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ARTICLES

Regular Features

The Editorial Board does not necessarily agree with opinions expressed in articles and correspondence, and does not necessarily endorse courses advertised.

EDITORIAL

LIN WAKLEY
Editor

This months issue of the Journal is composed of articles from several different sources including this years conference, the Introduction to Paediatric Physiotherapy Course held in September and several submitted inadequately by members. Even so, I have managed to match the first five together under the loose title of Respiratory Care. I am conscious that much of the material in the Journal is biased towards community paediatrics and would like to include more hospital based items. For this I need your help! What would you like me to include? Have you been involved in treating a child with an interesting condition and wish to share your experience?

This time, you also have a centre fold pull-out for next years conference as well as to well as two loose flyers. I hope you will take the time to fill in and return the questionnaire about conferences. In the changing climate it is important that the National Committee know what you would like in the future. We are all aware of the constraints on both time and funding which may affect whether you are able to attend conference or not and we would like to make it accessible to as many members as possible.

The second flyer is a result of a very interesting and stimulating working weekend, on Setting Clinical Guidelines, held for the National Committee in October. It is intended that the March issue will be dedicated to this subject. We want to share our new found knowledge with you and intend to produce a Guide to Setting Clinical Guidelines. Hopefully it will be an interesting, stimulating and thought provoking issue.

It just remains for me to wish you all:

A VERY MERRY CHRISTMAS AND A HAPPY NEW YEAR

Copy for the March 1998 Journal must be with the editor by 1st FEBRUARY 1998

LETTERS TO THE EDITOR

Nicky Cogan OBE
Physiotherapy and allied professions Officer

One of the prime policies of the current Government is to improve the health of people and in particular to have healthier children.

The focus is on all school age children but in the Department of Health we have a specific interest in children with special needs and how services are provided.

One of the ways of developing services is through encouraging good practice and to this end is the purpose of the letter. We find it very difficult to identify examples as most of you are beavering away without the Centre having any idea of the innovative services you offer. We are particularly interested in services that work across social, health, voluntary and independent interfaces, offering a genuinely holistic service to school children and their families. Examples of health promotion and prevention would be extremely useful especially if they have been evaluated and can demonstrate a positive effect!

If any of you have good examples of services currently running please could you write and let me know at Wellington House, 133-155 Waterloo Road, London SE1 8UG as soon as possible.

Thank you in anticipation of an immense response.

Nicky Cogan

Liz Hardy
APCP Vice-Chairman
9 Rook Lane
Norton
Stockton-on-Tees
TS20 1SD

Dear Lin
I have recently received a letter from a member in Guildford requesting information about treating children privately. Unfortunately my dog ate the letter before I could reply! Can I, through the Journal, ask for that person to write to me again so I can contact them.

Yours
Liz Hardy
Vice Chairman

Gail Smith
Senior Physiotherapist
St. Martin's Special School
Smith Dorrien Avenue
Gibraltar

Dear Editor,

I have had a referral for a 14 month old boy diagnosed with Klippel-Feil Syndrome. I would be very interested in hearing from anyone who has experience in treating children with this condition.

The parents would also desperately like to get in touch with a support group or with parents of other Klippel-Feil children. If you know of anyone who could help them please write to me.

Yours sincerely,
Gail Smith
Senior Physiotherapist

LETTERS TO THE EDITOR

Archana Kaul-Mead
Community Paediatric
Physiotherapist

Dear Editor

The Community Paediatric Physiotherapy Staff at Glan-y-Mor NHS have been using Rebound Therapy (therapeutic trampoline) as a treatment modality for Dyspraxia for several years. During this time, it has become apparent that there has been a significant improvement in gross motor skills of children treated by this method.

It is our intention to research this therapy technique for children with this condition, to formally evaluate its effectiveness. We are already in the process of carrying out a pilot study on which an on-going research project will be based.

We would appreciate any relevant information, by therapists who are working or have done similar work, to contact us at the following address:

A. R. Kaul-Mead M.C.S.P.
Research Co-Ordinator
Ysgol Crug Glas
Croft Street
Dyfatty
Swansea

Margot Arthurton
Community Paediatric
Physiotherapist.
Children's Centre, Stoke
Mandeville Hospital,
Mandeville Road, Aylesbury,
Bucks. HP21 8AL
Tel: Aylesbury (01296) 315000
Direct line: (01296) 315158

Dear Editor

I would be interested to hear through the Journal from any Paediatric Physiotherapists who have experience of working with children with spina bifida - both in infancy, early and late childhood, and adolescence.

I am interested in the management of this condition at all ages, including the appropriate use of AFOs, callipers, low carts, types of wheel-chairs, etc., etc.

I should be grateful for any information that I can get on the management of this condition.

Thank you.
Yours sincerely,
Margot Arthurton

Sheila Bryson
Sen. Physiotherapist
Tameside and Glossop
Community and Priority
Services NHS Trust
Greenfield Street
Hyde SK14 1EJ
Childrens Physiotherapy Dept.
0161 368 4242

Dear Lin

I would be grateful if any other paediatric physios who have treated children with the genetic disorder Trisomy 4P, could contact me at my office.

I have been involved with a little boy for the past 10 months, with this condition, he has made excellent progress and has just walked independently at 18 months. His mum is keen to make contact with any parents of other children with Trisomy 4P, and would possibly like to set up a support group. So far within our local authorities we have not come across any other children with the same condition.

With many thanks and I look forward to hearing from other physios.

Yours sincerely
Sheila Bryson

Pauline Johnson
Superintendent Physiotherapist
Midkent Healthcare Trust
Maidstone Childrens Centre
188 Union Street
Maidstone
Kent
ME14 1EY

Dear Lin

Re: Developing/enhancing skills in pre-school children

I have been asked to investigate the possibility of setting up a project on the above subject to include all areas of their development. More and more children are being referred with motor organisational problems, often associated with speech difficulties. Several of our therapists have found that by introducing a non specific gross motor skills programme via a group in school or nursery that the children have made considerable progress in all areas of their development. With this in mind we felt that such programmes should have benefit, and possibly reduce the referral rate, if such a scheme could be introduced for all children in nurseries and playgroups.

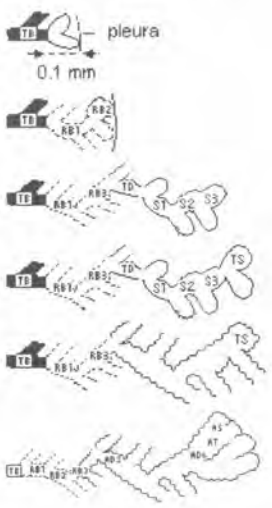
I would be very interested to hear from anyone who is/has been involved in a similar project.

Yours sincerely
Pauline Johnson

DR. C. D. BEDFORD
Consultant Paediatrician, Warrington Hospital NHS Trust.

The anatomy of the lung changes considerably from its first appearance after the fourth week as two lung buds which develop at the end of the laryngotracheal groove. Separation of the lungs from the foregut occurs with further development of the larynx. The lung buds grow downwards and the increasingly bronchi divide into smaller airways ending up as terminal and respiratory bronchioles. The respiratory bronchioles further divide and lead into transitional ducts and saccules. Alveoli only develop after birth. The lung continues to grow considerably for the next few years with increasing numbers of alveoli.

Age	Length from TB to pleura
16 weeks gestation	0.1 mm
19 weeks gestation	0.2mm
28 weeks gestation	0.6mm
birth	1.1mm
2 months	1.75 mm
7 years	4mm



Dichotomous branching of the airways during development that leads to acinus formation. TB = terminal bronchiole; RB = respiratory bronchiole; TD = transitional duct; S = saccule; TS = terminal saccule; AD = atrium; AS = alveolar sac. (Hislop & Reid, Thorax 1974;29:90-94)

The lung is formed from endoderm which forms the lining respiratory epithelium. By 24 weeks of gestation the epithelium of the terminal saccules is made up of Type 1 cells which are flattened and form over 90% of the gas exchange surface of the mature lung. The rounded Type II cells are as numerous but cover a smaller area. They produce surfactant, a substance that reduces surface tension in the fluid lining the lung.

The lungs are supplied by the pulmonary arteries which branch as the lung grows. The supply to the saccules greatly increases in the final trimester but even at term the lining is relatively less vascular than in later life.

The diaphragm is formed by fusion of mesoderm from a number of sites. It separates the thoracic and peritoneal cavities.

EMBRYOLOGICAL ABNORMALITIES

Failure of the normal process of lung development can lead to a variety of congenital abnormalities that are important in the newborn period. Failure of complete separation of the foregut and the developing lung will lead to tracheo-oesophageal fistulae. If the component parts of the

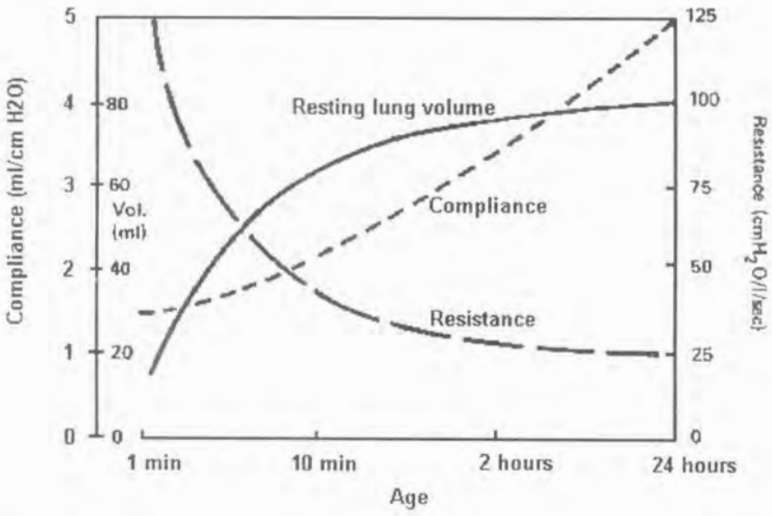
diaphragm fail to fuse and if bowel enters the chest cavity then the lung will be unable to grow properly and there will by lung hypoplasia and diaphragmatic hernia.

The developing lung needs space to grow so where there is chronic leakage of amniotic fluid and constriction of the chest there will be bilateral lung hypoplasia. Foetal breathing also appears to be important in lung growth.

THE LUNGS AT BIRTH

During foetal life the lungs produce fluid, this is stopped during labour. Some of the lung fluid is squeezed out during the second stage of labour while most is absorbed through the pulmonary lymphatics and capillaries. During the first few minutes after birth the lungs gradually fill with air. The small airways remain open during expiration because of the surface tension lowering properties of surfactant. Aeration of more and more saccules and small airways occurs with each breath. Over extension of airways is prevented by the reduced surfactant concentration per surface area and hence increased surface tension in dilated saccules.

Healthy term infants generate pressures of around 20cm H_2O whilst taking the first few breaths. The resting volume of the lung increases rapidly over the first 10 minutes and then more slowly over the first 24 hours. Airway resistance falls rapidly whilst compliance increases more slowly.



In the foetus only about 10% of the cardiac output goes through the lungs. After birth with clamping of the cord and aeration of the lungs, the pulmonary vascular resistance falls and blood flow increases greatly. The foramen ovale closes and the ductus arteriosus constricts.

NEONATAL PROBLEMS

If there is delayed clearance of lung fluid then the lungs may remain relatively stiff for 24-48 hours. The baby has to work harder with recession, faster breathing and grunting. This transient tachypnoea of the newborn (TTN) or wet lung, is more likely following elective caesarian section, birth asphyxia or when there is borderline maturity.

Respiratory distress syndrome (RDS) occurs in more premature infants where there is a lack of surfactant due to immaturity of the type II lining cells. The small airways tend to collapse on expiration due to the high surface tension of the lung lining fluid. Over expansion of some airways occurs. Leakage of proteinaceous material into the lungs occurs later forming a hyaline membrane. Mismatch of ventilation and perfusion in the airways leads to inefficient gas exchange. Finally the vascular resistance in the pulmonary circulation may remain high leading to blood bypassing the lungs via the ductus arteriosus which further compounds the respiratory inadequacy.

Resolution of RDS occurs with maturation of the type II cells and production of surfactant, clearance of the lung fluid and aeration of all the lung. Ventilatory support and increased inspired oxygen concentration is usually needed. Antenatal corticosteroids given to the mother and endotracheal instillation of surfactant have helped reduce the severity of the disease.

THE PHYSIOLOGY OF BREATHING

The airways

The large airways take no part in gas exchange but they account for most of the resistance to airflow. The nasal portion is firmly supported by its bony and cartilaginous walls. The nasal resistance to flow is determined by the physical dimensions in the individual as well as the state of the mucous membranes lining them. Nasal resistance contributes 30-50% of total airways resistance in babies. Neonates are obligate nose breathers. Active muscle contraction is needed to keep the pharynx open. Laryngeal resistance can be varied by the degree of apposition of the vocal chords. The trachea and main bronchi are supported by cartilage. The smaller airways are more compliant and can collapse in expiration.

The lungs and rib cage

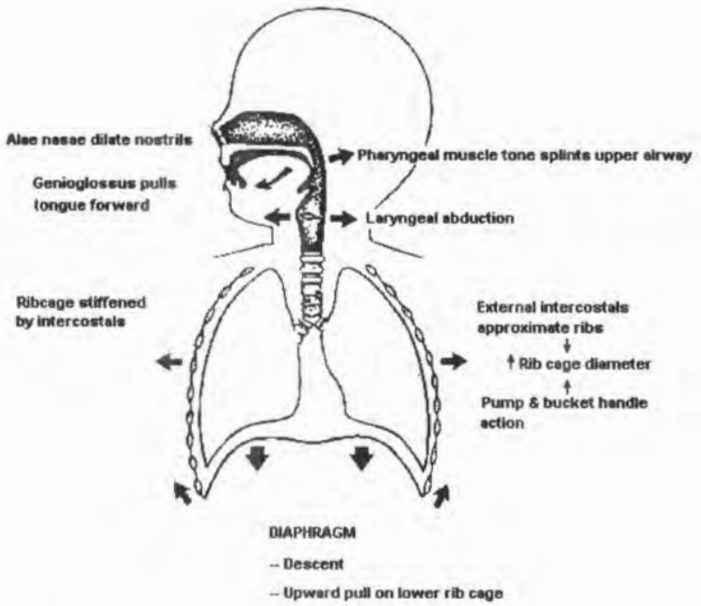
The thoracic cage is made up of the vertebral column, ribs and diaphragm. They prevent the lungs collapsing under their inherent elastic recoil.

PHYSIOLOGICAL MEASUREMENTS

A number of physiological measurements can be made of the lung and airways.

