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SENSITIVITY OF 98% IN AUTOMATIC SEIZURE DETECTION OF NEONA- TAL AMPLITUDE-INTEGRATED EEG.

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Background: From clinical point of view it is important to detect all seizure activity in neonates. The cerebral function monitor (CFM) processes the electro encephalogram (EEG) into an amplitude-integrated EEG (aEEG) signal that is relatively easy to read and interpret compared to the classical EEG. So far seizures were defined based on the visual interpretation of a typical pattern.

Objective: The objective of this study is to create a program for automatic detection of seizures in neonatal aEEG signals, based on a quantitative analysis. Seizures of a length of more than 60 seconds are included.

Method: Since high cerebral activity corresponds with high amplitude in the aEEG signal, the program detects rises in amplitude of the lower margin, compared to the background signal. The lower margin is defined as a threshold value, where 95% of the aEEG samples are above this threshold. If this lower margin for a segment is significantly higher than the mean lower margin of the 6 minutes prior to the segment, and if this difference in height continues for at least 60 seconds, this pattern is marked as a seizure. Muscle artefacts are detected based on the frequency content of the EEG signal. Other artefacts are detected using the amplitudes of aEEG, EEG and impedance of the electrodes. Three signals were used to train the program.

Results: Three CFM recordings of 9 hours from full-term newborns with different background patterns were used to evaluate the program. The signals were annotated by an expert in neonatal neurophysiology, who found in total 95 seizures. The program detected 101 patterns as seizures, with a sensitivity of 98% (93 true positives) and a positive predictive value of 92% (8 false positives).

Conclusion: This study indicates that it is possible to automatically detect seizures of more than 60 seconds, using CFM recordings.

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EVALUATION OF DEVELOPMENTAL CENTERED CARE IN SPANISH NEONATAL UNITS

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Introduction: The developmental (DC) and family centered care is a framework for providing care that enhances the neurodevelopment of the infant. Over the past years Spanish neonatal units have been working towards introducing this type of care.

Objective: Evaluation of DC in Spanish neonatal units through consideration of some aspects of the care provided to very low birth weight infants and their families.

Methods: The study centers on Spanish hospitals caring for children under 1500g. In a telephone questionnaire, we performed a transversal study by asking 25 questions releated to DC.

Results: Of the 100 hospitals taking care of children under 1500g, 83 of them, representative of all the regions, responded to the questionnaire. Of these, 31% had noise pollution controls, 72% controlled light intensity, 75% bound the infants and 29% used sacarose as an analgesic, 10% allowed unrestricted parental visits. In 22% Kangaroo care is openly used. 63% of the centers admitted difficulties with regards to introducing changes in the DC. There are not differences in the implementation of the DC between big and small hospitals.

Conclusions: In practically all centers some type of DC activity occurs although in certain areas such as unrestricted parental visits, the rate of implementation is low.

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NEONATAL SHOCK: PROTOCOL COMPLIANCE

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Background/Aims: Clinical protocols based on available evidence and supported by wide staff consensus are considered an effective means to introduce potentially better practices in the diagnosis/ treatment of medical conditions. In the management of neonatal shock, a wide variability has been observed. This study aims to determine the level of compliance with a neonatal shock protocol and to identify reasons of non-compliance.

Methods: After extensive review of the literature, full agreement was reached among medical staff of a third level neonatal unit on a revised protocol for the management of neonatal shock. The protocol, introduced in 2002, identified different steps: the first was fluid infusion; the second, if no response was elicited, was to use a specific sequence of vasopressor drugs, quiet different from the sequence in the previous protocol. In all patients with a codified neonatal shock during 2004, diagnostic work-up and treatment interventions registered in medical records were compared with protocol recommendations.

Results: 43 episodes of neonatal shock were identified in 42 patients. Fluid infusion was administered as the first intervention in 20/43; further treatment was applied to control the shock episode in 10/20, and in all of them (10/10) vasopressor drugs were administered according to protocol. Taking into account both steps, 46.5% of the shock episodes were managed according to the new protocol. When the initial treatment recommendation was not fulfilled, drugs were administered according to the new protocol sequence in 16/23 (70%); following the previous protocol in 3/23. When a transfusion was administered, protocol criteria were fulfilled in 50% of the episodes. Calcium was controlled only in 6/43, (14%).

Conclusions: In nearly half the episodes of neonatal shock, clinical practice complies with the recommendations of a revised protocol which raised full staff consensus. Only in very few cases were deviations from protocol caused by compliance with the previous one.

