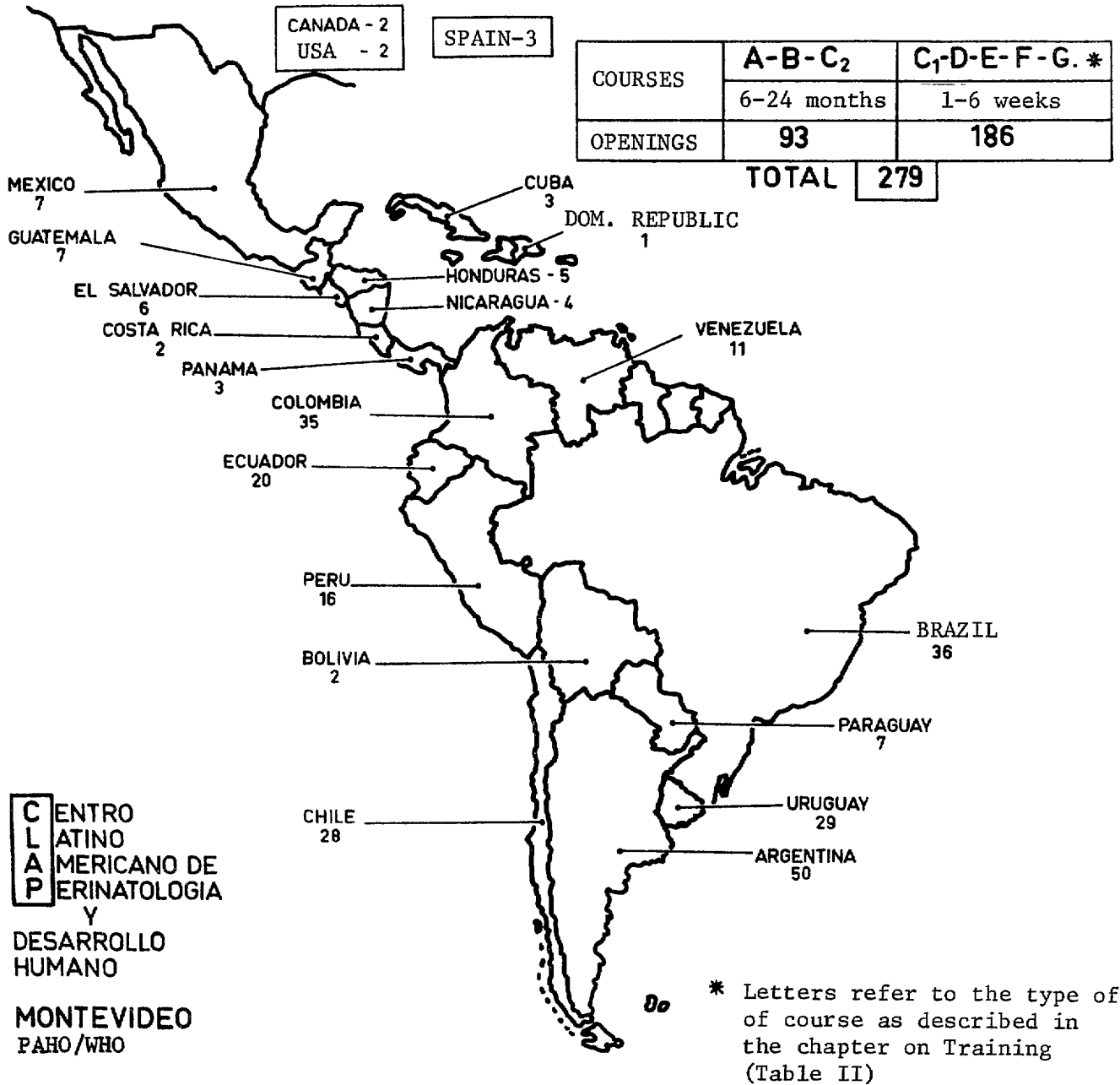
CLAP TRAINING ACTIVITIES
1 January 1970 - 31 December 1975

COURSE	LENGTH	PROFESSION	PURPOSE	NO. HELD	FELLOWS
A	12 mos.	Young obstetricians and neonatologic pediatricians	Perinatal care, teaching, research	4	61
B	6-24 mos.	Specialists in obstetrics and neonatology	Research in perinatology	6	24
C 1st. stage	4-6 mos.	Young researchers	Update in perinatology	4	32
C 2nd. stage	18 mos.	Young researchers	Research in perinatology and reproduction	4	8
D	1 wk.	Medical School teachers	Update knowledge, techniques and teaching methods in perinatology	5	97
E	3 wks.	Midwives and specialized nurses	Standardization of functions on the perinatal team	2	37
F	2 wks.	Obstetricians and neonatologists	Training for specialized diagnostic units and perinatal intensive care	1	9
G	1-4 wks.	Qualified personnel from health care institutions	Organization and implementation of perinatal services	Personal programs	11
				26	279

TABLE II
CLAP TRAINING ACTIVITIES. COUNTRY COVERAGE
1 January 1970 - 31 December 1975

COURSE	Argentina	Bolivia	Brazil	Colombia	Costa Rica	Cuba	Chile	Ecuador	El Salvador	Guatemala	Honduras	Nicaragua	Mexico	Panama	Paraguay	Peru	Dominican Republic	Uruguay	Venezuela	Canada	U.S.A.	Spain	TOTAL
A	A																						
12 mos.	12	2	9	2	-	-	3	1	1	2	-	1	3	1	2	2	-	11	5	-	1	3	61
B																							
6-24 mos.	6	-	3	1	-	-	-	1	1	-	1	-	1	-	1	-	-	6	-	2	1	-	24
C																							
Stage 1 4-6 wks.	13	-	3	2	-	-	3	1	1	-	-	-	1	-	1	2	1	3	1	-	-	-	32
C																							
Stage 2 18 mos.	3	-	-	1	-	-	1	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	8
D																							
1 week	8	-	21	24	2	-	3	9	2	4	4	3	-	2	3	8	-	-	4	-	-	-	97
E																							
3 weeks	1	-	-	5	-	-	12	7	-	-	-	-	-	-	-	4	-	8	-	-	-	-	37
F																							
2 weeks	5	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
G																							
Short Fellow- ships	2	-	-	-	-	3	2	-	-	1	-	-	2	-	-	-	-	-	1	-	-	-	11
TOTALS	50	2	36	35	2	3	28	20	6	7	5	4	7	3	7	16	1	29	11	2	2	3	279

TRAINING ACTIVITIES AT CLAP, 1970-1975
COUNTRY COVERAGE



MAP 1

V. RESEARCH CONDUCTED (1970-1975)

Only the principal research conducted by CLAP is covered in this chapter.

I. GENERAL CONCEPTS

1. Applicability of Knowledge Generated by CLAP Research Projects in Surroundings where there are few Manpower or Equipment Resources

CLAP has been concerned with determining the basic physiopathological dynamics of many perinatal processes and has developed original research methods which frequently require complex equipment and well-trained personnel.

At the same time, CLAP has been concerned with translating newly-acquired knowledge into simple, clear language easily accessible to paramedic personnel (auxiliaries, midwives). It has also devised simple methods making it possible to apply this new knowledge with a minimum of equipment or even none at all. Such simplification recognizes the absence of well-trained personnel and of complex, expensive equipment in a large part of the Region of the Americas.

2. Simplification of Obstetric-Newborn Care

It is worth noting that several of CLAP's research studies show that many of the medications and techniques routinely used in childbirth and newborn care are unnecessary (and potentially dangerous), especially when conditions are normal. This fact provides a scientific base for simplifying standards of perinatal care and lowering its cost.

II. GROWTH AND MATURATION OF THE FETUS AND NEWBORN

1. Establishment of the Local Growth Curve

1.1 For the intra-uterine fetus. Weight at birth and measurements of length and cephalic perimeter were taken of 1,805 consecutive newly born infants, whose gestation had been normal. The three variables rise continuously from the 33rd to the 43rd week of amenorrhea, and coincide with the curves obtained in the developed countries, even though absolute weight figures were slightly lower.

1.2 For normal, premature and low-weight newborns. This study involves a 24-month monitoring of growth parameters (weight, length and cranial perimeter) as compared with development parameters (neurological examination, age of passage, and evolution of the ducts).

Results worth noting are (a) local curves of postnatal growth; (b) growth rate patterns, which make it easier to detect disorders than absolute figures do; (c) at 24 months, children who are premature and low weight at birth are no different from the normal controls.

2. Design of Simple Techniques for Estimating Fetal and Newborn Maturation

2.1 For the intra-uterine fetus (by composition of the amniotic fluid). The gestation age was correlated with the percentage of lipid-containing cells in the amniotic fluid, with the concentration of bilirubin, creatine, proteins, glucose, electrolytes, pO_2 and pH.