Compliance

This is the amount of pressure needed to distend the lung. It is expressed

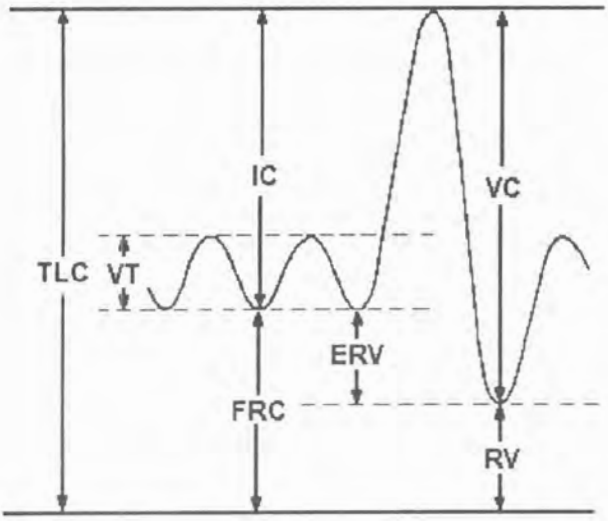


in the change in volume per unit change in pressure. It is linear over most of the range of lung volume. The pressure is needed to overcome the elastic recoil of the tissues and the surface active forces of the lung lining fluid. Laplace's law states that for a given surface tension (T), the pressure (P) required to hold a given spherical structure open is inversely proportional to the radius (R):

P=2T/R. In the lung, surfactant reduces the surface tension. As the surface area of the alveolus decreases during exhalation the surfactant effect increases leading to a fall in surface tension and a reduction in the pressure needed to keep the alveolus open. On inspiration the surface area increases and the surfactant effect decreases with a concomitant rise in surface tension which limits the further expansion of the alveolus. The overall effect is to keep the alveoli all to about the same size.

Resistance

The forces needed to move air in and out of the lung depend on the compliance of the lung and more importantly the resistance to gas flow. This resistance is made up of two components, resistance during laminar flow which predominates in the small airways where flow is slow and there is a large cross-sectional area, and resistance to turbulent flow which occurs in the large central airways. This latter component is more important in older children and adults.



TLC = Total Lung Capacity
VT = Tidal Volume
IC = Inspiratory Capacity
FRC = Functional Residual Capacity
ERV = Expiratory Reserve Volume
VC = Vital Capacity
RV = Residual Volume

Lung Volumes

The total lung volume can be divided into a number of subdivisions. Most can be easily measured in older children with simple apparatus. Residual volume is harder to measure.

Spirometry

Measurement of air flow can be made using spirometers. Modern equipment can easily produce measurements of flow and calculations of other parameters from this. The information is useful in diagnosing disease and monitoring responses to treatment.

The techniques are unfortunately effort dependent and need some co-ordination to do properly so they are unsuitable for children under the age of about 5 years. Lung function measurements are possible on younger children but they involve complex apparatus and sedating the child. They are thus used mainly for research or one off measurements. They are not widely available.

Differences between adults and infants

Aside from the neonatal period and adaptation to post-natal life the child is prone to more respiratory problems.

Firstly, the child is exposed to a large number of respiratory pathogens. The immune system is also maturing during childhood.

Secondly, any inflammation of the airway leads to a comparatively greater increase in airflow resistance due to Poiseuille's Law. This states that resistance (R) is directly proportional to the length of the airway (I) and the viscosity (?) of the gas and inversely proportional to the fourth power of the radius (r) of the airway.

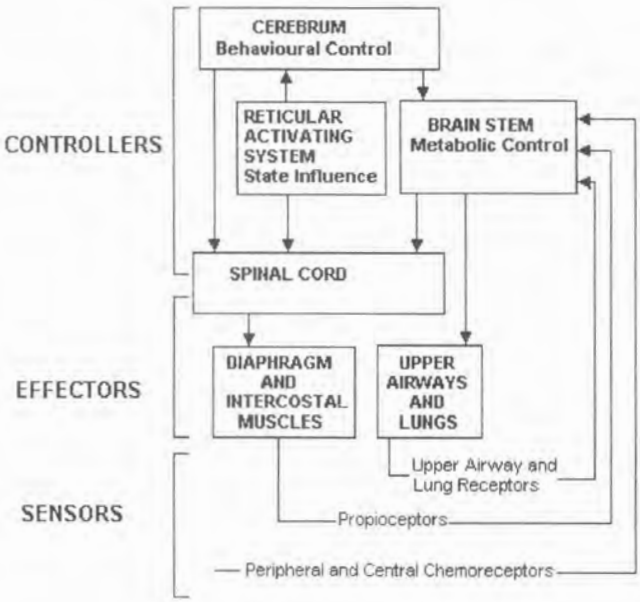
$$R = 8\ |\eta I/\pi r^4$$

If the radius is reduced by half there is a 16 fold increase in airways resistance.

Thirdly, the thoracic cage is more compliant than later in life. Any increase in airways resistance or stiffening of the lungs will require more respiratory effort.

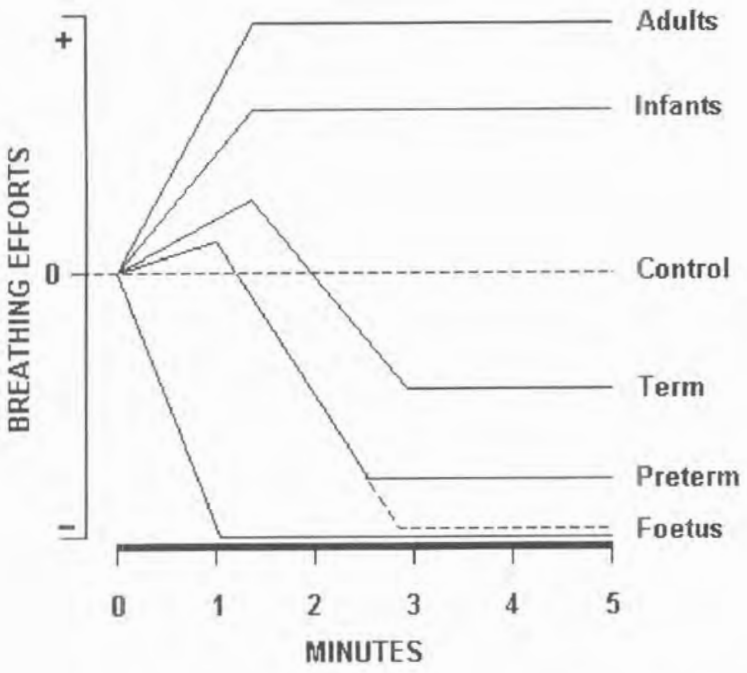
Control of Respiration

Breathing is controlled by the brain stem with modifying input from peripheral receptors. There is also voluntary control from higher centres that can modify breathing patterns.



A schematic view of how breathing is regulated.

Carbon dioxide via brain pH is probably the major metabolic drive responsible for sustained breathing efforts. The ventilatory responses to pCO2 are similar in term babies and adults. Preterm infants show a decreased response. The response to hypoxia varies with age.



Henderson-Smart,
NEJM:1983:308;353-357.

As can be seen from the above diagram the foetus responds to hypoxia with cessation of breathing. The preterm infant has an initial increase followed by hypoventilation or even apnoea.

Breathing Patterns

In the newborn rate, depth and regularity of breathing is related to behavioural state. In quiet sleep breathing is regular with sighs every 2-4 mins followed by a short period of hypoventilation or apnoea. In REM sleep breathing is much more irregular with frequent pauses of 2-10 seconds. In the awake state the breathing pattern is quite variable. Apnoeas of 2-10 seconds are normal in preterm and term infants. Prolonged apnoea is common in preterm infants.

Respiratory Rates

Age (yrs)	Rate (/min)
<1	30 - 40
2-5	20 - 30
5-12	15 - 20
>12	12 - 16

Summary

The lung is developing rapidly from birth throughout childhood.

The upper airways are narrower than in adults and are more prone to obstruction and narrowing.

The respiratory pump is not as effective as in adults and older children when the ribs are less compliant, and less horizontal. The diaphragm and respiratory muscles are less prone to fatigue.

Respiratory rate is faster in children. However, the exhausted child may show slowing of respiratory rate and a pre-terminal bradycardia. Breathing patterns are irregular in young children and they may naturally have short periods of apnoea (< 10 seconds)

Immunological defences are less well developed in children than in adults.

PROBLEMS OF PREMATURE BIRTH

ALAN GIBSON
Consultant Neonatal Paediatrician
The North Trent Regional Neonatal Intensive Care Unit
The Jessop Hospital for Women
Leavygreave Road
Sheffield S3 7RE
Tel: Sheffield (0114) 276 6333
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For any infant the period around birth is associated with a high risk not only of death, but also of events which may have a significant impact on future physical and mental health. For infants born prematurely these risks are higher and increase progressively as the degree of immaturity becomes greater. There are approximately 700,000 infants born each year in England and Wales, and of these around 7% have a birth weight below 2500 grams. Information on the gestational age of babies has not been collected until very recently, and birth weight is therefore used as an indication of the likelihood of preterm birth. The proportion of infants born at low birthweights (Figure 1) has changed little over the last decade, and there is evidence to suggest that the number of infants born at an extremely low birthweight is slowly increasing.

PRETERM BIRTH

Preterm birth was defined as any birth before 37 completed weeks of gestation by the World Health Organisation in 1977 when a relatively small proportion of babies born earlier than this would have survived. Recognition of neonatology as a speciality in its own right, and rapid advances in the quality of equipment used for neonatal life support have been associated with substantial improvements in the survival rates of premature infants. As survival has improved, it has become apparent that inclusion of all infants born below 37 completed weeks of gestation in a single category is inappropriate. To identify those infants at higher risk the category of 'the very low birthweight infant - VLBW' has been adopted to include all those infants with a birthweight of less than 1500 grams and 'the extremely low birthweight infant - ELBW' to include all those with a birthweight below 1000 grams. As survival of these infants steadily increases a further sub-division has been proposed and in the United States of America the term 'micro-preemie' is used to refer to all those infants with a birthweight below 750 grams.

Sub-division of premature infants into these different categories reflects the increasing awareness of the need to identify those infants at highest risk of acute and chronic problems as a consequence of their early delivery. It is well recognised that there are many problems associated with preterm birth and these are more likely to be severe, require intensive life support, and result in long term impairment as the degree of immaturity increases. Neonatology arose as a speciality not only because of the increasing number of infants requiring care, but also because of the unique nature of the diseases they develop and the care they require in the treatment of those diseases.

THE CONSEQUENCES OF IMMATURITY.

Almost all of the problems that these babies encounter can be attributed to the consequences of immaturity; immaturity of anatomical structures, immaturity of biochemical systems, and immaturity of neurological controls. Nowhere is this more apparent than in the classical respiratory

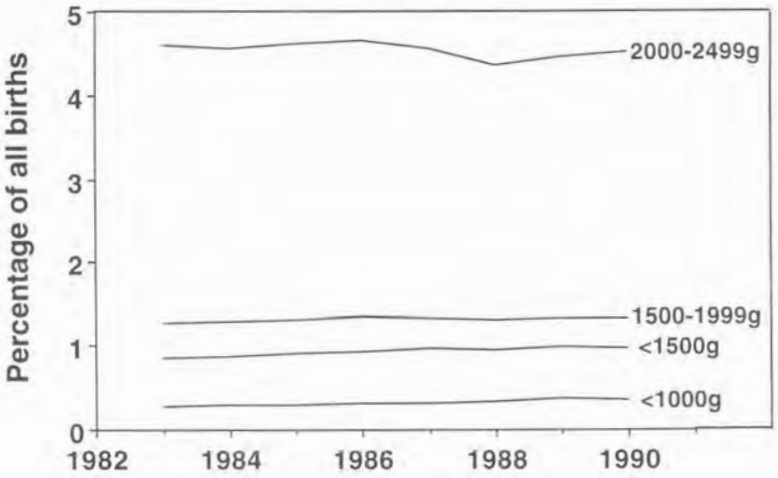

Figure 1: Delivery rate at low birthweight. England and Wales 1983 - 1990. OPCS statistics.

illness of preterm infants. Almost all infants born at a gestational age of 28 weeks or less will develop respiratory illness and a large proportion will require mechanical ventilation for this. The instability of the oxygen, carbon dioxide and hydrogen ion concentrations in the blood during this illness may be responsible for a significant proportion of neurological problems that these infants develop and mechanical ventilation may irrevocably damage the lungs that have to be ventilated to permit survival.

Under normal conditions the highly elastic lungs inflate and deflate as movements of the rib cage and diaphragm increase and decrease the volume within the thorax. Air is sucked into the lungs during inspiration and expelled forcibly during expiration. The lungs are able to do this by virtue of the delicate structure with air filled alveoli separated by extremely thin septae within which run the blood vessels. the lungs adhere to the internal surfaces of the thoracic cavity by virtue of the surface tension forces of pleural fluid which ensures that respiratory forces are transmitted from the thoracic cage to the lungs. The strong bone and cartilage of the rib cage and the powerful intercostal and diaphragmatic muscles hold the lungs in a state of partial expansion at the end of expiration thus permitting inspiration to proceed with minimal effort. All of these movements are facilitated by the presence of pulmonary surfactant, a complex mixture of lipid and protein that is produced by the type II alveolar cells and spreads to line the entire air-water interface of the lung. In the preterm infant none of these mechanisms are fully functional.

At approximately half way through gestation the lungs are almost solid with only a few rudimentary airways present. Over the next ten weeks

there is progressive division of respiratory canaliculi with the eventual budding at the end of these airways to form the terminal saccules from which rudimentary alveoli will develop. Even at 28 weeks (a gestational age at which a large proportion of infants will survive) the lungs are histologically immature in comparison to the healthy lungs of the term infant, with a relatively thick cellular wall around the alveoli and a relative paucity of blood vessels running within this space. These immature lungs will thus expand less readily, and have a stronger tendency to collapse, while gas exchange will be restricted by the thicker walls and reduced blood supply. To further compound these difficulties, the ribs are entirely cartilagineous and relatively thin and the muscles of the chest wall and diaphragm are underdeveloped and weak. The poorly compliant lungs will therefore tend to collapse and this cannot be resisted by the thin and weak chest wall. Expanding lungs of the immature infant is thus much more difficult than would be the case in normally developed lungs, and this is further compounded by a complete or partial absence of pulmonary surfactant.

RESPIRATORY DISTRESS SYNDROME

Surfactant first appears in the lungs at around 22 weeks gestation, and then slowly increases as the infant approaches term. There is a surge in surfactant production at around 35 weeks gestation at which point the majority of infants are able to spontaneously breathe room air. If born prematurely, the rate at which the surfactant is used up usually exceeds the rate at which it is produced and surfactant deficiency progressively develops. In the absence of surfactant the lungs become stiffer and the difficulties alluded to in the previous section will be exacerbated. The lung disease of the immature infant due to surfactant deficiency is widely referred to as 'Respiratory Distress Syndrome of the Newborn - RDS' and is characterised in its initial phase by widespread collapse of a large number of alveoli, with relative over-distension of others. The stiff lungs are difficult to expand and respiration is associated with increased effort and a loud expiratory grunt. As the disease progresses, the lungs become damaged by the forces associated with breathing and plasma will exude into the alveoli spaces as a consequence of the tissue damage. This exudate will rapidly become infiltrated with white cells from the plasma and the protein of the plasma exudate will become organised to form a thick, sticky, proteinaceous membrane that lines the alveoli and airways. Should an infant die at this stage, widespread damage is visible and the lungs are largely filled with a material that stains pink with conventional histological stains. Any such pink staining material is referred to as hyaline material giving rise to the alternative name for Respiratory Distress Syndrome of 'Hyaline Membrane Disease of the Newborn - HMD'.