A simple technique was developed at CLAP which, by combining two easily measurable elements (lipid-containing cells and bilirubin), greatly reduces error in estimating gestational age. (*) (**)

2.2 For the newborn. This is based on the Dubowitz method which uses 10 neurologic and 11 somatic parameters and is therefore complicated to carry out. At CLAP, using the multiple regression technique, the six most important parameters (four somatic and two neurologic) in the Dubowitz method were found. Despite its simplicity, the margin of error in the CLAP technique is no greater than Dubowitz, and it has therefore been adopted by many maternity hospitals in Latin America. It is of interest in a region where over 20 per cent of the women do not know their gestational age.

III. CHRONIC FETAL DISTRESS (High Risk Pregnancy)

A study was made of the pathogenesis and physiopathology of chronic fetal distress with emphasis on fetal undernutrition and the principal methods of prophylaxis and treatment.

Several techniques were used to evaluate the health of the fetus during gestation when chronic fetal distress is suspected.

(*) Tamm-Horsfall urinary glycoprotein was present in abnormal amniotic fluid which concurs with the presence of fetal urine in the composition of the amniotic fluid.

(**) The fetal heart rate gradually decreases from the 12th week (170 beats/min.) to the end of the gestational period (140 beats/min.) because of the increase in vagal tone as the fetus matures; this is why the accelerating effect of atropine on the fetal heart rate speeds up with gestational age.

1. Test of Fetal Tolerance to Uterine Contractions Induced by Oxytocin

This test, developed at CLAP, is based on the abnormal response of the fetal heart rate to contractions when fetal vitality is in jeopardy in high-risk gestations. The reliability of the test has led to its routine use throughout the Hemisphere and in Europe, where it is called the "oxytocin challenge test."

2. Transfer Test using Sodium Para-aminohippurate

It was learned that when the increment in the amniotic fluid of para-aminohippurate (PAH) administered i/v to the mother was slow, there was an increase in (1) perinatal mortality, (2) immediate neonatal depression, and (3) the proportion of neurologic abnormalities detected in the examination performed 72 hours after birth.

3. Urinary Estriol Excretion

Using Oakey's colorimetric technique, CLAP obtained the normal curve for normal gestations. In a group of high-risk pregnancies, no relationship was found between the daily amount of estriol excretion and fetal-neonate health.

4. Plasmatic Concentration of Chorionic Somatomammotropin Hormone (HCS)

A technique was developed to measure HCS in plasma or amniotic fluid. The standard curve for normal gestations was determined. Concentrations which were significantly lower than the norm were detected in a gestational group composed of newborns whose weight was low for their gestational age. In a series of pregnant diabetics (which included several cases of fetal distress), HCS concentration was always within normal limits (false negative).

5. Factors Affecting Perinatal Morbidity and Mortality in Diabetics

Even though the ratio of diabetic patients is low (between 0.5 and 3 per cent of total pregnancies), perinatal mortality is very high, several times that of the general population. Through the analysis of 200 diabetic patients at CLAP, certain factors were identified which increase the risk of fetal and/or newborn death.

The results formed the basis for the integral standardization of care (pregnancy, labor, puerperium and newborn) using a team approach. In general, there is a better control of metabolism and a tendency to succeed in delaying interruption of pregnancy until term. This represents a radical departure from normal practice found in Latin America and is based on the possibility of being able to judge the degree of maturation of the fetus and evaluate intrauterine fetal condition. It was learned that the higher the concentration of glucose in the amniotic fluid, the more depressed the newborn infant.

The noniatrogenic interruption of gestation before term avoids the risks involved in prematurity without causing a rise in fetal deaths in patients whose metabolism is well monitored. The application of this type of care has made better development of the newborns possible, and perinatal deaths have been cut by one-third.

IV. UTERINE CONTRACTIONS DURING LABOR

1. Contractility Patterns in Normal Labor (without drugs)

Using techniques developed at CLAP (continuous monitoring of intra-uterine pressure), normal patterns of uterine contractility during labor were established. Simple clinical techniques were arrived at which make it possible to assess uterine contractility by means of mere abdominal palpation and a watch with a second hand.

2. Factors which may Alter Contractility

The contractility of the uterus during labor is not changed significantly by any of the following:

a. Artificial rupturing of the membranes performed through the cervix (amniotomy).

b. Perforating the amniotic cavity through the abdominal wall (amniocentesis).

c. Epidural or rachidial anesthetic block.

The intramyometrial injection of procaine (during local anesthesia of the abdominal wall) has a noticeable effect in stimulating uterine contraction.

3. Factors Affecting Uterine Response to Oxytocin

Uterine response to oxytocin was not affected by parity or post-term pregnancy. It was higher than normal in gravidas with opisthotonos fetalis. It did not vary where gestation age was 35 weeks or more. Of more than 300 gravidas which were studied, only two had very low response, for some unknown reason, and required very high doses to produce labor contractions.

4. Betamimetic Pharmacons as Uterine Contractility Inhibitors

Quantitative studies were made of the cardiovascular and uterine inhibitory effects of several betamimetic drugs. Alupent (Orciprenaline) and Birotec take effect quickly and end quickly; they were used successfully for speedy inhibition of contractions and delivery in cases of severe fetal distress.

Effortil (ethyl adrianol) takes effect more slowly but lasts much longer, and was therefore used to detain premature labor when the purpose was to inhibit uterine contractions over a prolonged period. Working pregnant women who tended to go into premature labor and who were treated with Effortil had a longer gestation (40 days more, Fig. 1) and the newborn weighed 650 gr. more (Fig. 2) than the control group receiving regular clinical treatment. This research is part of the scientific basis for a future cooperative program, to be coordinated by CLAP in which Latin American maternity hospitals will join together to standardize early diagnosis and treatment for the control of premature delivery.

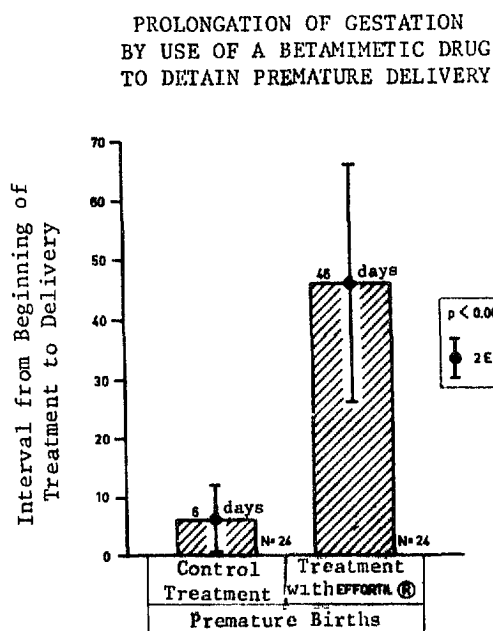


FIGURE 1

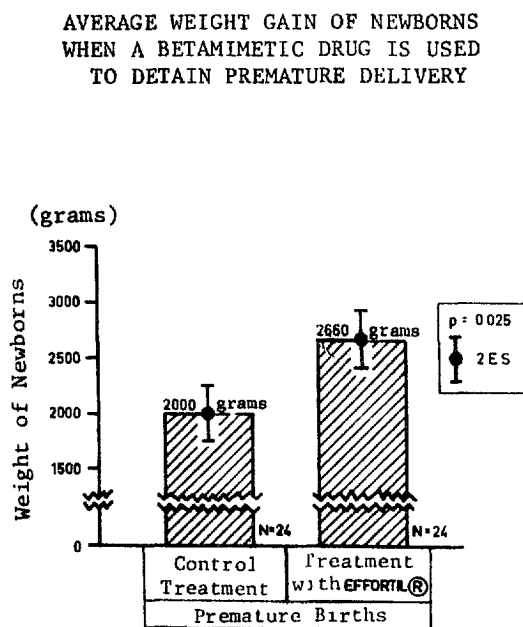


FIGURE 2

Effortil has an opposite effect on the uterus in the puerperium, in which case contractions are stimulated; it is used to treat puerperal hemorrhages caused by hypotonia of the uterus. Effortil also acts as a stimulant to the nonpregnant uterus, whereas other betamimetics act to inhibit contractions.

V. DANGERS TO THE FETUS FROM INDUCTION OF LABOR

1. Elective Induction

At the present time there is over-emphasis on elective induction of labor on a pre-arranged date (in some maternity hospitals, over 35% of deliveries are induced). The main reason is the physician's convenience. CLAP has shown that elective induction may involve a risk for the fetus; it was learned that half the uterine contractions produced type I dips, whereas in spontaneous onset of labor type I dips occurred only in one out of five contractions (Fig. 3).

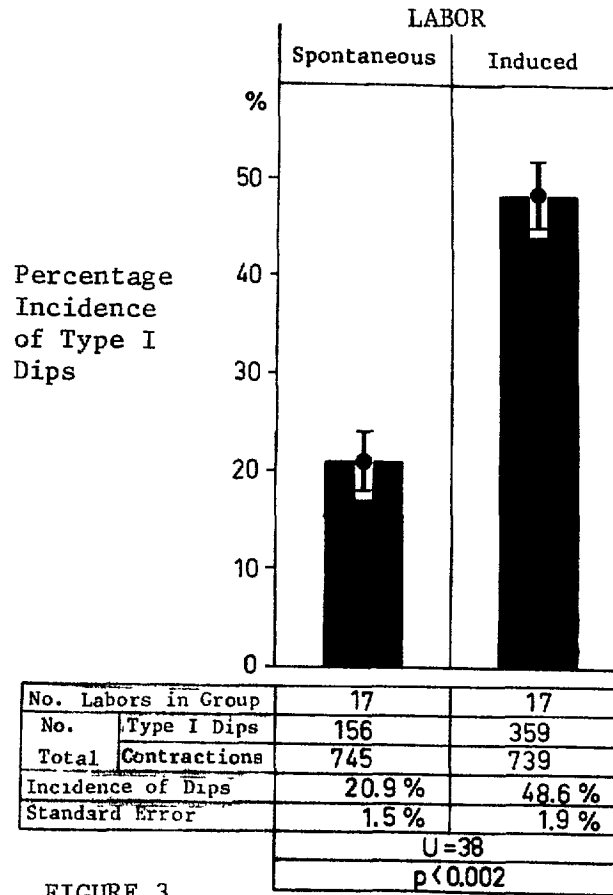


FIGURE 3

Figure 3. The percentage of uterine contractions producing type I dips is significantly higher in labor induced with infusion of oxytocin than in labor in which onset and evolution are spontaneous.

A type I dip is a drop in the fetal heart rate which occurs synchronically with the contraction of the uterus (Fig. 6); it indicates that the head of the fetus is being compressed and deformed (Fig. 5) during the contraction which may cause alterations in the fetal EEG, encephalic injury and neurologic sequelae for the child.

When labor begins spontaneously, the birth canal is already softened and ready for easy distension; it therefore offers slight resistance to the head of the fetus, which acts as a wedge and aids dilation. This softening cannot have been fully accomplished at the time elective induction takes place.

Because of these results it is recommended that labor not be induced except for justified reasons.

2. Proper Dose

When induction of labor is indicated, it is well to administer the lowest dose of oxytocin and cause the least necessary stimulation of the uterus for labor to progress; in this way, the newborns are in better condition than when the dose of oxytocin is increased to speed up delivery.

VI. ROLE OF THE OVULAR MEMBRANES IN PROTECTING THE FETAL HEAD DURING LABOR

In the 1930s, artificial early rupture of the membranes was introduced into obstetric practice as a routine technique to shorten the duration of labor in normal childbirth cases. Research undertaken and coordinated by CLAP indicates this technique is harmful to the fetus because it eliminates the protective role of the membranes.

1. Cooperative Research Among 22 Maternity Hospitals Located in 11 Countries of Latin America

In 1971 CLAP began a cooperative multinational study involving 22 maternity hospitals from 11 Latin American countries and 1,413 precoded clinical protocols which the clinics contributed to the project. The data were processed at CLAP and published in 1975. Results indicate that rupture of membranes encourages compression and deformation of the fetal head (Fig. 5), and that the earlier the membranes are ruptured the greater the injury caused to the head, as shown by the higher incidence of serosanguineous bags of water (Fig. 4). Misalignment of the cranial bones is also greater when the membranes rupture early in labor. Labor is shortened by early amniotomy, perhaps because the unsheltered head acts as a better wedge to dilate the cervix than the intact bag of waters. Labor is speeded up at the cost of greater trauma to the fetal head.

2. Intensive Study of Childbirth Using Biochemical and Electronic Monitoring

This study was backed up by a study conducted at CLAP which monitored normal deliveries. When the membranes were artificially ruptured, the incidence of type I dips was significantly higher than when the membranes remained intact until the end of labor. These results have been confirmed in Mexico and Europe. (The type I dip is a sign of compression and deformation of the fetal head.)

The pH value of the fetal blood at birth was higher in the group in which the membranes remained intact than in the opposite group, indicating that the newborns are healthier when the membranes are not artificially ruptured. CLAP therefore does not advise amniotomy as a routine technique in normal deliveries.

The number of type I dips, once the membranes have been ruptured, increases as labor progresses, as the uterine contractions intensify, and with efforts to bear down.

Compression of the umbilical cord and umbilical vessel occlusion, also stimulated by artificial rupturing of the amniotic sac, may contribute to type I dips. Fig. 6 shows how artificial rupturing of the membranes encourages type I dips.

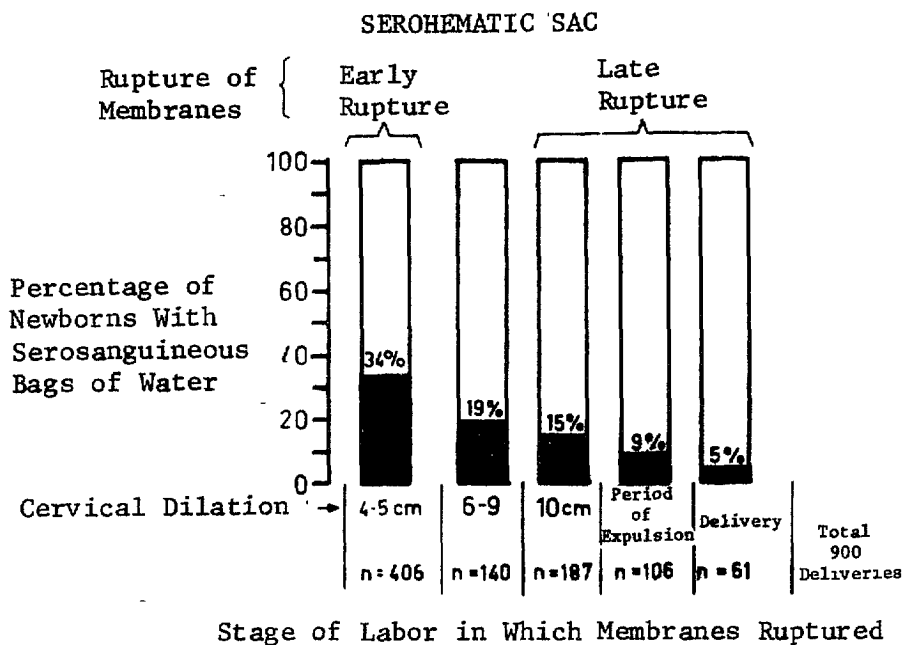


Figure 4. The proportion of newborns with serohematic sac at the head decreases as rupture of ovular membranes during labor is delayed.

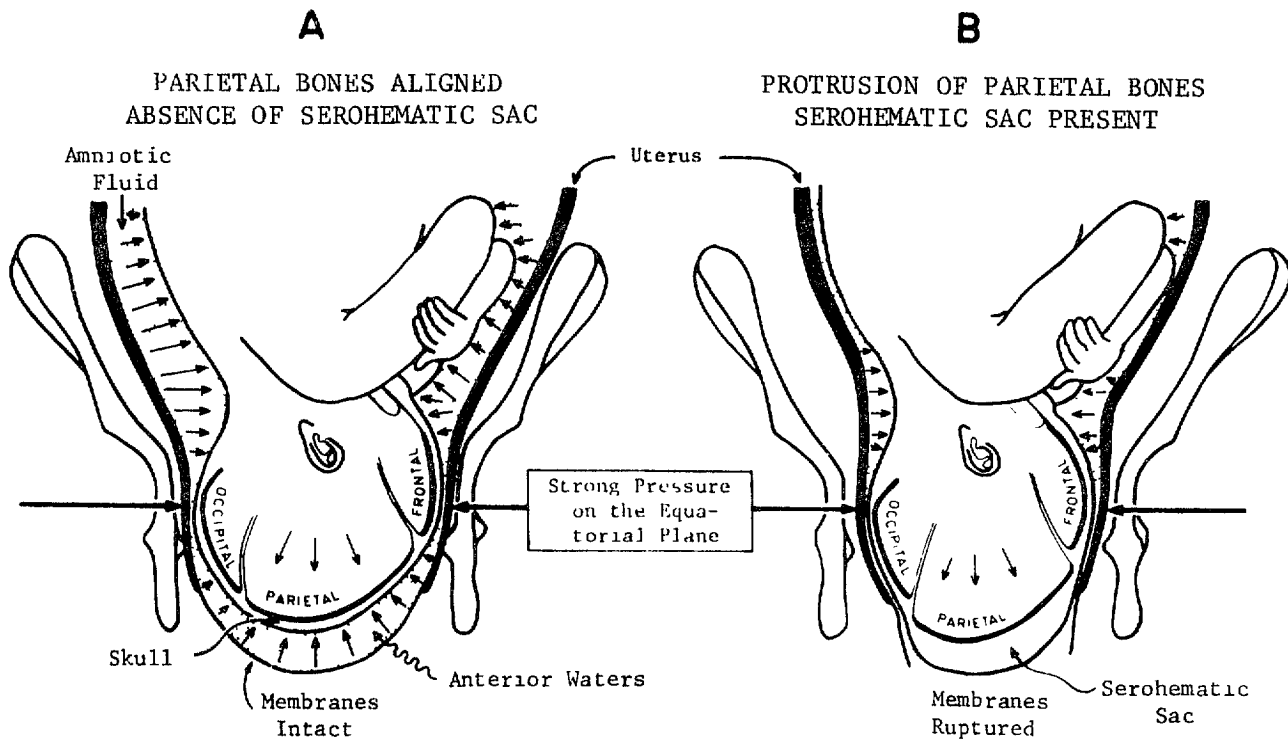


Figure 5. Schematic representation of the system of forces and pressures which produces the serohematic sac and protrusion of parietal bones when membranes have been ruptured. The arrows indicate pressures exerted during uterine contraction.