The combination of widespread alveolar collapse and a profuse inflammatory infiltrate further increases the difficulties encountered in

maintaining adequate gaseous exchange. Restrictions to diffusion of oxygen mean that, at a minimum, increased concentrations of inspired oxygen will be needed, and difficulties in lung expansion frequently mean that mechanical ventilation with high inspiratory pressures will be required. Much of the advance in neonatal care in the last decade has been in the evolution of different patterns of ventilation to try and minimise trauma to the lungs while maximising efficient gas exchange. Techniques that have come into practice have included high frequency oscillation, patient triggered ventilation and extra-corporeal membrane oxygenation. Different modes of support such as liquid ventilation, are currently under evaluation in a number of centres.

INTRACRANIAL HAEMORRHAGE AND ISCHAEMIA

Restrictions in diffusion of oxygen lead to progressive hypoxia, and retention of carbon dioxide generates a respiratory acidosis. The increasing work of breathing induces a secondary metabolic acidosis which is further exacerbated by poor peripheral perfusion due to a mixture of reduced circulating volume, poor cardiac contractility, and systemic hypotension. The physiological instability which results from this combination may have profound effects upon the cerebral circulation. Under normal conditions in a healthy human, blood flow to the brain is carefully regulated so that perfusion remains constant. In the newborn infant this is not the case and perfusion of the brain is subject to rapid and substantial changes. The brain of the premature infant is further compromised by virtue of the presence of a specific cell layer, the germinal cell layer, from which the majority of the elements of the evolving brain develop during pregnancy. To facilitate this developmental activity there is a rich blood supply which is poorly supported, and the blood vessels are prone to rupture. The combination of immature blood vessels and fluctuations in cerebral perfusion which may occur in the sick preterm infant, may result in bleeding into the supporting matrix below the germinal layer which lies on the latero inferior border of the lateral ventricles. Microscopic bleeds are almost universal in this region in any infant born prematurely, but in some infants substantial haemorrhages may occur. In their mildest forms these haemorrhages may present as small collections of blood which are clearly visible on an ultrasound examination but have little long term consequence. In other infants these haemorrhages may be larger and may burst through the germinal layer, so that free blood may lie within the ventricular cavity. Such haemorrhages may be of no consequence but small clots of blood within the ventricular system may prevent adequate drainage of cerebro-spinal fluid leading to the development of post-haemorrhagic hydrocephalus which may be associated with significant neurological impairment. At times the amount of blood which may extravasate into the ventricles may be substantial so that large blood clots fill and distend the ventricular cavities. Outcome with such haemorrhages is substantially worse than if only a small amount

of blood is present. In a small proportion of infants the initial haemorrhage lying on the floor of the lateral ventricle may occlude the venous drainage from the adjacent cerebral cortex, and lead to a secondary venous infarction in this region. Such infants may present with a rapid deterioration and large areas of the cerebral cortex may be involved. Over time the infarcted area cavitates and leaves a large porencephalic cyst. The area of cortical damage may be substantial, and yet in a proportion of affected infants no visible evidence of handicap may be found at any point in the future The fact that substantial damage may occur with no obvious neurological deficit is a reflection of the continuing plasticity of the evolving immature brain in which neuronal formation, myelination and dendritic connections are still being established. In addition to such gross haemorrhages smaller infarctions may be seen as a result of periods of ischaemia and may be widespread throughout the brain. Such generalised damage is associated with a high risk of impairment.

CHRONIC LUNG DISEASE OF PREMATURITY

The immature lungs which require ventilation to attain adequate gas exchange are extremely vulnerable to the damaging effects of elevated oxygen concentrations and increased damage due to repeated stretch and relaxation of friable tissue by the regular distending pressures required. In such lungs an aggressive form of chronic lung disease may develop characterised in its initial stages by widespread inflammation and in the later stages by interspersed areas of alveolar collapse and alveolar hyper-expansion with thickening of the inter-alveolar septum. Marked restriction in gas exchange may result and such infants may require long term supplementary oxygen. Affected infants are particularly vulnerable to respiratory infections in the first year following discharge. In the few very long term studies that are currently available, infants who develop this form of chronic lung disease (previously known as broncho-pulmonary dysplasia) may have significant abnormalities in lung function tests through into their late teens. It is highly likely that such changes in lung structure are irreversible and will always be present in those who have survived mechanical ventilation as an immature neonate.

Within the restrictions of this article it is not possible to describe, in detail, the many other unique conditions that premature infants may develop. The combination of immature development and the treatment required to sustain life may lead to involvement of almost all body systems, and a number of abnormal conditions (Figure 2). The developing retina may be affected by retinopathy of prematurity which in its most severe forms may lead to blindness. The immature intestine may develop necrotizing enterocolitis which may lead to such severe inflammation that perforation and widespread necrosis result. The extreme vulnerability of the immature infant has led to the evolution of many strategies of treatment to try to reduce the possible consequences not only of premature birth but also of

the treatment required to sustain life.

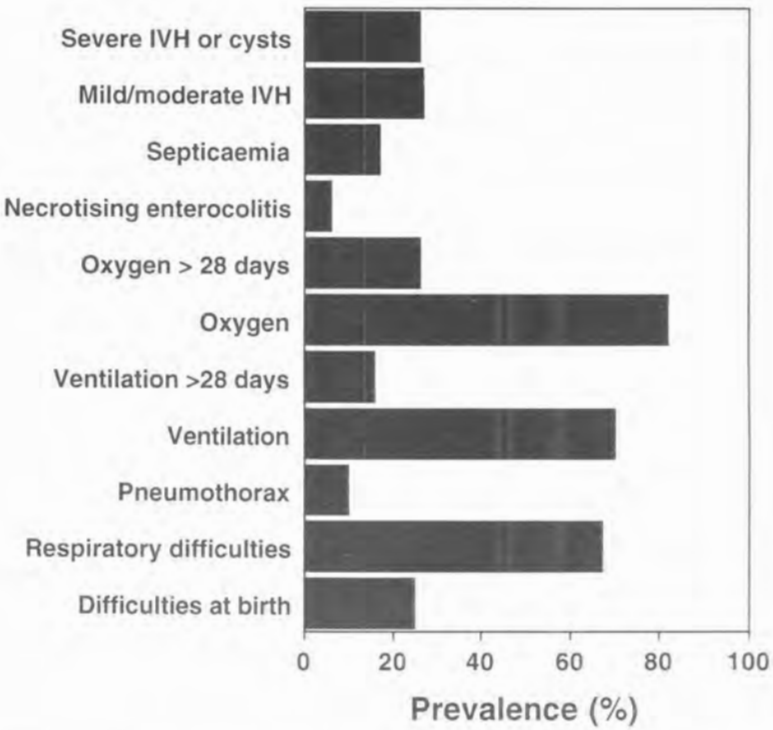

Figure 2: Prevalence of complications of immaturity and need for respiratory support. (IVH - Intra-ventricular haemorrhage)

SURVIVAL AND HANDICAP

Infants born at 30 weeks gestation or above are likely to have as good a long term prognosis as those born at term. Very few of such infants die, and although a proportion require intensive care during an initial period of illness, few will develop the problems detailed above. Below 30 weeks there is a progressive increase in mortality and morbidity (Figures 3 & 4). Currently the limit of viability would appear to be in the region of 22 weeks gestation, at which point very few infants survive. It is unlikely that this limit will be further reduced as it marks the point at which the developing lung is able to adequately exchange gases. Some hesitation must be expressed in over-interpretation of survival figures for the most immature infants as in general these figures will refer to the survival of infants admitted for neonatal intensive care. The majority of infants at 22 and 23 weeks will not be regarded as viable, and active resuscitation will not be performed. At 24 and 25 weeks there is still a substantial proportion of infants who will not be resuscitated, although by 26 weeks the majority of infants delivered are admitted for intensive care.

The proportion of survivors who develop significant problems is directly related to the gestational age at birth. It is difficult to give accurate figures once again, as the reporting of complications varies widely in terms of the definitions of impairment. The data shown in Figure 4 have been complied from a large number of separate reports and caution must be expressed because of the different definitions used in describing impairment. Although the proportion described as severely handicapped may seem substantial, this group includes infants who have mental, physical, visual and auditory handicap, and the different impact upon the individual of, for example, spastic quadriplegia when compared against a hearing defect requiring bilateral aids (both of which are regarded as severe handicap) is obvious. Such studies usually look at clearly defined indicators of neurodevelopmental impairment, but there is increasing evidence that more subtle degrees of impairment in the form of attention deficit disorders and hyperactivity may be substantially more common in infants born prematurely. These may be manifest at school age, at which point learning difficulties appear far more frequent.

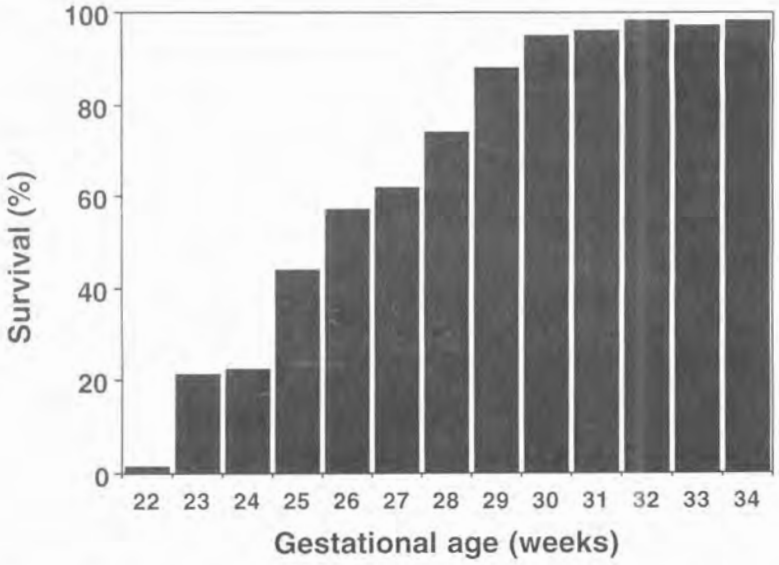

Figure 3: Survival following premature birth. These data have been compiled by combination of a large number of separate published reports.

SHOULD CARE BE PROVIDED?

There is justifiable concern over the level of impairment in infants who are born prematurely and a considerable amount of research devoted to gaining an understanding of the reasons for this impairment and attempting to reduce it further. An important element of outcome, however, which is frequently omitted from all such analysis is the quality of life for those infants who have survived neonatal care. The limited data which are

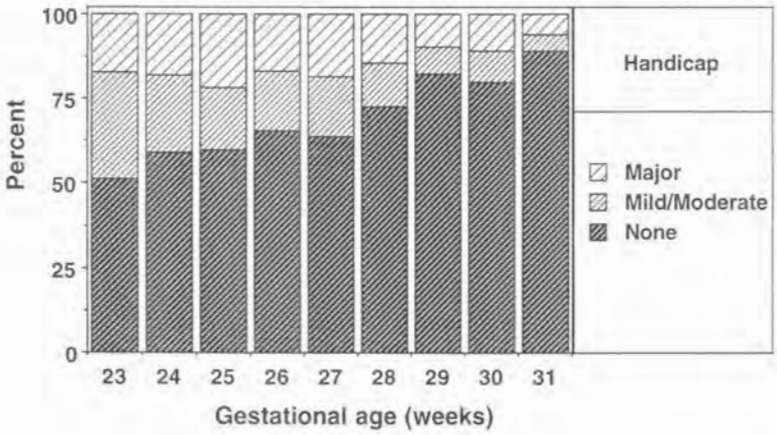

Figure 4: Proportion of survivors with severe, mild to moderate, or no handicap following premature birth. Data compiled by combination of separate published reports.

available suggests that the quality of life as perceived by the infants and their parent is substantially higher than might be anticipated, and always substantially higher than that predicted by the physician providing care. In early teens the majority of infants who were born prematurely would rate their quality of life as highly as an infant born at term, and this rating is often independent of any handicap which the infant might have. It must always be remembered that a handicap which is present from birth may not be regarded as a handicap by the infant, as it is all they have ever known and is only regarded as a handicap by those around the child who possess different faculties.

Neonatal intensive care is expensive and there are undoubted problems of preterm birth. There are frequent and understandable questions raised as to whether the economics of this care are justified, and for the majority of infants born prematurely, there is no doubt that it is. In a small minority who develop significant problems and in whom quality of life is poor this could be questioned, but it must be remembered that all such infants should be regarded as autonomous human beings with their own rights, and the right to an attempt to provide a healthy long term survival must be weighed against any desire to arbitrarily restrict care on the basis of financial considerations. Any decision should be made on the basis of knowledge and understanding, rather than on simplistic and emotive evaluations. As neonatal care progresses and new techniques evolve the accumulation of information to allow these ethical dilemmas to be adequately explored becomes of paramount importance.

NEONATAL CHEST CARE

CHRISTINE PASSINGHAM
Supt. Physiotherapist - Leeds General Infirmary

Introduction

Although paediatric physiotherapists are generally comfortable treating older children, there tends to be an aura surrounding neonates, and many physiotherapists feel nervous when faced with treating a pre-term baby.

COMMON CONCERNS

1. Equipment and monitoring
Do not be threatened by equipment etc. It is mostly there just to give information. Take great care especially with arterial/long lines and with scalp drips which are usually only inserted as a last resort! Always disconnect ETT's before repositioning baby.

2. Treating whilst parents are watching
Explain what you are doing. It is usually better for parents to watch treatment, rather than going away and imagining 'the worst'. It can be helpful to give them a job, eg. support ETT, switching off alarms etc.

3 Acute reaction of baby to handling
Have all necessary equipment ready so you can react speedily.

4. What to do if infant's condition deteriorates
Decide why:-
- Is it a blocked tube? Watch for chest movement, if none - suction.
- Is it baby responding to handling? Chest movement - yes. Remedy - stop handling, increase oxygen and wait until baby 'picks up'.
Always inform nursing staff of changes.

5. Size of patient
Pre-term infants are not as frail as they look. It is very hard to cause rib fractures, due to the compliant chest wall.

COMMON CONDITIONS

Pre-term infants present with a host of medical conditions, but only a small core require physiotherapy involvement. The most common of these are respiratory distress syndrome (RDS), bronchopulmonary dysplasia (BPD, also known as chronic lung disease), meconium aspiration and post surgery for diaphragmmatic hernia or oesophageal atresia.