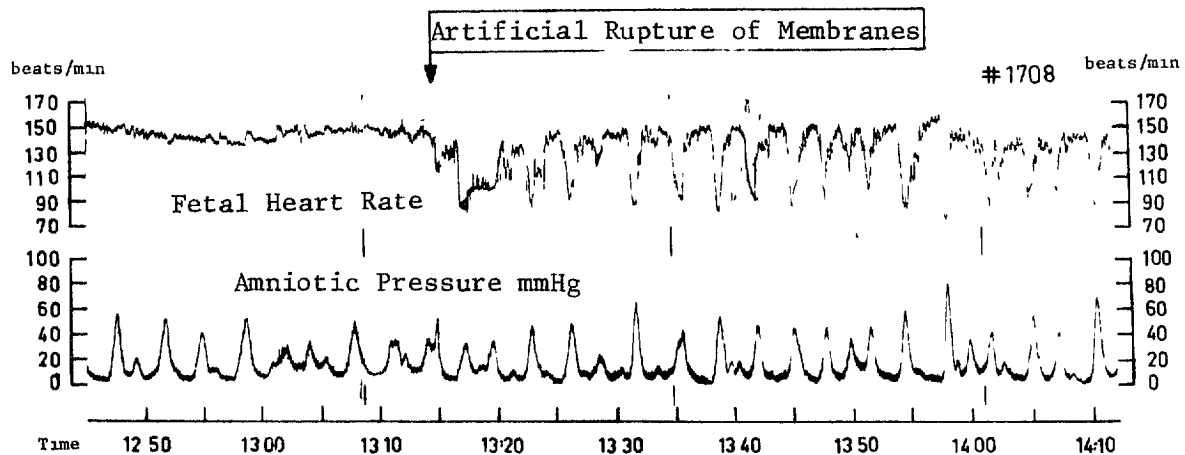


Figure 6. With bag of waters intact, uterine contractions (lower part of the figure) fail to alter the fetal heart rate. After artificial rupturing of the bag of waters, each contraction causes a type I dip (synchronous drop in the heart rate vis-a-vis the contraction). The umbilical cord was wrapped around the fetus' neck once.

VII. ACUTE INTRAPARTUM FETAL DISTRESS AND ITS REPERCUSSION ON THE NEWBORN AND INFANT

1. Causes

Intrapartum fetal distress is brought about by a severe drop in metabolic exchanges between the mother and the fetus, which in turn is set off by the contractions of the uterus and a diminished flow of maternal blood through the placenta (and sometimes of fetal blood when the umbilical cord is compressed). Many of the numerous causes behind fetal distress can be traced to medical intervention to speed up labor. One result is fetal asphyxia, which may damage the nervous system (see below) and even cause death of the fetus or newborn.

2. Symptoms

Intrapartum fetal distress is characterized from its onset by type II dips in the fetal heart rate, i.e., a fall in the heart rate after each contraction. This sign of fetal distress, which was discovered by the use of recorders, can be recognized by trained nursing personnel using a stethoscope and a watch. Other signs are hypoxia, hypercapnia and fetal acidosis. Through a combined examination of these symptoms, the condition of the fetus can be determined and managed treatment begun (inhibition of contractions), administration of O_2 to the mother, intravenous hypertonic glucose, injection of base substances into the amniotic fluid.

Experiments conducted with pregnant sheep have made it possible to learn the physiopathologic dynamics of acute fetal distress and the inter-relationship between hypoxia, acidosis and the drop in heart rate (type II dips and dips caused by umbilical occlusion).

3. Neurologic Injury

By monitoring future development of the children, acute fetal distress was tied to neonatal depression, abnormalities in the 72-hour neurologic examination, including aspiratory trouble, EEG results, and to convulsions.

On the other hand, no correlation was found with the Bender visual-motor gestalt test or with motor perceptive maturation (Gessell test).

VIII. COMPARISONS BETWEEN FETUS AND NEWBORN

1. pO_2 , pCO_2 , pH and Base Deficit

In comparison with values before birth, there was a noticeably sharp rise in pO_2 values in normal vigorous newborns, and a progressive rise in the pH blood value as a result of a drop in pCO_2 and base deficit.

2. Heart Rate

The heart rate of a normal newborn is 30 beats/min. higher than the intra-uterine fetal heart rate. The newborn who had gone through severe intra-uterine fetal distress had a significantly faster heart rate than the newborn in whom fetal distress had been absent. The first symptom recorded in newborns who developed respiratory distress syndrome was a gradually faster heart rate which became sharper and more persistent as the gravity of respiratory distress grew.

3. Hematocrit (Influence of Timing in Tying the Cord)

When tying of the umbilical cord was delayed (until five minutes of life), hematocrit was significantly higher than when the cord was clamped early (immediately after birth), thus confirming flow of blood from the placenta to the newborn. The difference discovered continues beyond 60 days of life.

IX. MISCELLANEOUS

1. Biology of the chorionic somatomammotropin hormone (HCS) (a project funded by a gift from the Population Council)

A study was made of the chemical structure and biological activity of HCS, especially its lactogenic effects on the thymo-lymphatic system and on tolerance to skin grafts.

2. New human placental gonadotropin (a project funded by a gift from PLAMIRH)

A protein-type substance with gonadotrophic activity, immunologically different from HCG, was isolated in the human placenta. Its properties and action are now being studied.

3. Biology of oxytocin (a project funded by a gift from the Population Council)

A bioassay method was developed and perfected for the measurement of physiologic concentrations of oxytocin.

This method, using a strip of mouse mammary gland on glass, is now employed universally because of its great sensitivity and specificity.

It demonstrated degradation of oxytocin by the human placenta and the myometrium. Release of oxytocin during aspiration and labor was found in a woman with "incipient diabetes" who did not segregate vasopressin, which indicates the two hormones are unrelated in synthesis and release.

The function of the neurohypophyseal hormones during gestation and their biochemistry were updated for chapters to be included in monograph books.

4. The ovary and its contractility (a project funded with a gift from WHO through ILAFIR)

On strips of rat ovary on glass, deamino-oxytocin augmented the length and tone of ovarian contractions. These contractions may play a part in ovulation.

5. Epididymal contractility (a project funded by a grant from WHO through ILAFIR)

The contractility of the cauda epididymidis in a rat was shown to increase markedly under the action of physiological doses of adrenalin and noradrenalin. This is impeded by alfa blockers but not by beta blockers. The results indicate that alfa-adrenergic receptors would be mainly responsible for contractile stimulation of the cauda epididymidis and therefore its involvement in ejaculation.

Oxytocin and vasopressin, as well as aceticholine, also had a stimulating effect, albeit not so strong as the alfa-adrenergic compounds. Histamine was a weaker stimulant to spontaneous contraction.

VI. SERVICES PROVIDED TO THE COUNTRIES OF THE REGION

Under the agreement by which the Center was founded, CLAP provides technical advisory services to those institutions in the countries of the Region which officially request them.

The Center has been especially diligent in meeting these requests to the maximum extent of its budgetary and technical resources.

Although the Center has been given widely diverse tasks, its activities can be classified as follows:

Activity I. Consultation on organization: technical advice sought on the organization of perinatal services to establish standards for the care of the mother, fetus and newborn, or to program and implement local or cooperative research projects in the field of perinatology.

Activity II. Intensive courses: technical support for the training of local personnel in handling high risk pregnancies and techniques of maternal, fetal and newborn monitoring, under a team of CLAP instructors and occasional involvement of former fellows trained at the Center.

The program includes practical demonstrations and lasts 40 or more hours.

Activity III. Up-date courses: technical support in the form of a theoretical program which varies in length and is carried out by a team of CLAP instructors possibly joined by local experts (especially former fellows of the Center).

Other Activities: Many institutions have requested CLAP to provide experts for lectures, round table discussions, seminars, symposiums, etc., in national meetings and congresses on perinatology, pediatrics, obstetrics, gynecology, endocrinology, sterility, etc. These activities are covered in the chapter on dissemination.

In its six years of existence, CLAP has provided 36 advisory services under Activity I, 16 under Activity II, and 25 under Activity III, using experts from the Center who traveled to the countries making the requests. Some activities were combined in a single trip, with stops arranged in several countries to keep down travel costs.

Below is a breakdown of tasks performed by Center experts, covering each of the activities mentioned above.

Activity I. Advisory Services on Organization

Thirty-six advisory services were provided in 13 countries: Argentina, 7; Brazil, 7; Colombia, 2; Costa Rica, 2; Cuba, 5; Ecuador, 2; Honduras, 1; Mexico, 3; Paraguay, 1; Peru, 3; Dominican Republic, 1; Uruguay, 1; and Venezuela, 1, for a total of 466 consultant man-days (Table I).

These advisory services included CLAP assistance in setting up an obstetric physiology laboratory in Buenos Aires, a human reproduction institute in Asunción, and nine centers of perinatal medicine in Argentina, 1; Brazil, 2; Costa Rica, 1; Cuba, 1; Honduras, 1; Mexico, 1; Peru, 1; and Venezuela 1.

Advisory services were provided on standardization of obstetric and newborn high-risk care to institutions in Uruguay, Ecuador, Cuba, Mexico and Brazil; the design and evaluation of a uniform codified perinatal clinical history for use in all maternity clinics run by the Ministry of Public Health of Argentina. This clinical history procedure will also be adopted by official institutions in Honduras.

Support was given to local research in perinatology in Argentina, Brazil and Peru, and arrangements were made with centers in Argentina, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Honduras and Venezuela to cooperate in three Latin American cooperative research programs, one concluded and two in process.

The Ministry of Public Health in Colombia requested CLAP's advisory services to organize institutional perinatology services and their inclusion as part of the National Health Plan. CLAP experts will work on that in 1976.

TABLE I
Advisory Services on Organization

Country	No. of Advisory Services	Consultant Man/Days
Argentina	7	62
Brazil	7	72
Colombia	2	8
Costa Rica	2	8
Cuba	5	48
Dominican Republic	1	6
Ecuador	2	96
Honduras	1	6
Mexico	3	15
Paraguay	1	70
Peru	3	31
Uruguay	1	7
Venezuela	1	7
COUNTRIES: 13	ADVISORY SERVICES: 36	CONSULTANT MAN/DAYS: 436

Activity II. Intensive Courses

CLAP was asked to undertake this activity by regional institutions which now or shortly will have highly complex care facilities and have requested the Center to provide accelerated training for technical personnel needed in the care of high-risk pregnant women and newborns.

Local needs have been taken into account in these programs and national experts (former fellows of CLAP) have been included on the teaching teams.

Between 1970 and 1976, CLAP experts held 16 combined theoretical-practice courses in perinatology in five countries (Argentina, 2; Brazil, 6; Ecuador, 4; Peru, 2; and Uruguay, 2, totaling 308 consultant man-days (Table II).

TABLE II
Intensive Courses in Perinatology

Country	No. of Intensive Courses	Consultant Man-days
Argentina	2	48
Brazil	6	102
Ecuador	4	88
Peru	2	26
Uruguay	2	44
COUNTRIES: 5	COURSES: 16	CONSULTANT MAN-DAYS: 308

Activity III. Theoretical Courses

This activity was requested and met by CLAP experts in order to make current knowledge available and rapidly disseminate new techniques and procedures for improved care of high-risk maternal, fetal and newborn cases. The explanations, attuned to local needs, emphasize organizational aspects of services, the importance of prenatal control and detection of high-risk conditioning factors in the mother and child, the advantages of rooming-in, and the need to promote adequate breast feeding.

CLAP sponsored 25 courses for different types of health professionals in 10 requesting countries, and spent 182 consultant man-days on this activity (Table III).

TABLE III
Theoretical Courses

Country	No. of Courses	Consultant Man-Days
Argentina	5	28
Brazil	6	78
Canada	1	3
Bolivia	1	14
Colombia	1	5
Paraguay	1	3
Peru	1	10
United States of America	3	14
Chile	3	14
Mexico	3	13
COUNTRIES: 10	COURSE: 25	CONSULTANT MAN-DAYS: 182

VII. DISSEMINATION OF INFORMATION IN THE REGION

CLAP has been a pioneer center in perinatology in Latin America and continues to generate ideas, manage projects and disseminate knowledge in this discipline. It has used several channels as means for updating and spreading knowledge, methods and techniques to the various parts of the Region, such as:

1. The training of young professionals selected by their countries to attend CLAP courses (see Training).
2. Combined theoretical-practice courses and update courses given in the various countries by CLAP experts at the formers' request (see Services Provided to the Countries).
3. Latin American cooperative research, coordinated by CLAP and in which professionals from several countries' institutions are involved (see Latin American Cooperative Research on Effects of Rupture of the Ovular Membranes).
4. Involvement of its team of experts in scientific events in countries of the Region and other countries (congresses, symposiums, meetings, lectures, etc).
5. Distribution of CLAP publications and the services of the CLAP library.
6. International Seminars

Training and cooperative research as a means of disseminating information are discussed in various chapters of this report. Particular attention will be given here to the other means of dissemination mentioned.

I. Involvement in Scientific Events

Several institutions in countries of the Region request CLAP and its team of experts to assist in discussing the perinatal approach at congresses and scientific meetings in Latin America on obstetrics, gynecology, sterility, endocrinology, pediatrics and perinatology. CLAP has been especially receptive to this type of activity as an appropriate, low-cost means of spreading knowledge and providing motivation to other countries, given the large number of professionals, ranging from the very young to the highest level university and practicing professionals, who attend such events. The countries interested in CLAP cooperation of this kind have been very appreciative and requests for it surpass CLAP's ability to meet them.

By special invitation CLAP has also participated in this type of activity outside the Region.

Tables I and II spell out in detail CLAP participation in and beyond the Region in lectures and round tables, seminars, symposiums, congresses, and in courses organized by other institutions. Table III shows activities carried out, by requesting country.

Within the Region, CLAP personnel addressed and participated in 208 conferences and round tables, 20 seminars, 18 symposiums, 58 congresses and 13 country courses. Many of the papers presented by CLAP have been published in congress documents.

Whenever possible, a selected bibliography, abstracts, theses and monographs published by CLAP were distributed to university professors and services for local libraries, and, when possible, material was also given to interested professionals at the meetings mentioned.

Outside the Hemisphere, particularly in Europe, Center representatives gave 19 lectures in eight countries, and took part in two symposiums, one seminar and six congresses.

Distribution of Publications

Most of the Center's research is published in widely circulated Spanish and English language professional journals. From 500 to 1,000 abstracts from each publication are distributed by CLAP directly to libraries, medical schools, centers where care is given, and institutions or professionals who request them.

The Center also has particular experience in preparing chapters for student texts or books for general practitioners, as well as those geared to the specialist.

CLAP also has a small graphics department for printing monographs, theses, care standards, and scientific tracts produced by the Center or translated from other sources; some 300 to 500 copies of each of these have been distributed in Latin America free of charge.

The Center has a specialized library in perinatology and human reproduction, with large holdings of volumes and abstracts, and an original filing system for articles which is in the process of automation.

By request, CLAP sends institutions copies of these materials and bibliographies. In this way it works directly with the Regional Library of Medicine (BIREME).

TABLE I

Information Activities in the Americas

	Number	Countries
Lectures and Round Tables	208	17
Seminars	20	8
Symposiums	18	6
Participation in Country Courses	13	6
Congresses	58	18
Activities: 317		

TABLE II

Information Activities Outside the Americas

	Number	Countries
Lectures and Round Tables	19	8
Seminars	1	1
Symposiums	2	2
Congresses	6	4
Activities: 28		

Information Activities in the Americas

Perinatal High Risk Seminar

At the suggestion of CLAP and under the sponsorship of PAHO, a Seminar on High Perinatal Risk was held in Montevideo from 24 to 28 July 1972. Three consultants, aided by personnel from the Center, specified the purposes of the meeting:

- a. Preparation of a cooperative research project on perinatal risk.
- b. Motivation of participants to promote a scientific and multidisciplinary approach to perinatal problems.

A background document drawn up by CLAP with a detailed up-to-date bibliography (470 pages) was distributed to representatives of the Latin American institutions present.