RESPIRATORY ASSESSMENT

The ability to decide when treatment is appropriate, which techniques to use, how frequently or how long to treat, and assessing the effect of that treatment require the special skills and knowledge of the physiotherapist. They are dependent upon a good thorough assessment being carried out. This should include the main diagnosis and present complaint, birth history, charts - especially mode and trends of ventilation and oxygen requirements, investigations carried out, drugs.

Enquire
- how the baby is handling
- if there are bradycardias or apnoeas
- how baby responds to suction, and its result
- general short/long term plans
- any contraindications to treatment

Observe
- general condition - lively or lethargic
- respiratory effort? - triggering ventilator
- signs of respiratory distress or pain
- chest movement - bilateral/unilateral/compromised by abdominal distension

Palpate
- creps/wheezes/ruckles
- expansion/compliance
- respiratory effort

Auscultate
- air entry
- added sounds - creps/wheezes etc.

Indications for treatment

1. Retention of secretions
2. Lung or lobar collapse due to mucus plugging
3. Productive consolidation

Any treatment must be justified as pre-term babies generally do not tolerate handling very well. Treatment or suction should **never** be routine. It is taking the easy option to treat a baby, rather than explain to staff or parents why intervention is not appropriate at any specific time. This approach would clearly **not** be good practice.

However, it is important to remember that secretions are much more of a problem in babies than in older children or adults. This is for a variety of reasons:
- intubation causes trauma to the trachea
- sedation depresses the respiratory centre
- babies often have a poor cough reflex
- cilial damage occurs even after 24 hours
- babies have very narrow airways and often very thick secretions

CONTRAINDICATIONS

1. **Severely ill or unstable baby** - most pre-term infants fall into this category. The physiotherapist must continually assess the value of treatment and keep sessions as short and effective as possible.

2. **Pulmonary haemorrhage** - common, due the immature clotting mechanisms of pre-term infants. Percussion and vibs can cause production or continuation of bleeding.
Suction should be carried out minimally. When blood is old, physio can proceed with caution to clear debris from lung fields.
3. **Tension Pneumothorax** - ensure adequately drained with chest drains in appropriate position.

TREATMENT TECHNIQUES AND METHODS

Positioning and postural drainage are valuable since the main conducting airways are completely developed in the neonate. One or two positions may be used at each treatment, most common are prone, alternate side lying with head up, and flat.

Percussion and vibrations are effective methods of mobilising secretions. Use of a Bennets face mask can be a way of standardising treatments. There is no need to be too gentle or the treatment will be ineffective and the baby disturbed for nothing.

Instillation of saline has been shown, in research, to be ineffective, but in practice it is needed because of the thick secretions, narrow ETT and catheters. Use <0.5 ml in pre term babies and 0.5-1ml in full term.

Suction must be done with great care, when indicated and **never** as routine. The catheter can reach marginally beyond the end of the ETT. Babies will usually need pre-oxygenating by at least 10% prior to suction.

Hand bagging is not used routinely in the treatment of premature babies.

If conventional treatment is not sufficiently effective bronchial alveolar lavage or suction under direct laryngoscopic vision may be considered. CPAP with a Whisper Flo generator will enable airway to be splinted open therefore enabling treatment without the risk of atelectasis.

CONCLUSION

Chest physiotherapy is an integral part of the care of many pre-term babies. However, it should only be carried out when specifically indicated, and then with great care. With thorough assessment and constant evaluation the physiotherapist will be able to provide efficient and effective treatment, with a positive outcome for the baby.

THE GREAT AMERICAN EXPERIENCE - AN UPDATE ON CF

LIZ HARDY
Senior Physiotherapist

In October 1996, members of the paediatric CF team from North Tees NHS Trust were lucky enough to attend the 10th Annual North American Cystic Fibrosis Conference in Orlando, Florida. We decided, a few years ago, to raise enough funds for all of us to go together. So, thanks to lots of hard work fund-raising (mainly by our specialist nurse, Jennifer), two paediatricians, dietician, nurse and physiotherapist set off for adventure in the USA. Our managers happily granted us study leave - and worried what would happen if all any of the CF patients were ill!

Since we stayed in Walt Disney World (well, we were from the paediatric unit after all!) we were hoping for a 'magical' experience and we were not disappointed. The conference was WONDERFUL. There were 2400 delegates including 117 from the UK. Of these, only 11 were physiotherapists, so I feel very privileged to have attended. I had never been to a large international conference before, and wanted to see and do everything on offer. However, the range and variety of topics made this difficult. There were: 7 'Early Bird' short courses, 1 special symposium, 3 plenary sessions, 17 symposium sessions, 31 workshops, a variety of caregivers discussion groups, special interest group meetings, case conferences, physicians grand rounds, rise and shine roundtables (over breakfast) and, for those still awake at the end of a long day, fireside chats. It took a little while to get used to dipping in and out of sessions (like the Americans did), but with a little careful planning, the five of us managed to hear almost everything.

Obviously, I cannot summarise the whole conference, so here are some of the most interesting bits (in my opinion) - more details and all references are published in Special Supplement 13 (1996) Paediatric Pulmonology - ISSN 8755-6863. I apologise that it appears a bit disjointed, so I've tried to put things into specific sections. I've also added some current thinking for comparison and some personal comments here and there.

CF IN EARLY LIFE

Several studies reported significant damage to the lungs occurring very early in life. Altered lung function, airway narrowing and gas exchange anomalies are present before the age of 9 months in many cases, despite most children in this age group having normal clinical and radiological indices. This obstructive lung disease is progressive despite treatment.

INFLAMMATION

This is the primary damaging feature, and leads to bronchial obstruction. It is inflammation, rather than infection, which is present in the early weeks of life, is sustained and can be severe. Recommended palliative treatment is low dosage of prednisolone taken on alternate days. Ibuprofen or pentoxifylline can also be useful. Early and aggressive management is required.

ABILITY TO EXERCISE

It is established that activity levels are influenced by nutritional status and lung function. A new study by Boucher & Lands suggested that in those patients with significant lung disease (FEV predicted <75%), the main limiting factor is inadequate nutrition, and that dietary improvement is likely to lead to increased exercise tolerance.

Formal exercise tolerance testing is a useful adjunct to routine assessment. A poster presentation described a Step Test which is currently being evaluated at Great Ormond Street Hospital for Children, as an alternative to the standard 6-minute walking test. It is quick, simple to perform and requires little space to carry out. (I've tried it and find it most useful).

ISSUES RELATED TO CHEST PHYSIOTHERAPY

A whole symposium was devoted to "The best scientific evidence that airway clearance techniques are effective". A review of the research related to autogenic drainage, PEP, ACBT, high pressure PEP and oscillating PEP (flutter) was presented by the originator of each technique. Sadly, no attempt was made to draw techniques together or to help evaluate what the optimum technique might be for any specific patient, related to age, severity of illness or symptoms. Any UK physiotherapist working regularly with CF patients would have learned very little from these sessions. (The level of the lectures made me think we must be 'ahead' of the North Americans - but I could be wrong!)

The use of hypertonic saline is being extensively researched by Button et al in Melbourne, Australia. It is accepted that hypertonic saline can increase bronchospasm in asthmatic patients, but that it also increases cough and mucocilliary clearance. Button's studies demonstrate increased sputum yield and an increase in FEV. A 3-year trial is currently looking at the long term effects. I, personally, am a little confused since the increased salt content in the airway surface fluid of CF patients is known to inactivate the lung's innate antimicrobial activity against staph aureus and pseudomonas aeruginosa. I wonder if the use of inhaled hypertonic saline will increase this problem. Perhaps further research will make this clearer.

A poster presentation by the team from Liverpool, showed that those patients undergoing bronchial lavage, under general anaesthetic, during elective surgery for insertion of a port-a-cath or a gastrostomy, required up to 25% less post-operative physiotherapy. This is likely to be both kinder to the patient and more cost effective.

TRANSPLANTATION

Despite the hopes of the CF world, the number of donor organs available for transplantation remains low. However, approximately 100 bilateral lung transplants have been carried out worldwide, and this is currently the method of choice.

In addition to cadaver organs, living donor transplants have been carried out as a 'last resort' option. One lower lobe is taken from each of two healthy donors, who are preferably taller than the recipient (to provide a larger lobe). Due to the demands of caring for the recipient post-operatively, donors are preferred to be unrelated to recipients.

MALE REPRODUCTIVE TRACT ABNORMALITIES

It is known that 95% of males with CF are infertile as a result of abnormalities such as absence of vas Deferens, or atrophied, fibrotic or absent seminal vesicles or ejaculatory ducts. Several studies of non-CF males presenting at fertility clinics have shown that between 50 and 82% have at least one known CF mutation. These are most likely to occur in those males with a low percentage of motile sperm or who are diagnosed as having congenital bilateral absence of vas Deferens (CBAVD). This then begs the question 'Is CBAVD a mild form of CF?'. Obviously huge 'cans of worms' could be opened here, particularly with respect to assisted conception.

REPRODUCTIVE ISSUES

More than a third of CF patients are now over the age of 18, and are leading full and productive lives. A US multi-centre study has investigated the effect of pregnancy (previously thought to have detrimental effects on both lung function and life expectancy), and shown that pregnancy did not lead to a decrease in pulmonary status either during the pregnancy or in the following 2 years.

The sperm of males with CF is usually of 'standard' quality and can therefore be used in assisted reproductive techniques. The favoured method is IVF plus ICSI (intracytoplasmic sperm injection) following retrieval of oocytes from the female partner and testicular sperm from the male.

CONCLUSION

To attend a conference where almost 2500 people are all interested in the same things is an amazing experience. Our CF team were greatly reassured that we were 'going along the right lines', and we did learn things which changed our practice. Attending together was also an unbeatable team-building exercise, and it cannot be denied that we had great fun!

We're now fundraising to go again in 2-3 years. Hope to see You there!

PHYSIO IN HOSPITAL

ANDREW TIPLADY

Before I start telling you about my physio experiences in hospital I think I should tell you a little bit about myself.

I am 18 years old and have been coming into hospital every 3 months for the past 11 years or so.

The reason for this is that I have Cystic Fibrosis and need regular treatment to keep my lungs as clear as possible.

For this I have I.V. antibiotics and Chest Physio.

When I am at home either my Dad or Myself would do my physio but when I come into hospital I leave it up to the Professionals, I do this for two reasons:-

1. The Physios will know if I need to do extra physio or if I need to change the positions or the way I do my physio.

2. It gives me a rest from doing it myself.

If I were to do my physio all the time every day, every week, every year I probably would go insane, so letting the physios do it for me is like giving myself a little holiday from my physio! Which to me is a welcome break!!

Well, enough about me! Now it's time for me to tell you about my physio.

When I come into hospital I see the same physios each time so I know them really well and they know me and my chest really well too.

I have physio twice a day which involves percussion, vibrations, huffs, sniffs, deep breathing etc. so as you can imagine it's hard work doing physio not only for myself but also the person who is doing the physio!

When the physios come and see me, it is quite informal because if you can imagine me being bashed and told when to huff and when to do deep breathing it would be really boring but the physios who see me are always telling me jokes and are really friendly and happy. There is even a certain physio who we shall call "M" who does rather good impressions!

I have physio on my bed, so when they come I have to clear it because it is usually a complete mess, this can take up to 5 minutes on a bad day!

There is a serious side though, having physio keeps me well and active and without it I would be very ill indeed. So I am glad that the physios are there to help me and give me advice if and when I need it.

If I did not do my physio I would become unwell and would have to come in to hospital more often and would possibly have to stay longer than the usual two weeks, so you can see why I religiously do my physio every day.

At the moment I come to the children's ward when I am admitted but because I am 18 I have to move to the adult chest ward. It will be interesting to see if the physio will be any different on the adult ward because I will not be seen by the children's physios any more which is a shame because they have become my friends. What I do know is that physio is one of the most important parts of my life and that without it I would be stumped!

AN EVALUATION OF THE BENEFITS OF HALLIWICK SWIMMING ON A CHILD WITH MILD SPASTIC DIPLEGIA

KATE MACKINNON
MCSP

Introduction

The case study will look at the effect of carrying out Halliwick swimming on an 8 year old boy with mild spastic diplegia. Over a period of 9 months he had 16 swimming sessions which showed a measurable improvement in his swimming ability as well as in his physical ability. During the time he achieved independent swimming and his standing balance and walking pattern improved. Other subjective improvements were also identified.

LITERATURE REVIEW

Although there are a number of articles written about the benefits of hydrotherapy and swimming for people with disability there has been little research carried out to substantiate these claims.

The approach used to help Paul, the subject of this case study, gain water skills was using the Halliwick method. Halliwick swimming was devised by James McMillan who was an engineer by profession and also an Amateur Swimming Association teacher. The method is based on known scientific principles of hydrostatics, hydrodynamics and body mechanics and aims to teach people with special needs to become as safe and independent as possible in the water (AST, 1991). The backbone to the approach is based on a 10 point programme. Emphasis is placed on gaining breath control, aiming for the swimmer to be able to submerge underneath the water and to be able to blow out. However, this definition of breath control is not followed by all methods. Grosse and Gill (1983) have stated "Progressions in developing breath control include dunking and graduated breath holding under water". This is viewed as being dangerous, as breath holding causes a build up in carbon dioxide in the blood stream stimulating inspiration whilst the person may be submerged (AST, 1992). If the instructor can see bubbles then they know that the swimmer is safe. It also causes increased tension in the body which reduces the buoyancy of the body.

No floatation aids are used and this can sometimes cause concern for physiotherapists. Many of them argue that with the floatation aids they can float independently and do not require any assistance. However, this then prevents any further progression e.g. submerging and rolling (AST, 1991). Also the child will learn to balance in the water with the floatation aids, and once they are removed, they will have to start all over again. For children who already have problems with their balance this can be very disheartening. The philosophy of the method is that the swimmer is water happy and the emphasis is on ability not disability (AST, 1992).

AN EVALUATION OF THE BENEFITS OF HALLIWICK SWIMMING ON A CHILD WITH MILD SPASTIC DIPLEGIA

Movement in water allows people with disabilities freedom from the constraints that they endure on dry land (Peacock, 1994). One of the advantages of using the water as therapy is that no matter how severe the physical disability they can learn movement in the water. An added bonus is that swimming can also be used as a recreational activity. Combining the therapeutic and recreational aspects of swimming has been discussed by Dulcy, 1983. She argues that there is a dichotomy between recreational and therapeutic approaches. This is supported by Harris (1978), a physiotherapist who follows the normal development therapy, and criticises the promotion of teaching frontcrawl or backcrawl. These are asymmetrical strokes which she argues facilitate abnormal postural reflexes, instead she suggests that the swimmer should be taught breast stroke which promotes hip abduction. In the experience of the author this argument is invalid and the swimmer should be encouraged to seek the most efficient method of moving through the water whatever that may be. Dulcy does, however, identify some common ground between the recreational and therapeutic approaches, these are: three dimensional exercise, perceptual stimulation, buoyancy and respiratory effects, psychological benefits, balance and rotational control. Skinner and Thompson (1983) also identify these advantages and feel that water can provide massive perceptual stimulation visually, aurally and through skin receptors, owing to the turbulence, heat and hydrostatic pressure. Reid (1985) suggests that the perceptual and visuomotor skills improve because the water slows down movement and gives the child time to react and appreciate how to use his/her body.