Seventy participants from 13 countries of the Americas meeting in multidisciplinary working groups (30 obstetricians, 16 pediatricians, 9 health care specialists, 1 anatomopathologist, 2 statisticians, and 12 perinatologists) attended the seminar.

Nine PAHO consultants were present, with Prof. Neville Butler of England acting as Special Adviser. CLAP personnel and fellows attended the sessions, took part in the working groups, and coordinated the mechanics of the seminar.

The working group prepared a final report containing an exposition of objectives and recommendations, among which was emphasized the importance of the subject and of its dissemination, and the need for improved reliability in the vital statistics pertaining to Latin America.

Although the feasibility of the research remained pending obtention of necessary funding, interest in the topic was promoted. Institutions from Chile, Peru, Mexico, Argentina, Uruguay, etc., as a reflection of their concern, began research on high risk, and improved clinical documentation to include a record of perinatal statistics. Argentina designed a uniform perinatal clinical history form for use there.

Information Activities in the Americas

	Lectures and Round Tables	Seminars	Symposiums	Country Courses	Congresses	Total per Country
Argentina	44	9	5	4	9	71
Bolivia	3	-	-	-	1	4
Brazil	45	1	4	1	13	64
Colombia	3	-	-	1	2	6
Costa Rica	5	-	-	-	3	8
Cuba	6	1	-	-	-	7
Chile	9	-	2	-	4	15
Ecuador	4	-	1	-	1	6
El Salvador	5	-	-	-	1	6
United States of America	22	2	5	-	2	31
Guatemala	6	1	-	-	2	9
Honduras	3	-	-	-	1	4
Mexico	20	1	1	4	7	33
Panama	2	-	-	-	1	3
Peru	3	2	-	-	3	8
Uruguay	23	1*	-	2	4	30
Venezuela	5	-	-	-	2	7
Paraguay	-	3	-	-	1	4
Canada	-	-	1	1	-	-
TOTAL	208	21	19	13	57	316

*The Seminar held in Uruguay on "Factors which increase perinatal risk in Latin America" will be dealt with separately.

SECTION III

ACTIVITIES PLANNED FOR THE NEXT THREE YEARS, 1976-1978

VIII. TRAINING

1. Introduction: Justification for changes with respect to the earlier period

CLAP has evidence that the distance between scientific knowledge in the area of perinatal medicine and the application of that knowledge to benefit the population of Latin America is becoming greater each year. In addition, the technology explosion in the field of control of the fetus during pregnancy and labor, and the care of the unhealthy newborn infant, is leading to a significant imbalance between equipment available in the industrialized countries and what can be acquired in Latin America. What is more, within this Region poor use is being made of the little equipment available because of the absence of properly trained manpower.

CLAP, with this reality in mind, proposes to guide its training activities within the following frame of reference: 1) dissemination of the latest scientific information and its application to the professionals making up the health care team, for the benefit of the population; 2) promotion of standardization in mother and child care; 3) attempt to make manpower training appropriate in relation to the material resources available in the institutions of the Region; 4) simplification of training methodology so that care can be given with a minimum of equipment resources and thus make it possible to achieve the widest possible coverage of the vulnerable group.

2. Activity within CLAP

2.1 CLAP's own courses

2.1.1 Course on integral care of the mother, the fetus and the newborn

a. Objectives: train participants so that when they return to their countries they will know how to:

- apply the knowledge and skills acquired towards improvement of maternal-fetal-newborn care.
- train students and other professionals by using active teaching methods.

b. Requirements: Physicians with residency completed in obstetrics or pediatrics, or two years regular activity in a service where such specialities exist. Maximum age: 40.

For admission, sponsorship of the applicant by an official institution will be required, with an indication of how the latter plans to use the applicant's services upon his return.

- c. Length of the course: three months, 48 hours/week
- d. Frequency: two a year
- e. Number of participants: maximum 20 per course.

2.1.2 Intensive course in specialized techniques in perinatology

- a. Objective: Train participants in the use of new technology for controlling high-risk pregnancy, labor and newborns.
- b. Requirements: physicians, nurses or obstetricians, preferably with supervisory care responsibility.

No age limit

For admission, the applicant must be sponsored by a public institution and justification for need of such training given, as well as an indication of what equipment the applicant is to be trained to handle.

- c. Length of course: two weeks, 40 hours/week
- d. Frequency: two a year, one for obstetricians and neonatologic pediatricians and a second for specialized nurses and obstetrics nurses.
- e. Number of participants: maximum of 10 per course.

2.1.3 Training for research in perinatal medicine

- a. Objectives: Train participants to direct or conduct clinical or experimental research projects in the field of perinatal medicine.
- b. Requirements: physicians, with at least two years experience in physiology, obstetrics or pediatrics.

Age limit: 35 years

For admission, the application must be sponsored by a public institution which shall indicate how it plans to use the applicant's services when he returns.

- c. Length: two years, 40 hours/week
- d. Frequency: one a year
- e. Number of participants: maximum of 3 in each course

2.2. CLAP involvement in multinational courses

These programs are a continuation of an activity which CLAP has already undertaken.

2.2.1 Course on teaching of the biology of reproduction in medical schools and universities. Perinatal aspects

Objective: teach the latest knowledge in the biology of reproduction and demonstrate appropriate methodology for its teaching.

2.2.2 Course on nursing and obstetric care in maternal and child health programs

Objectives: Promote better identification of the role of these professions in the development of maternal and child care in hospitals and health centers.

3. CLAP Training in the Various Countries. (This is described in Chapter X, Services Provided to the Countries, and Chapter XI, Dissemination.)

IX. RESEARCH

GUIDELINES PROPOSED FOR THE THREE-YEAR PERIOD 1976-1978

1. Criteria Used for Selection

The line of research proposed below falls within the framework of the agreement signed by the Pan American Health Organization in 1974 for the continuation of CLAP activities. In addition to their feasibility, subjects have been chosen which are related to the Ten-Year Health Plan for the Americas. The research proposed is intended to generate knowledge and experience which will be useful in reducing maternal, newborn and infant morbidity and mortality rates. One of the main perinatal problems in the Region is low weight at birth, a consequence of prematurity, low socioeconomic level, and related undernutrition. These factors enter into several of the projects submitted.

There are plans to carry out operational research which will tend to encourage and prolong breast-feeding. Some known benefits would be the prophylaxis of diarrhea in infants who have been weaned early and have enteric infections, and of protein-calorie malnutrition in many areas of the Hemisphere where there are nutrition problems.

A study (Project No. 1) of the vertical position of the mother during delivery takes into account this position as a spontaneous tendency among the autochthonous groups in the Region plus scientific observations on physiology and this posture in childbirth. The object is to reinstate and encourage the natural position during labor and simplify care.

2. Research Methodology

2.1 Some research projects, at least in their initial phase, will be conducted at CLAP headquarters in Montevideo.

2.2 Others will be multinational cooperative projects with many maternity or perinatal centers participating.

The feasibility of coordinating cooperative projects among maternity hospitals in Latin American countries, their low real cost and their short-term yield, have all been demonstrated recently. CLAP coordinated a cooperative research project on the "Influence on labor and the newborn of early rupturing of the ovular membranes." Twenty-two maternity hospitals in 11 Latin American countries took part. The success of the project was complete, as evaluated through the fulfillment of project goals in a given time (CLAP Scientific Publication No. 595).

Based on this positive experience, CLAP proposes to implement new cooperative research projects in many maternity hospitals in the countries of the Region. The overall goal of this multinational research is to support those measures which tend to diminish perinatal morbidity and mortality rates through the results it is hoped each project will produce. Improvements in obstetric and neonatal care are expected as those involved in the programs are motivated to form perinatal health care teams. Cooperative research projects also tend to broaden experience and unify the criteria of care during pregnancy, labor and of the newborn. They are also a means of becoming acquainted with local perinatal conditions for adaptation of care standards to the particular surroundings. Another advantage of this cooperative research effort is that a sufficient number of observations can be made in a short time and the results given broad dissemination. The participating maternity hospitals, because they are the protagonists, are the best vehicles for spreading the new concepts born of the research.

3. List of Research Projects

A. Multinational Cooperative Projects Planned and Coordinated by CLAP

1. Influence of the vertical position of the mother during labor.
2. Evaluation of a standardized treatment to detain premature labor.
3. Patterns of growth in the height of the uterus in relation to gestational age.

B. Research to be Done at CLAP

4. Operational research to encourage breast feeding.
 - 4.1 Obtention of development curve on weight and height during the first three months of life in newborns who are breast-fed only.

- 4.2 Identification of maternal factors related to early interruption of breast feeding.
 - 4.3 Surveys of knowledge and attitudes towards nursing the infant:
 - 4.3.1 of mothers during gestation;
 - 4.3.2 of members of the health care team (obstetrician, pediatrician, midwife, auxiliary nurse, etc.)
 5. Perinatal factors related to higher morbidity and mortality risk in early newborns.
 6. Study of the reliability and feasibility of the most commonly used techniques in diagnosing fetal health (in high risk gestations).
 7. Scientific basis for prophylaxis of respiratory complications in premature newborns: Study of new tensio-active phospholipids in the amniotic fluid.
 8. Newborn growth and maturation in recent normal, premature and low weight births.
 9. New human placental gonadotropin.
4. Detailed description of projects (project numbers correspond to the preceding list)
1. Influence of the vertical position of the mother during labor (maternal well-being, progress of labor and health of the fetus and the newborn) (multinational cooperative project)
 - 1.1 Purpose. This program seeks to learn the most natural, physiological postures or positions for the mother during labor, through a comparative study of the horizontal and vertical positions (seated or standing) during the period of cervical dilation.

The intention is to learn which position is best for the mother's well-being, most facilitates progress in labor, diminishes risks of asphyxia and trauma for the fetus, and most benefits the vitality of the newborn.
 - 1.2 Working hypothesis. The working approach already initiated by CLAP is continued under this program, the goal being to bring childbirth back to its natural, physiological state. When the mother's trunk is in a vertical position, the uterus and fetus are in better alignment with the pelvis for movement of the fetal head down the birth canal. In the expulsion stage, birth of the head is aided by flexion of the lower members under the pelvis, in a position which resembles squatting.

In the maternity hospitals of the Continent at the present time, the horizontal position is the customary one for the whole labor process. This practice was introduced by Moriceau in mid-XVIIIth century France so the midwife could more easily diagnose cervical dilation, the height and manner of presentation, and attend the birth more comfortably.

Adoption of the horizontal position spread across Europe, through the influence of European culture, to other continents. In such a position, particularly if the mother is lying on her back, the alignment of the fetus, the uterus and the pelvis aids progress of labor less than when the trunk of the woman in labor is vertical.

1.3 Background. Among the autochthonous communities in many parts of the American Hemisphere still not influenced by modern obstetrics, the woman in labor spontaneously adopts a vertical position and, according to many observers, labor progresses easily and without pain. When a modern obstetric center enters one of these communities, the mothers are reluctant to lie down, and when allowed to they tend to walk or sit during the period of dilation and deliver, usually very easily, in a vertical position (ending up squatting). Research with electronic monitoring begun in Argentina and Spain by physicians trained at CLAP indicates that uterine contractions are stronger, better coordinated and less painful when the mothers are in a vertical rather than in a horizontal position. Of 20 women in labor, 19 were more comfortable on their feet than lying down.

2. Evaluation of a standardized treatment to detain premature birth (multinational cooperative project)

2.1 Justification. Low birth weight (less than 2,500 grams) is the major perinatal problem in the Region because of its contribution to high morbidity and mortality rates, the high percentage of neurologic and pulmonary sequelae in survivors, and the high costs of newborn care. Between 10 and 43 per cent of live newborns in Latin America are underweight at birth. About half of these are pre-term deliveries (before the completion of 37 weeks of gestation). The present project is aimed at this group, through the study of pregnant women who go or are referred to participating maternity hospitals because of the onset of premature labor. Retarded fetal intra-uterine growth with its many causes, including deficiencies in maternal nutrition, accounts for the other 50 per cent of underweight newborns. Both may combine to cause low weight at birth.

2.2 General objective: To lower newborn morbidity and mortality in the cooperating maternity hospitals, and sequelae in the children who survive.

2.3 Final objective: Once the effectiveness of treatment is shown, to spread the experience acquired to other maternity hospitals, general hospitals and rural hospitals and, to the extent possible, to all levels of maternal and child care.

2.4 Specific objectives

- 2.4.1 To detain premature delivery and prolong the gestation in peril of interruption before term as long as possible. At the same time, to induce speeded up pulmonary maturation in the fetus to prevent occurrence of the respiratory distress syndrome in the newborn.
- 2.4.2 To improve standards of care in premature labor and of the pre-term newborn.

2.5 Corollary objectives

- 2.5.1 To improve the quality of vital statistics in participating maternity hospitals.
- 2.5.2 To increase cooperation between obstetricians, neonatologists, nurses and auxiliary personnel.
- 2.5.3 To lower the cost of care of the premature newborn.

2.6 Basis of the program

The program is built on the following:

- 2.6.1 Uniform criteria in early diagnosis of risk of premature birth and premature labor.
- 2.6.2 Stepped-up early pharmacologic inhibition of uterine contractility by means of a standardized therapeutic procedure:
a) attack treatment: bed rest + tranquilizers + inhibitors of uterine contractility, followed by b) walking support treatment: self-administered inhibitors of uterine contractility and restricted physical activity.
- 2.6.3 Prevention of the respiratory distress syndrome in the below weight newborn, by means of uniform fetal treatment during the endangered gestation (administration of glucocorticoids to the mother).
- 2.6.4 Application of uniform standards of attention for pre-term newborns, aimed at reviving them and controlling infection and feeding.
- 2.6.5 Uniform criteria for diagnosis of pathologies in the low-weight newborn (respiratory distress syndrome, and nonhemolytic jaundice) and application of treatment standards.

2.7 Evaluation. An evaluation of each participating hospital will be made before and during the program in accordance with a two-year chronogram.

The following parameters will be used as principal indicators of program-derived benefits.

2.7.1 The time which passes from diagnosis of risk of premature labor until birth. (This time lapse should become significantly longer if the treatment is successful).

2.7.2 Newborn weight in cases of risk of premature labor

2.7.3 Gestational age, determined by examination of the newborn (in the same group)

2.7.4 Early newborn mortality (in the same group)

2.7.5 Newborn morbidity

Thirty-seven maternity hospitals in 12 Latin American countries have offered to take part in this project.

3. Patterns of growth in the height of the uterus in relation to gestational age (multinational cooperative project)

3.1 Interest. Retarded fetal development during gestation is an important cause of low birth weight, even in term gestations. It is most frequent in areas where there is chronic maternal malnutrition. In such areas, up to 30 per cent of the newborns may have retarded development. The consequences are reflected in higher newborn morbidity and mortality rates and late growth and development disorders.

3.2 Justification. It is important to diagnose retarded development of the fetus as early as possible so that remedial measures may be taken (rest, dietary calorie supplement, treatment of infection or other pathologies). At present there are some instrumental techniques (ultrasound echograph) for acquiring very precise measurements of fetal growth, but the high cost of such equipment puts it out of reach of most maternity hospitals in Latin America.

The mere measurement of uterine height (from the pubis to the fundus) and its increase with gestation at age is a simple, inexpensive method (just a measuring tape is needed) which, when used correctly, makes it possible to determine fetal development and diagnose retardation. In order to make use of this information, there should be a normal curve of uterine height available for the geographic area concerned, since there are noticeable differences between one area and another.

3.3. Objectives. The purpose of this cooperative program is to establish the patterns of uterine growth in many areas of the Region; these patterns could then be compared and information obtained on area differences.

Availability of a normal curve for each area also facilitates detection of retarded fetal development by means of an easy, inexpensive method which can be handled by auxiliary personnel possessing a minimum of training.

4. Operational research to encourage breast-feeding

The studies which are summarized below will first be conducted as a pilot program at CLAP. If the results are satisfactory, an attempt would be made to extend them to other institutions in the Region, after adapting them to the particular surroundings.

4.1 Obtention of development curve on weight and height during the first three months of life in newborns who are breast-fed only

Although it may sound astonishing, there is no information available on this at present. CLAP plans to collect data from normal newborns whose mothers will be nursing their infants for this length of time. A comparison of these "natural" curves will be made with existing normal curves which appear to be based on newborns receiving some artificial feeding, with the resulting possibility of overnutrition.

If this suspicion is confirmed, the present "artificial" curves would not be appropriate as controls of weight gain in breast-fed newborns, since they would inspire unnecessary supplements or replacement of breast feeding by bottle formulas, with their detrimental features (e.g., diarrhea in the weaned infant caused by enteric infections).

4.2 Identification of maternal factors related to early interruption of breast-feeding

In CLAP's pilot sample of 700 mothers, half had stopped nursing after 30 days. After three months, only 13 per cent continued to breast-feed. An attempt will be made to pinpoint some of the biological, psychological and sociocultural factors influencing interruption of nursing. With this knowledge, efforts to encourage breast-feeding can be appropriately focused when working with the mothers.

4.3.1 Survey of knowledge and attitudes towards breast-feeding

This survey will be conducted during prenatal consultations. Instruction and guidance given during the check-ups and the rooming-in period immediately after birth will be adjusted to the results of the survey. Eventual changes in maternal education will be evaluated by (1) the proportion of mothers still nursing their child at one month of life; (2) her visits to the pediatric office on the dates suggested; and (3) newborn morbidity during the first month.