There is also a great psychological value of swimming. In water, people with a disability often achieve as much as the able bodied population (Gresswell, 1991). This can be witnessed in the Association of Swimming Therapy's video 'Water Free', in which a person with a severe disability is seen to perform a controlled somersault in the water - this is something that would be virtually impossible to experience on land and it is indeed something that many able bodied cannot achieve in the water.

CASE HISTORY

Paul was born at Hammersmith Hospital after 27 weeks gestation by caesarean section. He was one of a pair of fraternal twins, and weighed 1.1kg. and his sister was 860g. They were both on the special bay care unit (SCBU) for three months. Paul had many of the complications common to premature babies and required ventilation where as his sister thrived well during her time on SCBU. He had an intraventricular bleed at 3 days which probably gave rise to his motor problems in the form of mild spastic diplegia associated with mild learning difficulties. He also had a pulmonary haemorrhage, liable blood pressure, serial lumbar punctures and ventricular taps. He was critically ill whilst on SCBU and his parents spent a lot of time on the unit talking to and touching Paul. He

was slower to develop his gross motor skills than his twin sister although his parents feel that his development was faster than it might have been due to him competing with his twin. He sat independently at 1 year, crawled at fifteen months and walked at 2 years 3 days. It was noted that he had greater control on the left side even though he is right handed. During his time in nursery it was reported that Paul's play was exploratory and solitary. He found it difficult to stand up to his peers and often relied on his sister to speak up for him. He had slurred speech and rarely initiated conversation. The family moved from London in 1993 where he had been statemented for his educational needs. He subsequently started school in Oxfordshire where he has been making good progress, the areas of concern being his mathematical skills and the use of his imagination. Recently with the loss of a teacher due to education cuts the class size has risen mixing the ages and he has also been separated from his twin sister. As a result of these changes the parents have decided to send them to a private school in January. Paul has two younger brothers who are both fit and well.

Paul received physiotherapy assessment when he was five in London. He did not receive physiotherapy when discharged home because he was part of a research study until 18 months old. His parents now feel that they should have been informed that Paul would normally have had physiotherapy input. When the family moved to Oxfordshire in December 1993 he first started to receive regular physiotherapy input. He is currently seen by myself on a half termly basis at home and I have been taking him swimming using the Halliwick method, privately, since March 1995. The swimming was instigated at the request of the parents as they felt it was very important but were unable to find suitable lessons for him in the area.

METHODOLOGY

Paul was measured on the Swimming With Independent Measurement (SWIM) assessment and the Gross Motor Function Measurement (GMFM) when he started the swimming sessions in March 1995. Between March and October he had 10 sessions. As a result of Paul being the subject of this case study a six week period of weekly sessions was assessed, starting from October 1995 to December 1995. At the beginning and at the end of this period a video was taken along with the SWIM and GMFM assessments.

The SWIM assessment was devised as a means of assessing disabled children who were following the Halliwick system. Kim Peacock, a Halliwick lecturer, and Joe Mason, an OT student developed the form. The form has 11 items, and scores range from 1-7, the maximum score therefore being 77. Although it has not been validated I have had previous experience of using this assessment. I have been using the Halliwick method for five years and am currently training to be a Halliwick lecturer.

The Gross Motor Function Measurement was devised in Canada as a means of assessing a cerebral palsied child's physical ability. The GMFM assesses 88 items of motor function in five areas a) lying and rolling b) crawling and kneeling c) sitting d) standing e) walking, running and jumping. The scores range from 0-3. All items would usually be accomplished by a 5 year old with normal motor abilities (Rosenbaum, 1989). It has been validated (Russell, 1989) and I have undergone training in the use of the assessment and it is used routinely for children with cerebral palsy on my caseload.

A video was used to analyse the improvements over time and to identify the subjective improvement which may have been missed by the objective measurements.

RESULTS

The results show that there was an improvement both in his swimming and physical skills.

VIDEO

The video clearly showed the improvement in Paul's confidence in the water. In December he is much happier about being in the water and feels confident enough to walk in the water unaided and to attempt swimming on his back independently. The video also shows that his single leg stance has improved over the 3 months, particularly his balance on his more affected side, the right. In March he tended to toe walk but when the video was taken in October his walking had improved so that he now walks with a predominantly flat footed gait pattern. However it can be seen that by December he walks with a narrower base of support.

SWIMMING

The main areas of improvement were in his vertical and horizontal balance. At the beginning of the 6 week period he could only walk a short distance in the pool with the instructor in front. At the end of the period he could walk around the pool unaided without the eye contact of the instructor. His ability to initiate a lateral rotation improved, by October he was able to lie on his back, bring his arm and leg, of the same side, across body with helper physically supporting whereas in March this could not be attempted but in December he could turn and blow in the water. By December he could float, on his back, in the water unaided and could swim a short distance. His actual scores were 34/77 in march, 46/77 in October and 52/77 in December. Figure 1 shows the improvement over time of his swimming ability.

PHYSICAL ABILITY

His GMFM scores improved over time. The main area of improvement was seen in his standing balance. His single leg stance improved by a factor of four from one second in March to four seconds in October and on the left leg an improvement from six seconds in March to ten seconds in December was seen. He also became able to attain standing through

half kneeling without using his hands and his ability to walk up and down the stairs also increased (this is another balance related activity). Figure 2 shows Paul's physical ability improvement over time.

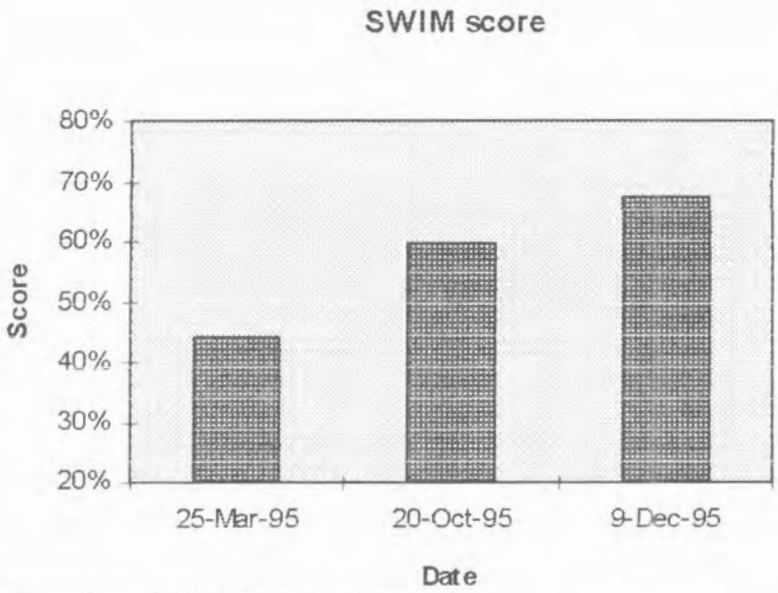

Figure 1 graph of SWIM against time.

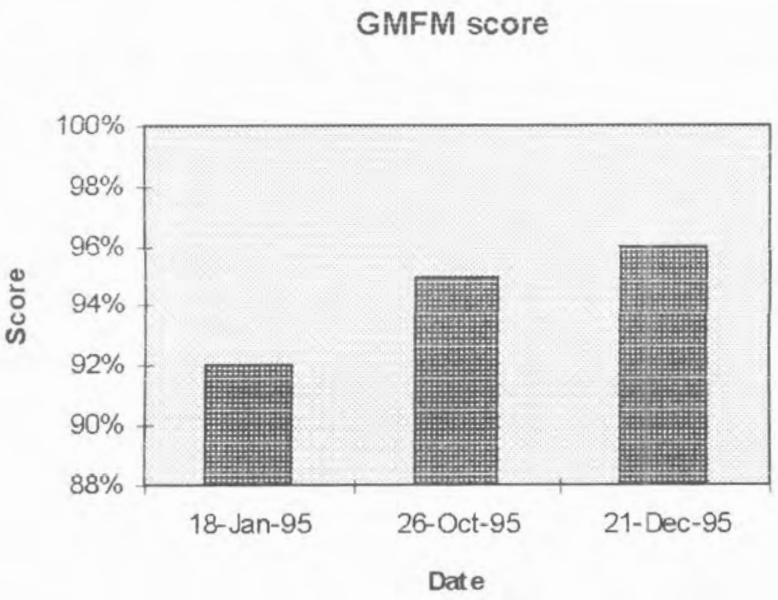

Figure 2 graph of GMFM against time

ANALYSIS OF RESULTS

It is proposed that these changes in Paul's gross motor skills took place as a result of the swimming. The Dynamic Systems Approach (Thelan, 1989) helps to provide a theoretical framework for this. When Paul first started swimming in March 1995 he found it very difficult to maintain his vertical balance. He soon became happy to submerge under the water but was unable to keep himself vertical and would fall forwards onto his stomach. It took him from March to October to be able to maintain his vertical balance to successfully carry out a game called 'spaceships' where the child has to climb round an adult who has their arms outstretched, he would often fall forwards or backwards and would be unable to correct himself. It is felt that this is the first time that Paul's vertical balance has been challenged sufficiently enough for him to have to learn a way to correct it. It is proposed that he had devised compensatory mechanisms to correct his balance on land which were not adequate enough in the water. The Dynamic Systems Approach (Thelan, 1989) puts forward an explanation of how this change could have occurred. It looks at how the different parts of the body and the environment cooperate to produce stability or to engender change. For a child to move, perception, motivation, plans, physiological status and affect must all interact with a mechanical system that is composed of muscles, bones and joints (Thelan, 1989).

The theory states that motor control needs to be in context of the task itself and the environment in which it is being performed, as they are powerful factors in the production of controlled movement (Shepherd, 1995). Therefore in Paul's case the properties of water such as buoyancy and increased resistance to movement create a change in the environment in which he was moving and he therefore had to learn how to balance and move in the water, creating an active learning process. This agrees with Carr and Shepherd (1991) who state that the therapists should provide the environment and goals which enable the individual to learn to perform self-initiated active body movements within naturally occurring constraints.

Paul's physical abilities have improved to such an extent that there is now a much reduced need for physiotherapeutic intervention. It has been argued that this is due to the swimming and it is anticipated that once Paul has become an independent swimmer he will be discharged from physiotherapy. In the environment of the present day NHS this represents a cost effective intervention.

DISCUSSION

The benefits that have been measured physically have been discussed. It was also felt that there were unmeasured benefits. Paul developed much greater confidence in the water and this is an area that his parents feel he is lacking in. This observation has also been made by Martin (1983) who

states 'as the child develops an ability to move and enjoy the water, he seems to improve his self-awareness and inner self-esteem.' Paul was also motivated to come along to the swimming and enjoyed the sessions, often staying in the pool for nearly an hour. Treatment and play are inseparable in the young child (Shepherd, 1995). The Halliwick method incorporates this philosophy as it is based around the use of games and songs. One of the difficulties with carrying out the exercises recommended by the physiotherapist was Paul's lack of enthusiasm and reluctance to carry them out with his mother. This resulted in his mother becoming negative about the exercises and creating tension in their relationship. Care must be taken in the involvement of parents (Ross, 1993) and the therapist should be cautious about overburdening parents by expecting unrealistic or inappropriate levels of involvement which may reinforce feelings of inadequacy in the parents (Featherstone 1981). Both Gibson (1995) and Patterson (1994) have looked at the relationship between the health care professional and the parents. Both find that the relationship is one of negotiation and empowerment of the parents. It is argued therefore that the physiotherapist should be able to provide the treatment in the most appropriate setting in order to maximise the benefits. The swimming sessions were carried out on a private basis because currently the time and facilities were not available. This arrangement still required a joint therapist-parent relationship and the family needed to make special concessions and arrangements (Martin, 1983). However it can be seen from the results that the improvement seen is significant and therefore extremely worthwhile. It also helps to meet the requirements of the Children Act (1989) which states 'services must be provided to minimise the effect on disabled children in the area of their disabilities and to give such children the chance to lead lives which are as normal as possible.'

The Halliwick method advocates the use of groups as there are many benefits from a group situation and for some of Paul's sessions his twin sister joined in. This proved to be a great success in advancing his water skills particularly in being able to walk around the pool without the instructor being in view. This can be seen on the videoed session in December when they are playing with the balloon. By having an activity which is beneficial to Paul and in which his twin can also participate is very important. They have a very close relationship and excluding her could have a detrimental effect. The water skills he gained over the nine months has enabled Paul to integrate in with his school and family swimming sessions. Milani -Comparetti (1979) states that "All physiotherapy can be decoded to become experience of life, instead of encoding life into therapeutic exercise." This means that physiotherapists need to work in a function orientated approach directed toward optimum independence in adult life (Bleck, 1982). These water skills will help him to integrate with his peer group all the way through his life. Integration

is defined by Hutchinson (1979) as a process whereby individuals participate and enjoy experiences similar to their non-disabled peers.

Providing Paul with skills to participate in a sport for the rest of his life is important as it provides him with a means of keeping himself fit. As Paul gets older it has to be recognised that there needs to be a change in approach from physiotherapy programmes to encouraging an acceptance of responsibility for his own fitness for life (Johnson, 1995). The importance of maintaining a certain level of fitness is backed up in a study carried out by van den Berg-Emons (1995) who found that children with spastic diaplegia are considerably less active than their healthy peers and they recommended special physical activity programs for these children.

The National Curriculum for physical education includes swimming in key stages 2-4. In Key stage 2 which is for 7-11 year olds Paul has already achieved one of his targets which is "to develop confidence in water and learn how to rest, float and adopt support positions." He is also able to swim a short distance unaided and is required to be able to swim 25 metres. It is felt that Paul would not have gained these skills through his school swimming programme. In the school swimming session there was nobody in the water to give him assistance, he was in very shallow water so was not experiencing the properties of water and he was given a float throughout the whole session. This approach disagrees with the definition of integration by Hutchinson (1979) who feels that for true integration to take place there should be the means of providing support and changing and adding services where necessary. Gresswell (1991) found that swimming sessions within a special school setting could be used to help fulfil aspects of the National Curriculum core subjects as well as the Physical Education requirements. Although Paul attends a mainstream school it should be recognised that it benefits all aspects of a child's development (Gresswell, 1991).

SUMMARY

The case study has measured the changes in the swimming and physical ability of Paul over a nine month period. It found that there were improvements in both of the areas. It is proposed that the gaining of the water skills led to an improvement in his standing balance and the Dynamic Systems Theory is used as theoretical framework. It also found that there were additional advantages to carrying out the swimming sessions such as increased confidence, aiding integration with his peer group and improved ability to maintain an adequate level of fitness.
It concludes that swimming is an important sport to be learnt by a disabled child and the opportunity for mastering the necessary skills should be made available.