4.3.2 Survey of knowledge and attitudes on breast-feeding conducted among members of the perinatal health team (obstetrician, pediatrician, midwife, nurse)

There is an impression that many members of the health care team have a negative influence on initiation and continuation of breast-feeding. CLAP intends to begin surveys to document the knowledge and attitudes of members of the health team on the subject of newborn feeding.

5. Perinatal factors related to higher morbidity and mortality in early newborns

5.1 Objective. To identify some of the maternal factors bearing on pregnancy and labor, and other factors of newborn care, which are closely related to a higher proportion of the following abnormalities: (1) low birth weight, (2) prematurity; (3) low weight in relation to gestational age; (4) depression at birth; (5) early newborn death; and (6) newborn morbidity.

In considering the latter, primary attention will be given to respiratory distress syndrome, abnormal neurologic examination, sepsis and jaundice.

5.2 Methodology. Use will be made of CLAP's perinatal data bank, where information from a codified perinatal card is stored. As of late 1975, data on 3,000 consecutive births from the Gynecotokology Clinic B which operates in association with CLAP had been processed into the bank. This project is expected to yield a scientific means of identifying high risk groups, rational standardization of some attention procedures and of developing preventive medicine programs.

5.3 CLAP perinatal data bank. Since 1973 information from all the births at the maternity hospital connected with CLAP has been recorded on precoded perinatal cards. The card contains 89 selected pieces of information on the mother's obstetric history and clinical examination, evolution of the current pregnancy (including complications), labor, examination of the newborn and the latter's progress during the first week of life. This information is condensed on a clinical history sheet, which takes two or three minutes to fill out, and is then punched on a Hollerith computer card. A simple procedure of administrative controls and computer programming was developed to detect errors and verify consistency of data.

The data stored in the bank is processed, using both simple and complex computer procedures, into complete periodic perinatal reports.

6. Study of the reliability and feasibility of the most common techniques for diagnosing fetal health (in high risk gestations)

6.1. Justification. During high risk pregnancies it is very helpful to know what condition the fetus is in as a rational basis for handling gestation.

Obstetric clinics use several methods for this purpose, e.g., estriol levels in plasma, volume and composition of the amniotic fluid, tolerance of the fetus to contractions resembling labor, etc. (Two of these techniques were first developed at CLAP.) There is no comparative information on their reliability; therefore, many maternity hospitals tend to apply the maximum number of tests to a single pregnant woman, raising costs and complicating diagnosis.

6.2 Objective and method. The purpose of this research is to make a comparative study of several diagnostic methods to determine their reliability in evaluating fetal health. An attempt will be made to find the most reliable and at the same time simplest and lowest cost methods.

The validity of the information from each diagnostic technique studied will be graded as it relates to direct indicators, such as fetal or early newborn death, the appearance of symptoms of acute fetal distress in labor, and the newborn's condition (weight, length, Agpar score, acid-base balance, and early morbidity). The question of what maternal factors determine high-risk pregnancy will also be taken into account.

This study will be conducted on high-risk pregnancy women in CLAP's intensive care unit.

7. Scientific basis for prophylaxis of respiratory complications in premature newborns

7.1 Justification. The respiratory distress syndrome is one of the main causes of early newborn morbidity and mortality in pre-term births. It is caused by pulmonary immaturity and an insufficiency of tensio-active agents in the pulmonary alveoli, which are necessary to avoid lung collapse when the newborn begins to breathe.

Tensio-active agents are phospholipids, the main one being dipalmitoil- lecithin. Recently other tensio-active phospholipids, including phosphatidyl- glycerol, have been discovered through research in which Dr. R. Bustos of CLAP was involved.

These phospholipids, which are produced by the fetal lung, flow into the amniotic fluid where their concentration can be measured. When concentrations fall below certain limits, the fetal lung is immature, and the newborn will have respiratory distress syndrome. It is desirable then to delay birth until the amniotic concentration of the tensio-active substance has reached safe level. Preliminary studies indicate that in certain complicated pregnancies the concentration of the recently discovered phosphatidyl- glycerol may be a more reliable indicator than that of other phospholipids (e.g., lecithin/sphingomyelin) used until now.

7.2. Objective. In complicated pregnancies the object is to determine the amniotic concentration of phosphatidyl-glycerol beyond which there may be reasonable certainty that the fetal lung is mature and premature birth can be allowed with little risk of neonatal respiratory distress syndrome.

It is also intended to study the regulatory action of certain hormones (corticoids, insulin) on the synthesis of the tensio-active agents and their release into the pulmonary alveoli.

Finally, the project will study the possible inductive action of production of tensio-active phospholipids by uterine-inhibitory drugs used in treating threatened premature labor (betamimetics, inhibitors from the synthesis of prostaglandins such as Indocid, aspirin, etc.).

The tensio-active phospholipids will be identified in thin layers by bidimensional chromatography, using a technique developed by R. Bustos and his colleagues. The hormones will be measured by radio-immunity assay. This research will be conducted at CLAP.

7.3. This study will be conducted on high-risk pregnant women at CLAP's intensive care unit who are facing premature termination of gestation either because of medical reasons or because it may occur spontaneously. The study will be closely tied to the research conducted under Project No. 6.

8. Newborn Growth and Maturation in Normal, Premature and Low-weight Births

This is a continuation of a project which was described earlier. The number of case studies will be increased until complete results are obtained up to 24 months of age on 50 children in each of the three groups.

9. Isolation and study of a new human placental gonadotropin

Research at CLAP's protein hormone laboratory has succeeded in demonstrating that the human placenta contains a protein-type substance which displays gonadotropic activity and which is immunologically different from known gonadotropins (human chorionic gonadotropin (HCG) and lutein hormone (LH)).

It is chemically heterogeneous, but contains no free estrogens nor any united with proteins. At present, work is being done to isolate and purify the compound using chromatographic techniques on ionic-exchange resins, molecular filtration and affinity.

This line of research contributes to better knowledge of endocrinous control of gestation and fetal development. It is funded for that purpose by PLAMIRH (Latin American Program for Improving Research on Human Reproduction), which has its headquarters in Bogotá, Colombia.

X. SERVICES TO THE COUNTRIES OF THE REGION

Within the realm of its possibilities, CLAP will fulfill all the requests it receives for its advisory services. These requests can be classified as follows:

Activity I. Advisory services on organization

A typical example is a request from the Ministry of Public Health of Colombia for a consultant in perinatology to spend four month's in order to (a) set up perinatology services and a system of evaluation of these services under the Maternal and Child Care Program; (b) organize intra-hospital perinatology services; and (c) draw up administrative and clinical management standards for the perinatology services.

CLAP is in a position to provide help in standardization, using materials prepared over the past six years, part of which have been published. Another service consists of precoded perinatal clinical histories--a simple form and another a more complete, more complicated form. Still more simplified is a coded perinatal card which picks up 89 selected statistics that are then stored in CLAP's perinatal data bank (see Research, 5.3).

The system for retrieving and processing information stored in the data bank is easy and inexpensive, and enables a maternity hospital to keep its perinatal statistics up to date and publish them periodically in the form of reports. The bank can be used to analyze, standardize, and control the quality of care in line with local needs and resources. This methodology when put into practice leads to better knowledge of the population under care; the data can also be used in local clinical research which is easy to implement. For this purpose CLAP has prepared a prototype perinatal report and several data processing programs of different degrees of complexity. All this will be available to the countries and institutions of the Region.

Activity II. Advisory services on education

These advisory services, carried out on a large scale during the period 1970-1975, include intensive courses, refresher courses and participation in various scientific activities.

XI. DISSEMINATION OF INFORMATION IN THE REGION

There will be continued use of the information dissemination means used from 1970 to 1975, which are described earlier.

CLAP intends to adopt a new information activity, to be known as "Seminars on Standards," as follows:

a. Objective: To promote implementation of standards in obstetric and neonatologic medical care.

b. Requisites: Physicians specialized in obstetrics and neonatology, nurses and obstetricians; those professionals holding positions with managerial responsibility in the field of medical care or teaching will be given preference.

c. Length: Variable up to a maximum of 44 hours, according to the topic

d. Number of participants: Maximum of 50 in each seminar

e. Frequency: One to three per year, as the budget permits

f. Place: In key areas of the Region, to attract maximum country representation at each seminar, compatible with budget capability.

CLAP also intends to continue publication of teaching materials with current information derived from its own experience in certain areas. This material will be available through PAHO to the countries (ministries of public health, faculties of obstetrics, pediatrics, and public health, and nursing and midwifery schools, etc.).

CLAP will put out materials covering important perinatal subjects on medical care of mothers and newborns, including audiovisual materials, programmed texts, directed study materials, video cassettes and motion pictures, adapted to each profession and to persons of different levels of secondary and university education.