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Video

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CHAIRS FOR YOUNG CHILDREN: AN EVALUATION

Submitted by:
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Dip. COT, Research O.T.

The Disability Equipment Assessment Centre is funded by the Medical Devices Agency, an executive agency of the Department of Health, to undertake independent evaluations of equipment in order to collect evidence from users on the use and functioning of that equipment, in appropriate settings.

The number and range of chairs for young children with disabilities has increased over recent years. The market has been stimulated because more children are provided with special seating at an early age as part of therapists' intervention. Little evidence of their function was available, so a sample of 10 chairs, representing the range of seating types, and chair features, on the market, were chosen. These were:

Floor sitters:
three corner seats with the Tumbleform floor sitter, see Fig. 1

Chairs that provided approximately 90 degree flexion at hip and knee:
one high chair, one with a facility for prone sitting, one corner seat on a plinth, one conventional style chair, see Fig. 2

Bolster seats:
one with a backrest and facility for prone sitting, one with a chest and hip support, see Fig. 3

As this study was for *young* children, the maximum height for inclusion was 105cm, the normal height for a 4-5 year old.

AIMS

1 To identify the type of seating and chair features which best meet the differing needs of children with disabilities.

2 To provide guidelines for prescribers and parents that facilitate the choice of an appropriate chair to meet a given child's needs.

METHOD

As these chairs are used both in the therapy setting and in family homes, the chairs were tested in both settings, following pilot work which included focus groups with parents and therapists. Seven centres, comprising Child Development Centres, Opportunity Playgroups and school nursery classes, each tested the chairs in one or two of the 3 groups described, thus providing data from 4 centres per chair group. Either 12 or 16 children tested the chairs in one group in their own home. After the trial period, the parent completed a questionnaire with the researcher in the home trials; a lead therapist responded on behalf of all those who had tried children in the chair in the therapy setting.

Forty children took part in the home trials; their disabilities included 25

who were unable to sit unsupported (Chailey level 1-2 Mulcahy et al, 1988), 17 with poor head control, 11 liable to extensor spasm, 26 with low tone in the trunk, 23 with high tone in the limbs.

Figure 1 Floor sitters

From left to right: Jenx Corner seat, Smirthwaite corner chair 516. Tumbleform floor sitter Deluxe, Taylor Collapsit

Figure 2 Chairs that provide flexion at hip and knee

From left to right: Tripp Trapp, Taylor Hillside, Jenx Lion, Leckey County chair

Figure 3 Bolster seats

From left to right: Seal seat, Jenz Mouse

RESULTS

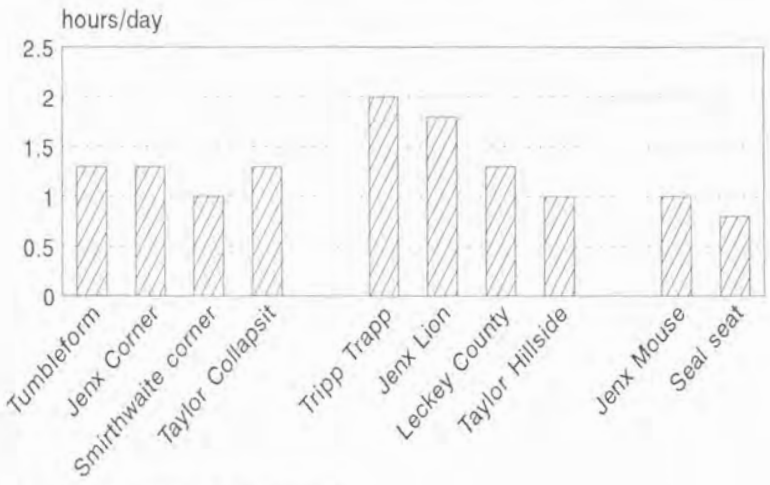
Data presented below are predominantly from the home trials; where responses from the therapy centre trials are included this is stated.

In the home trials, children were reported as using the chairs between a few minutes a day to 2 hours, typically in 2 sittings. Figure 4 shows the ten chairs evaluated, arranged in the three groups, with the mean number of hours per day recorded. The Tripp Trapp usage may be higher because this was quite often used at mealtimes as well as for other activities.

Of all the chairs tested, the researchers felt only the floor sitter group was really appropriate for those with poor head control. This is borne out by the results in Figure 5, where a greater number of parents felt their child was adequately supported in this group, shown on the left.

Eleven children with extensor spasm participated in the home trials, and findings are not conclusive, but suggest that long sitting is only successful when the child is well supported, as most were in the Jenx and Taylor corner seats. Tipping the chair is the main risk, and several parents placed the corner seat against a sofa to prevent the child tipping it backwards. Therapists feel a small forward tilt in the seat is often helpful. The angle can be critical, with children trying to right themselves when tilted too far. Several parents found the Jenx Mouse bolster seat satisfactory, provided the extensor thrust was not severe.

Figure 4 Usage of the chairs at home



The mean is given for each chair

Figure 5 Children with poor head control: parents' opinion of support provided

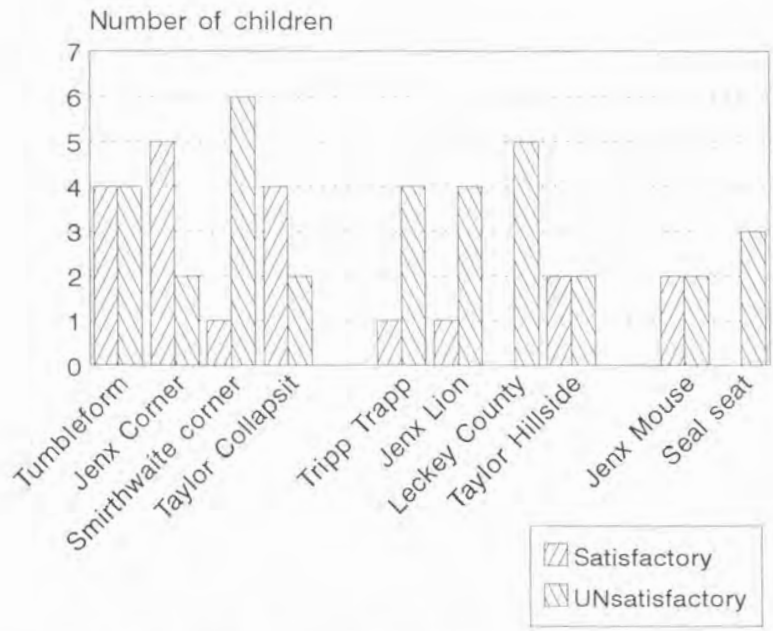


Figure 6 shows the results of those with high muscle tone in their limbs. Corner seats were successful in facilitating satisfactory posture for most of the children with high tone in their limbs, provided the chair gave good trunk support. This is the reason for the poorer performance of the Smirthwaite chair. In the group that provide flexion at hip and knee, few parents thought the Jenx Lion facilitated good posture, but this was the only chair in this group that provided knee blocks and a prone angle seat,

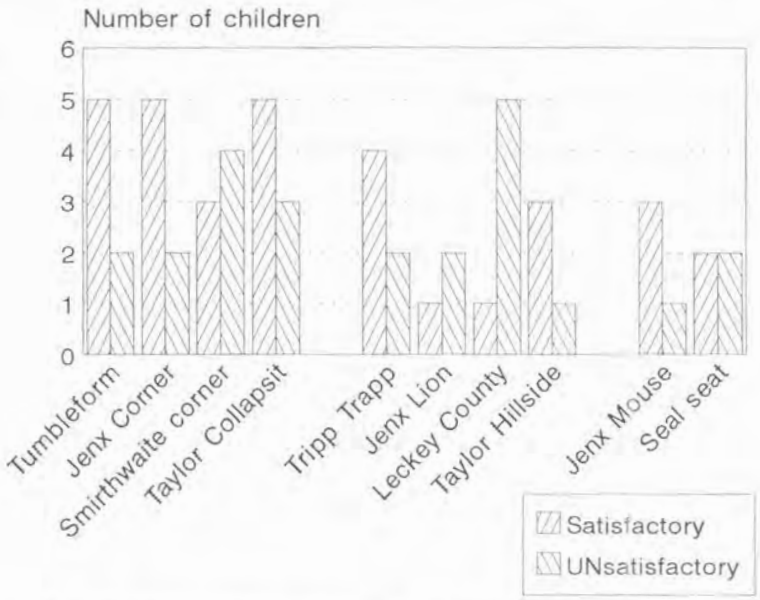


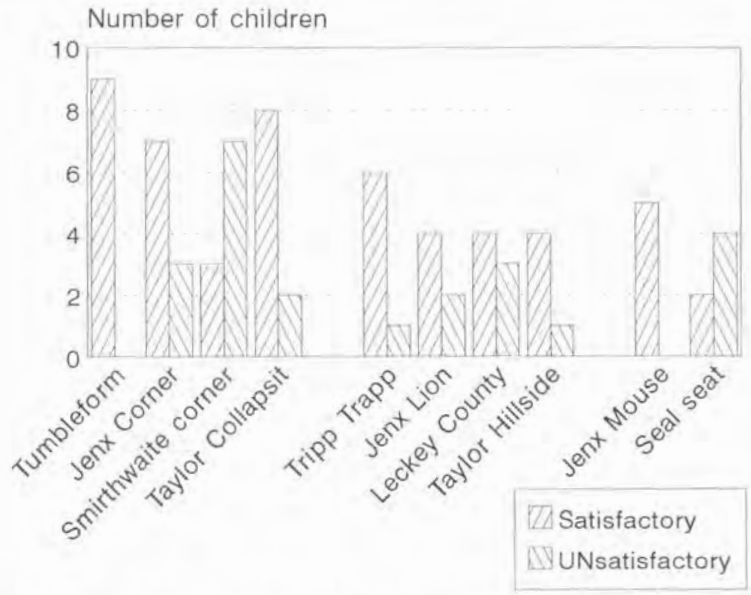
Figure 6 Children with high muscle tone in their limbs: Research Therapist's opinion of posture

which in the home setting can cause problems: better support for the child, but very fiddly for the parent, with potential for adjustments to go awry over time. Again, the Tripp Trapp was considered good. The performance of the two bolster seats was similar; one parent reported the astride position had reduced the tone in her child's legs, and that this carried over after leaving the chair.

The therapist's opinion of the posture of those with low muscle tone in their trunk is recorded in Figure 7. In the Floor sitter group, all parents were satisfied with their child's posture in the Tumbleform, which gives the greatest support of the chairs in this group. Of the remaining seats in this group, the closer fit provided by the Taylor Collapsit, which is slightly smaller than the other corner seats tested, gave adequate support to the highest proportion of children with low tone. Of the chairs that provide a 90-90 sitting position, the Tripp Trapp performed best with respect to the child's posture. This had a wide chest support band, which was often used in conjunction with the baby rail. Of the two bolster seats, the Jenx Mouse gave more children a satisfactory posture. This may be due to the advantage of the back support with straps on the Mouse as opposed to the front support of the Seal seat.

The parents gave their opinion of the chairs' appearance. The Taylor Hillside was considered least attractive by the parents, and also by the therapists in the therapy sitting trials. The Mouse was considered most attractive by the parents, and the Jenx Corner by the therapists, illustrating the popularity of this firm's products.

Figure 7 Children with low muscle tone in their trunk: Research Therapists's opinion of posture



Parents felt their child was most comfortable in the Lion, although the Tumbleform was a very close second, scoring a mean of 1.167 (on a scale of 5, where 1 was very comfortable) and 2.20 respectively. The Seal seat was considered least comfortable, with a mean of 3.20.

DISCUSSION

In the home trials, the parents were able to use each chair that they tested in the course of their normal routine with the child. This gave them the opportunity to see it from all viewpoints; having to clean it, and seeing the child's posture in the chair, and how that posture changed over a period. Completing the questionnaire at the end of the week's trial helped many parents to look more critically at its functioning. It is important to involve the parent when prescribing home equipment, because factors as diverse as size, colour, ease of use and weight of the chair, and how comfortable or beneficial it is regarded to be, will all play a part in determining whether the product will be used at home. The cost of equipment is such that it is a better investment to purchase a slightly more expensive piece of equipment that the parent is convinced is going to be useful, than supply a cheaper or more readily available one that will be permanently stored in the cupboard.

The experience of this study is that most parents are both interested in and skilled at judging their child's posture, but that perceived comfort will usually override therapeutic benefits if the two conflict. For some homes, space is severely limited, therefore size becomes crucial, but for other homes, it will be less important. Involving the parents in choices on all of the variations that the therapist considers within the parameters

of adequate provision for the child's progress will raise the parent's self esteem, ensure fuller use of the product when it arrives, and result in a more satisfied customer.

CONCLUSION

Chairs for under fives are typically used for 1-2 hours a day. Of the ten chairs tested in this evaluation, the floor sitter group provided better support for those with poor head control. Corner chairs are at risk of tipping if a child has extensor spasm, but some parents were satisfied that their child was safe if the seat was placed against the sofa or equivalent.

The more complicated the chair, the less parents favoured it, because of the difficulty in getting the child in, and they often mentioned the time taken would be too great to take the child out if he was choking.

There is some variability in opinion concerning appearance, but bright colours are always received well for this age group.

Although in the DEAC we cannot usually test the products with large numbers of users, we endeavour to enhance the quality of the evidence collected by ensuring our questionnaire addresses the pertinent issues concerning the products being tested, and by enriching our data by noting down qualitative data as well as the answers to closed questions. Additionally, by undertaking focus groups with parents, and with therapists, before conducting user trials, we can take all aspects of the products and their use into consideration as we design the trials.

In this study, the data collected from the three sources: focus groups, therapy setting trials and home trials have confirmed one another in many areas, so enhancing the quality of the evidence.

The results, a few of which are presented here, are distilled to produce principles and guidelines to assist people when they select a product for a specific individual. Both the results, together with the guidelines derived from them, are soon to be published under them, are soon to be published under the Disability Equipment Assessment series by the Medical Devices Agency. It is designed to assist those who have to prescribe chairs for young children with disabilities. But each family is unique. Evidence is the start, but attainment of the right balance between factual evidence, the therapist's experience and the parents' intimate knowledge of that individual child must always be the goal.

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For a free copy of the report on publication, please write to:

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SHARING HEALTH KNOWLEDGE IN THE PERUVIAN ANDES

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We bumped over the sandy track, that gradually rose up the huge rose-coloured mountain, in a series of hairpin bends. We were on the way to Sihuas, a small town which is the centre of the district of the same name, in the high Sierra of Ancash, Peru.

The journey takes about 8 hours, over earth roads 'afirmada' in a four wheeled drive truck. The countryside is incredibly beautiful, rising from sea level in Chimbote, (where I work as a physiotherapist in a Non Government Organisation, - NGO), threading it's way along the irrigated, fertile valley of the River Santa, in between the coastal desert hills, then rising through a narrow gorge of multicoloured rock until reaching the first village for 3 hours - Yuramarca. This exists because of a crossroads. The people have been very enterprising, and have planted different fruit trees on the steep slopes, which they irrigate. They sell these to the travellers that pass through.

After this we climbed steeply into a dry desert landscape with, here and there across the huge valley, small squares of green where the sparse rains have made the ground wet enough to plant wheat and beans. The road continues as a thin line visible on the other side of the valley, crossing multicoloured mountain sides that are gradually drifting downwards, by progressive landslides, a bit like a jelly slumping! We carry on, going through only two villages in 4 hours, and stopping at one to buy some cheese, and to chat about the volley ball game that is going on in the middle of the 'main street', it being Sunday.

As dusk arrives, we go over the highest peak at over 4,000 metres (as high as Mt Blanc), in countryside that looks very much like the Scottish moors, and see, far below, Sihuas.

Sihuas at 2,500 metres, is the centre of the district of the same name, serving about 30,000 campesinos (peasants). I am here at the invitation of another NGO, because this remote area has little in the way of health provision, and their maternal and child mortality statistics are some of the worst in Peru. They have a system of volunteer parteras (lay midwives) and promotores de salud (health promoters), and through their Federation de Campesinos they have asked for a health educator to give them some workshops.

The first time I went was in January 1997. It was difficult to know just how to go about the workshops - two days for parteras, and two for health promotores. However, armed with the bible of Primary Health Care workers 'Donde no hay Doctor' (Where there is no doctor), two suitcases of visual aids, and various photocopied fact sheets I started by asking them what they wanted.

Participants in the workshops

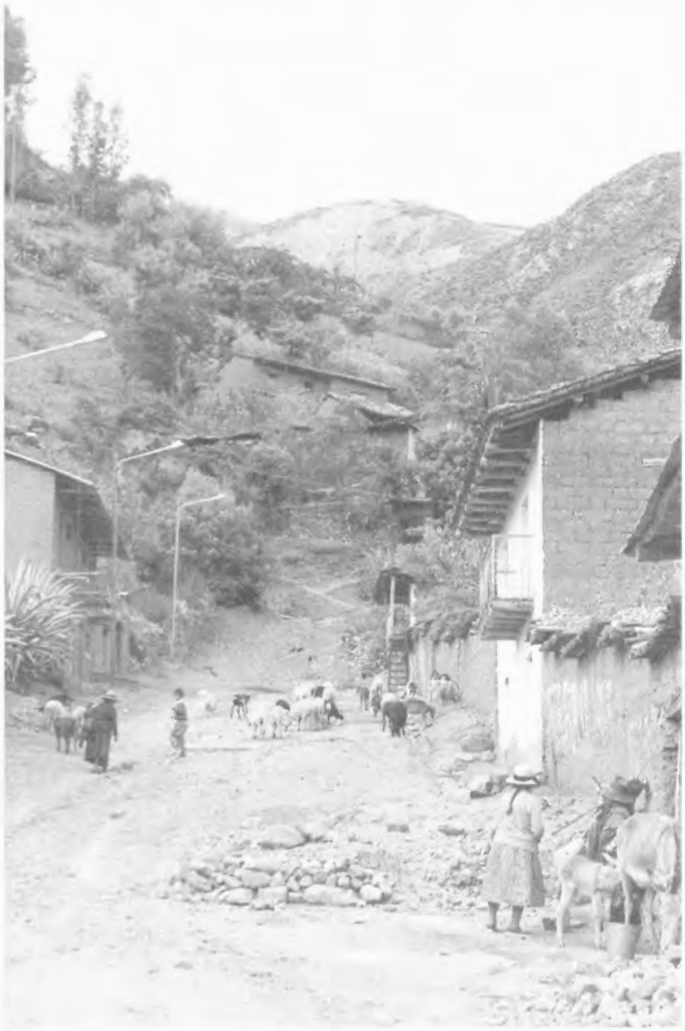
The first group of 35 parteras wanted to know about family planning, conception, all the way through to after the baby is born. The group was relatively small, as this was the rainy season, and many had been cut off by swollen rivers, and couldn't come. I attempted to cover all this with small discussion groups, lots of visual aids (many of which are from the NCT antenatal classes I used to give), and lots of help in translating (into Spanish) from the head of the workshop programme. Many were illiterate, and we joked about my language problems, as for many of them, Quetchua is their first language, and they only learn Spanish when they go to school. It was interesting for me to hear about their local beliefs, and the herbs that they use.

One belief is that they have to cut the cord immediately the baby is born and then tie it to the ankle of the woman, to prevent it being 'sucked' back inside her. I was very moved when they shared some of their experiences with the group. Domingo talked about and demonstrated with a pelvis and doll, how he helped a mother, who had been in labour for two days, deliver her baby. The problem was that the baby was transverse, so he had to push the baby's arm back inside, and manipulate the baby so the head came first. The baby was delivered, unfortunately dead, but the life of the mother was saved. At the end of the two days, they said they wanted me to come again.

The second 2 days was with the health promotors, 75 in number! They had been given a rough programme, based on some of the workshops I had given in Chimbote, to workers within my own rehabilitation centre (CERSI), and also to local health professionals. We covered 'How to

prevent problems of the spinal column, and how to treat them (McKenzie method)', 'Diet and health (starting from breastfeeding)', and finally 'Normal physical development of children up to 2 years old.' Again we used small discussion groups, lots of visual aids, and small group demonstrations. They are a naturally reticent people, and this last was difficult to organize!

However, it was a success, and I was asked to go back this April, for another series of workshops. I have just come back, and feel I have learnt a tremendous amount more from them, and I hope they have learnt lots from me. My daughter, who is a qualified GP, and who has been working



Sihaus village.

in New Zealand is here on a holiday, en route back to Britain. She doesn't know much Spanish, but knows a lot about womens' health, and this time I was able to translate for her, as my Spanish is so much better. Her partner drew the visual aids, and my husband took the photos - a Grant family joint effort!

Our fame had spread, and it wasn't the rainy season, so we had 58 parteras, and 78 health promotors this time. For the first group we covered the menstrual cycle, and family planning then I did some more on normal labour, and some problems they could obviate, or treat in some cases. We did lots of role playing of different situations this time, which went well.

With the health promotors we covered together, the anatomy of the genital organs, menstrual cycle, menopause, and infections of the vagina, and urethra. Then I continued with how to obviate or treat incontinence and constipation. Also how to obviate or treat sprains, muscle tears, fractures and burns using physical medicine. Again we used role play in small groups for different situations.

It was a huge success, and their evaluations at the end were excellent. They ranged from the elderly campesina who said that she was illiterate, but had been able to follow all of the workshop without difficulty, and hoped she could make her neighbours' lives better with her new knowledge. Another said how much she had enjoyed the information on the menopause, as women here very much lose status when their childbearing years come to an end, and that this isn't necessary. There is plenty of useful life ahead of them.

They presented me with a handwoven bag, and the local type of felt hat the campesinas wear in this valley. We also had lots of speeches, and singing of songs in Spanish and Quetchua.

It remains to be seen if there is time to go back again. There is still much work to be done in Chimbote, where I normally work in CERSI (a rehabilitation centre). We are running workshops for teachers of physical education this next week, as their knowledge of the body and appropriate, non-damaging exercises is very low. Let's hope we have some success, so that we don't continue to see adolescents of 13 and 14 with disc problems, being told they will have to have an operation, or wear a corset for the rest of their lives!

I am on a two year contract as a volunteer physiotherapist with CIIR/ICD (Catholic Institute for International Relations/International Co-operation for Development). They are always in need of donations to further their excellent work in the developing world.

PAEDIATRIC MOVING AND HANDLING 'REPORT ON WORKSHOPS'

Produced by: National Back Exchange - Essex Group
Authors: D. Couzens-Howard, L. Fisher, C. Letchford, G. Snow, P. Watson-Jones
Available from: Matrix House, Brook Road Industrial Estate, Rayleigh, Essex, SS6 7XL
Telephone enquiries to: 01277 631254 (evenings)
24 pages soft-backed booklet - Price £5

This booklet has been produced following two workshops run by the Essex Group of The National Back Exchange in January and October of 1996.

The aim of the workshops was to explore the many problems of moving and handling children with special needs, in various settings. The workshops were attended by a multi-disciplinary audience including physiotherapists, occupational therapists, paediatric nurses, teachers, parents, ergonomists, engineers, paramedics and equipment experts.

The booklet begins by outlining the organisation and purpose of the workshops and lists the many issues that were raised there. It goes on to list the general considerations of legal and management problems influencing the working practice of many employees and emphasising the lack of understanding and appreciation of the practical side of legislation regarding Manual Handling.

Moving on into the booklet the authors then begin to discuss practical problems facing staff working with children with special needs. Solutions are suggested for most of these problem areas and these range from the setting of standards for 'competent persons', establishing a national co-ordinator, guidelines or codes of practice applicable to health, education, social/community settings, adequate funding of provision, provision of facilities for children with special needs in mainstream schools and others. Much of this seems out of the remit of the average working physiotherapist and may need to be left to the bigger organisations such as National Back Exchange to lobby MP's on our behalf!

However, the following twelve pages contain very useful information in tabular form which is easy to read and useful for reference on particular aspects of manual handling, the problems that my be encountered, and possible solutions that could be tried.

This section looks at standing frames, handling on/off therapeutic equipment, special seating, hydrotherapy, transportation, the child themselves, and back care education in schools.

The booklet is concluded by a section entitled 'Looking Forward'. Here the group lay out a possible plan on the way to move forward. They acknowledge that it is important that the subject is not shelved and the problems that many of us face are addressed.

The booklet would be a valuable asset to have within departments and is a useful starting point for all staff. However, paediatric physiotherapists must remember that each child, in each situation should be assessed as to their own needs and the risks involved identified. Unfortunately when working with children there is no text book answer that suits all!

Julia Graham MCSP BSc (Hons)
Physiotherapy

NORMAL MOVEMENTS IN THE FIRST YEAR OF LIFE

by Helen Stephens MCSP
Produced by the Royal Hampshire County Hospital, Winchester

The purpose of this video was to show some of the components of movement required to achieve the milestones of normal sensory motor movement during the first year of life.

The baby is assessed at one month and thereafter at monthly intervals until one year of age. Each assessment examines the baby's activity in prone, supine, pulled to sitting, sitting etc. demonstrating the importance of weight shift, the development of righting and balance reactions, gross motor and fine manipulative skills to play, social interaction and attention.

Assessments are very detailed highlighting initially diminishing reflexes and asymmetry, then through symmetry, mid line orientation, development of proprioception, head and trunk control through rotation, lateral weight shift, righting reactions of head on body right through to independent balance in standing and walking.

This video is the most detailed I have ever seen of its kind, particularly as it has continuity with the same baby from start to finish. Each step of the way emphasises how each new motor skill acquired facilitated better fine motor skills and the acquisition of more sophisticated play and social interaction.

In retrospect I would like to have seen the same baby examined soon after birth and then at one month. Nevertheless, this video would be an invaluable asset to a paediatric library as a clear and concise teaching aid for staff and students and as an excellent reminder of what the 'norm' is.

Barbara Bowen MCSP

Reminder

NOW IS THE TIME TO RENEW YOUR MEMBERSHIP

The Annual Subscription for 1998
is
£21

The convenience and advantages of paying your Annual Subscription by Direct Debit are available to members.

The Direct Debit Instructions to your Bank/Building Society are obtainable from your Regional Representative.

There is a form at the back of this Journal for members who prefer to pay by cheque.

N.B. Members who are late renewing their membership will forfeit the right to back issues of the Journal.

Summary of Issues Discussed at the APCP National Committee Meeting on 10 October 1997

The Committee met at the James Gracie Centre, Birmingham, at the start of a 'Working Weekend'. Penny Sherlock attended as the North East Representative.

1. APCP/SCOPE Collaboration leaflets.
   No response yet from SCOPE in respect of further printing of leaflets. SCOPE to be requested to be responsible for future distribution.

2. CSP Congress 1997 - Edinburgh.
   Lyn Campbell congratulated the speakers, Maureen Grant, Jill Brownson, and Fiona Corkill and Mary Goy the Chairman of the Paediatric symposium session, for their excellent presentation at the CSP Congress.

3. Baby Walkers.
   A press release by the CSP on the use of baby walkers resulted in a flurry of media interest. Di Coggins represented APCP on GMTV. Teleri Robinson spoke on radio. Liz Hardy spoke to various press representatives in the North East. A number of articles have appeared on the Internet. APCP committee members were concerned that there had been little consultation with APCP prior to the press release. Work continues on the planned 'Baby Walker' leaflet.

4. Paediatric Physiotherapy and Conductive Education.
   A liaison meeting between representatives of APCP, BABTT, Conductive Education Employers Group, Conductive Education Federation, Royal College of Paediatrics and Child Health, and Occupational Therapy Association was held recently. Agreement was reached on a Protocol on method to overcome conflicting ideologies. Emphasis to be on communication and collaboration.

5. Clinical Audit '97 Conference.
   Teleri Robinson will attend on behalf of APCP.

6. Public Relations.
   Sue Whitby plans to develop an 'Information Pack' to enable her to respond to frequent requests from physiotherapists.

7. Research.
   Physiotherapy Research Society looking to recruit members from those who have recently gained a MSc.
   Priorities for Physiotherapy Research - the following topic was included in the final 25 drawn up by the CSP:
   'Physiotherapy Management of Children with Special Needs in Mainstream Schools'.

8. APCP Journal.
   A questionnaire to ascertain members views on future APCP Conferences to be circulated in December 1997 journal.

9. Post Registration Education.
A recent Introductory Paediatric Course at Chester attracted 32 participants.

10. APCP conferences.

10.1 Sally Braithwaite attended this part of the meeting on behalf of the 1998 Conference Committee. Further amendments were suggested to the timing of the programme for Saturday.

10.2 1999 and 2000 Conferences - no further decisions possible until the conclusion of the CSP is known in respect of future CSP National Congresses.

11. CSP Consensus Conference.
This meeting was organised by the CSP Community Care-mix Resource Group and attended for APCP by Angela Glyn-Davies. Members looked at methods of service delivery. The Report is to be forwarded to National Health Executive.

12. Next Meeting.
The next meeting of the APCP National Committee will be held on Friday 16 January 1998 at the Chartered Society of Physiotherapy.

NOTICE

The 25th Annual General Meeting of the Association of Paediatric Chartered Physiotherapists will be held on Friday 27 March 1998 at The Chamberlain Hotel, Birmingham beginning at 11.30 am.

All paid up members of the Association are entitled to attend. Voting will be restricted to full members of the Association and a current membership card will be required.

Minutes of the last AGM are available from the Secretary on receipt of a S.A.E.

Nominations are invited for three committee vacancies.

Nominations should be sent to the secretary by the end of February 1998 together with the names of a proposer and seconder who must be paid up members of the Association.

The retiring committee members are:

Lyn Campbell - APCP Chairman Mary Goy - APCP Secretary
Carole Hurran - Chairman of Post Registration Education Committee

Nomination Forms on last page of this Journal

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Scotland

We had an overwhelming response to the Study Day which was run on Friday 12th September at Westerlea School. In response to our questionnaire we held it on a weekday and purely on clinical topics. Having underestimated the response we had to turn people away!

Our A.G.M. will be held on Friday 27th February 1998 and the study topics will be orthotics and seating.

CHRISTINE SHAW

London

Thank you to all the members who responded to my plea for volunteers to help with the organisation of the National conference in 1999. It looks as if we shall be joining the C.S.P. as one of the Special Interest Groups at their Conference in Birmingham. However, details are not fully out yet - so watch this space!!

Our next Study Day will be on 1st December, and unfortunately you shall receive your journal after that date. However, I hope you saw it advertised and if you were able to attend found it enjoyable and stimulating.

Can I please remind everyone that if you have not already rejoined APCP, preferably by Direct Debit, that you do so now before the festive season takes over, and may I wish all our members a very Happy Christmas and New Year.

DI COGGINS

North East

On behalf of the North East Regional Members I would like to thank my predecessor, Teleri Robinson, for all her hard work over the years and to wish her well in her new role as Membership Secretary.

Keep these dates free in your diary for 1998:

Friday 6th February - Botulinum Toxin

Friday 8th May - Paediatric Sports Injuries

Saturday 26th September - Erb's Palsy

NB two of these dates are on Fridays instead of the usual Saturday!!

If you are not already doing so, please can members consider paying the annual subscription by Direct Debit and encourage your colleagues to become members of APCP.

MARY HARRISON

North West

Our respiratory update day in October was a great success. Thank you to Lorna Stybelska and Liz Roylance for their hard work.

The committee are sorry to say goodbye to Karen Holland - our Treasurer who is leaving the N. West area - Good luck! Plans are in hand for:- The A.G.M. in February - topic: DAFO's and TRAFO's look out for the advert and flier.

- Multidisciplinary Feeding Day in April - See Flier.

- Possible repeat of a G.M.F.M. Study Day and;

We are hoping to run an Erb's Palsy Study Day in October 1998 or early 1999.

I was involved in the recent National Committee working weekend on Clinical Effectiveness. We are hoping that many of you will respond to the report that will appear in the journal and help form a collaborative network across the North West.

Please contact me if you are producing clinical guidelines or are interested in forming a working group to take this initiative forward.

Finally - our membership is up again to 188 - Thank you for your support. Let's try for 200 in 1998!

Happy Christmas to everyone!

SUE LEECH

South East

On the 15th November we are running a study day on the use of Functional Electrical Stimulation to improve gait patterns in children with hemiplegia and Talipes Equinovarus, management and recent research. In the Spring we hope to run a two day course on the management of hips in children with cerebral palsy. It will cover areas of assessment, detection, measurement and management both conservative and surgical. Details of this should be available early in the New Year.

I hope that some of you will be willing to join the group working on developing clinical guidelines and I look forward to hearing from you.

TERRY POUNTNEY

Northern Ireland

The Northern Ireland Region held a successful study day on "Spasticity - the Bobath Approach" with Margaret Mayston, PLD, MCSP, in Craigavon in September. The course was well attended.

Our first evening meeting was also well attended even though the venue had changed to the Post Graduate Centre in Antrim Hospital. Our thanks go to Kathy Bell and Liza Lindsay for the Erbs Palsy update.

We hope our next three meetings and AGM are as well attended.

ADARE BRADY

South West

By the time this newsletter goes to print we will have completed two successful courses within the region during the autumn.

The day on Paediatric Manual Handling was well attended in October and has generated much interest, since then, from physiotherapists all around the country. This may indicate that people are still getting to grips with 'risk assessment' and are continuing to find Manual Handling a controversial subject!

The Gait Analysis course has been over subscribed and as a result the committee are thinking of organising another course in the spring. Details are yet to be finalised - look out for information in future journals.

Our AGM will be held on 14 March 1998 and will coincide with a study day on Bereavement. It is to be held at The Family Resource Centre, Mill Lane, Alton, Hampshire. Anyone interested in attending please contact me for further details.

Until then, have a merry Christmas and very best wishes for 1998!

JULIA GRAHAM

APCP REGIONAL STUDY DAYS

South West

MUSCULAR DISORDERS

Friday 24th April 1998
Child Development Centre, Scott Hospital, Beacons Park Road, Plymouth PL2 2PQ
Tel: 01752 550741 x 3403

Main Lecturer: Dr. Jardin, Consultant Paediatric Neurologist who is setting up a new muscle disorder team in Bristol.

Fee: Members £30.00, Non Members £35.00, Students £20.00

For application forms and programme contact:
Justine Reed after 1st February 1998.
Please send S.A.E.
Closing date: 24th March 1998

North West

FEEDING DIFFICULTIES IN CHILDREN WITH NEUROLOGICAL DISORDERS

A Multi-Disciplinary Study Day

Thursday 30th April 1998
Education Centre, Royal Liverpool Children's NHS Trust - Alder Hey, Eaton Road, Liverpool L12 2AP

Speakers include:
Dr. L. Rosenbloom - Neurological Aspects
Dr. M. Dalzell - Gastrointestinal aspect and use of PEGS
Prof. H. Carty - Radiological Investigations
Siobhan McMahon - Speech Therapy
Claire Ewan - Nutritional Aspects
Pat Caldicutt - Gastrostomy Care

Fee: £40.00 - including lunch

For further details and application forms contact:

Gill Holmes, Senior I Physiotherapist, Child Development Centre, Royal Liverpool Children's Hospital NHS Trust - Alder Hey, Eaton Road, Liverpool L12 2AP. Tel: 0151 228 4811 x 2660

North West

A.G.M. and STUDY DAY D.A.F.O.'s & T.R.A.F.O.'s

Saturday 28th February 1998
Physiotherapy Department, Royal Manchester Children's Hospital, Pendlebury, Manchester.

Speakers include:
Mike Gilligan - Orthotist
Vicki Hall - Research Physiotherapist

Cost: Members £14.00 Non Members £16.00

For further information contact:
Sue Leech, 4 Hartland Road, Urmston, Manchester, M41 9QG Tel: (work) 0161 790 3625

PHYSICAL DISABILITIES

January 19-21, 1998

This course is intended for clinicians working with disabled children and their families, and presents relevant new information at an advanced level. The programme includes aspects of juvenile arthritis, spina bifida/ neuropathic bladder, the cerebral palsies, neuromuscular disease, orthopaedic management, osteogenesis Imperfecta and genetics.

Apply to Marcia Batten, Courses and Conferences Offices, Institute of Child Health, 30 Guildford Street, London WC1N (tel: 0171 829 8692)

PSYCHOSOCIAL ASPECTS OF CYSTIC FIBROSIS

January 22, 1998

The purpose of this course is to provide an update on clinical practice and research findings for the psychosocial aspects of cystic fibrosis. The course will consist of lectures and workshops.

Apply to Marcia Batten, Courses and Conferences Offices, Institute of Child Health, 30 Guildford Street, London WC1N (tel: 0171 829 8692)

NEUROLOGICAL SPLINTING CLINICS - SECOND SKIN

January 26 to February 5 1998, 26-28 January Birmingham, 29-30 January Edinburgh, 3-5 February London.

The clinics provide an opportunity for you the therapist to accompany your client for a splinting assessment with therapists who have specialist splinting skills. Together a decision can be made regarding key functional objectives and splints designed to address these needs.

If we can be of assistance to you and your clients or patients, please contact Liz Thompson, on 0171 387 9571 for an appointment or more details regarding the clinics.

BRACHIAL PLEXUS INJURIES - CONGENITAL AND ACQUIRED

February 12, 1998

The Royal National Orthopaedic Hospital Middlesex.

This course will provide therapists with a multidisciplinary approach to the management of brachial plexus injuries. It is aimed at occupational therapists and physiotherapists working with patients following brachial plexus injuries, or who are interested in furthering their knowledge in this clinical area. Programme includes: Epidemiology; Natural history; Elements of treatment; Case studies. Tutor: Lydia Dean Dip COT, Clinical Specialist BNOHT. Fee £80. Apply to Carol Winston, Postgraduate Manager, The Sir Herbert Seddon Teaching Centre, The Royal National Orthopaedic Hospital Brockley Hill, Stanmore, Middlesex. HA7 41P (tel: 0181 954 5571).

PAEDIATRIC RESPIRATORY CARE

March 30-April 1, 1998
Clarendon Wing, Leeds General Infirmary
This three-day course is designed to provide physiotherapists with a basic theoretical knowledge of paediatric respiratory care. Topics covered will include neonatal problems, paediatric ICU, X-rays, medical issues, asthma and cystic fibrosis. Fee: £120 for three days or £45 per day, payable to ULTH NHS Trust Closing date March 13. Apply to Mrs. Pam Price, Paediatric Therapy, Clarendon Wing, Leeds General Infirmary, Belmont Grove, Leeds LS2 9NS (tel: 0113 392 6610)

NEUROMUSCULAR DISORDERS IN CHILDREN: Current concepts in management

May 11-13 1998
Wolfson Conference Centre, Hammersmith Hospital, London W12.
This 3 day course is aimed at therapists working with children who have neuromuscular disease, and wish to update their current knowledge and practice.
The course will be split into three areas of management of children with varying disorders:
Day 1: The ambulant child
Day 2: The child ambulant in orthoses.
Day 3: The non-ambulant child.

Topics will include: Genetics, orthopaedic management, seating and respiratory care. Speakers will be leading experts in these fields.
Cost: £175 for 3 days to include lunch and refreshments.
£75 for individual days.
Departmental tickets for all 3 days will be available.
For further information or application forms contact Denise Watson or Marion Main on 0181 383 3072

MEMBERSHIP APPLICATION/RENEWAL 1998

TO BE COMPLETED BY ALL NEW MEMBERS AND EXISTING MEMBERS NOT USING THE DIRECT DEBIT SYSTEM

NB. Any member who has arranged to pay by Direct Debit and then duplicates their subscription with a cheque will be refunded on request. They will, however, incur a £3.00 penalty to cover Administrative costs

1) Ordinary Membership is open to annually subscribing members of the Chartered Society of Physiotherapy.

2) Associate Membership is open to professional people with an interest in Paediatrics, subject to the approval of the National Committee.

3) Associate Membership is also open to Physiotherapy Students.

4) **Annual subscription for 1998 is £21.00,** and runs from 1st January to 31st December.

5) Retired Members are only required to pay half the total annual subscriptions.

All cheques should be made payable to 'APCP'

I wish to *apply for/renew my membership of the Association of Paediatric Chartered Physiotherapists.

*Delete which is not applicable PLEASE USE CAPITALS ON THIS FORM.

Title: (Mrs Miss Ms Mr)

First Names: ..... Surname: .....

CSP No. ..... APCP No. .....

Profession ..... Grade .....

Address for correspondence: .....

.....

..... Post code: .....

Tel. No: .....

Place of Work .....

..... Post code: .....

Have you completed a Direct Debit Form? Yes/No

Would you like your name to be entered on the Private Practitioners Register? Yes/No

If you are a new member please complete the questions overleaf. **THANK YOU**

About your work place

What type of facility is it? .....

Is your work place a regional or famous centre? *Yes/No

If 'Yes', what speciality? .....

About you and your own work:

Your speciality in Paediatrics .....

Do you have a sub-speciality? *Yes/No

If 'Yes', in what area? .....

Would you be willing to teach/lecture in your speciality subject? *Yes/No

Are you willing to have visitors? *Yes/No

If 'Yes', give contact person & address .....

.....

.....

Would you be able to take students on an elective placement? *Yes/No

If 'Yes', who should be contacted?

Name: .....

Address: .....

.....

Subscriptions are due by the 1st January.

Journals will **not** be sent until membership is renewed. Members who are late renewing their membership forfeit the right to back issues and will only receive them subject to availability.

Please notify the Membership Secretary of any change in address.

Currently, we are not permitting commercial mail shots to be sent to members. Should there be a change in this current policy, and you should not wish to receive such communications, please indicate by ticking this box. ☐

Please complete and return, with your cheque (to APCP) to:

Mrs. T. Robinson, APCP Membership Secretary, 22 Leith Court, Thornhill, Dewsbury, W. Yorkshire WF12 0QP

Association of Paediatric Chartered Physiotherapists

NOMINATION FOR NATIONAL COMMITTEE

NOMINEE .....

ADDRESS .....

.....

TEL. NO. .....

C.S.P. NO. ..... A.P.C.P. NO. .....

PLACE OF WORK .....

POSITION .....

PROPOSER .....

ADDRESS .....

.....

TEL. NO. ..... A.P.C.P. NO. .....

SECONDER .....

ADDRESS .....

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TEL. NO. ..... A.P.C.P. NO. .....

BRIEF PERSONAL PROFILE IN SUPPORT OF YOUR NOMINATION.

.....

.....

.....

.....

Please return completed form to: APCP Secretary, Mrs. Mary Goy, Churn Cottage, Fieldside, East Hagbourne, Didcot, OX11 9LQ. to arrive no later than 4 weeks prior to the A.G.M.

Notes for Contributors

The Editorial Board welcomes research material; referenced articles and evaluations of physiotherapy practice; informal articles.

Manuscripts should be sent to Lin Wakley, 2 Ash Bank, Pipers Ash, Chester, Cheshire, CH4 7EH, U.K.

Copy to be submitted should be typed on one side of the paper, double spaced and with ample margins. All pages should be numbered consecutively.

Manuscripts should provide the title of the article and the author(s) name(s) and full postal address for correspondence.

References should be given in the Harvard System.

In text	Author(s) name and initials followed by the date of publication. Use a,b, to indicate more than one publication in the same year. Where there are 3 or more authors use first name followed by et al.
For books	Laszlo, J. & Bairstow, P. (1985) *Perpetual Motor Behaviour* (Rinehart and Winston)
For chapters within books	Morley, T.R. (1992) Spinal deformity in the physically handicapped child, in : G.T. McCarthy (Ed). *Physical Disability in Childhood* (Churchill Livingstone)
For articles	Scott O.M., Hyde S.A., Goddard C.M., Dubowitz V., (1981a) Prevention of deformity in Duchenne muscular dystrophy. *Physiotherapy* 67(6), 177-80.

Tables and Figures

The approximate position of the tables and figures should be indicated in the manuscript.

Keys to symbols should be included.

Tables should be numbered by Roman numerals and figures by Arabic numerals.

Figures should be supplied in a finished form, suitable for reproduction. Figures will not normally be redrawn.

Proofs will be sent to authors if major alterations have been made to the text.

The Editorial Board reserves the right to edit material submitted for publication.

Cover designed by John Soper

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In this issue