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LOWER LEG LENGTH GROWTH VELOCITY- A USEFUL PARAMETER TO MONITOR THE GROWTH OF INFANTS < 1500 G

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Background: Adequate nutrition of infants with a birth weight < 1500g is a main goal in their treatment in order to optimize later development and neurological outcome. Therefore, an clinically usable and accurate method for growth measurements is needed. The aim of this study was to investigate lower leg length (LLL) and correlate this with other growth parameters and clinical data.

Methods: Prospective study. We investigated LLL by using knemometry every 3 days, and weight, head circumference and body length once a week. We included 45 infants with a birth weight < 1500 g. Enteral nutrition was performed with fortified human milk or preterm formula. Clinical data were recorded prospectively.

Results: Clinical data and growth parameters are sumarized in the table below. LLL velocity was correlated with body length (P<0.05) and head growth (P<0.01). Gestational age was one predictor of growth in our study. Dexamethasone therapy (5 infants in group 1) influenced growth negatively (P<0.01). Blood transfusions (group 1: n=20, group 2: n=5) was correlated with weight gain (P< 0.05). Infants with chronic lung disease (group1: n=12) and necrotizing enterocolitis > II (group2: n=3) showed a lower growth velocity (n.s.).

Conclusions: Regular measurements of growth help to monitor and improve nutrition of infants with a birth weight < 1500g. In this context knemometry is a useful tool.

	Group 1 < 1000g (n= 23)	Group 2 >1000g (n=22)
Gestational age (wk)	26+1 (25+1/ 28+0)	30+1 (28+1/ 32+0)
Birth weight (g)	820 (745/ 890)	1345 (1187/ 1445)
Gender (male/female)	10/13	11/11
Weight gain (g/d)	14.2 (11.3/ 16.7)	13.8 (11.3/ 19.3)
Head circumference (cm/wk)	0.64 (0.54/ 0.69)	0.60 (0.40/ 0.75)
Body length (cm/wk)	1.00 (0.69/ 1.06)	1.01 (0.60/ 1.20)
LLL (mm/d)	0.36 (0.29/ 0.41)	0.36 (0.29/ 0.44)

All data are given as median (25./ 75. quartiles).

All data are given as median (25./ 75. quartiles).

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FETAL POST-HAEMORRHAGIC VENTRICULOMEGALY: NEUROLOGI- CAL OUTCOME AT 24 MONTHS

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Background: Intraventricular hemorrhage (IVH), a common event in preterm infants, may also occur in utero with a suggested estimate of 1–5 in 10000 pregnancies. A high incidence of sequelae is reported in survivors but the data available so far have not been sistematically and prospectively collected with a structered assessment. The aim of this prospective study was to evaluate the presence and the severity of neurological and neurovisual impairment in a cohort of 13 infants with antenatal IVH and post-haemorrhagic ventriculomegaly.

Methods: All 13 infants have been regularly followed for at least 24 months with a standardized assessment. This included the Griffiths mental scales and a battery of age specific tests assessing cerebral visual function.

Results: Nine of the 13 infants developed post-haemorrhagic hydrocephalus (PHH) and underwent ventriculo-peritoneal shunting, the remaining four had a not hypertensive ventricular dilatation. Eight infants had hemorrhagic and/or ischemic parenchimal lesions (7 of them developed PHH): all of them showed abnormal visual function, associated in all but one with severe neurological impairment. Five infants had no evidence of parenchimal lesions (2 of them developed PHH): no neurologic impairment was found in this group but neurovisual anomalies were evident in two patients (1 of them with PHH).

Conclusions: Seven of the 13 infants included in the study (53,8%) showed neurological sequelae and ten of them (76,9%) abnormalities in neurovisual function. Cerebral visual anomalies were found in three infant with no neurological impairment or no evidence of parenchimal involvement. An early screening of neurovisual function is recommended in order to provide an adequate rehabilitation programme in this high risk group of patients.

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IS CUMULATIVE NUTRITIONAL DEFICIT PREDICTIVE OF EXTRAUTER- INE GROWTH RETARDATION IN VERY PRETERM AGA INFANTS?

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Background/aims: A nutrient deficit is a frequent feature in premature infants and may represent one of the main causes of poor postnatal growth.

Methods: AGA infants with GA < 31 weeks admitted to our NICU between 2000 and 2004 were included in the study if they had no major congenital anomalies and were still hospitalized at 34 wks PMA. A metabolizable energy intake of 100 kcal/kg/day and a metabolizable protein intake of 3.0 g/kg/day were assumed to be adequate. Actual intake was subtracted from these reference intakes to calculate daily and cumulative deficit. Extrauterine growth retardation (EUGR) was defined by a weight z score < -1.28 at discharge.

Results: Among 174 infants studied, 45(25,9%) had EUGR. They showed lower weight z score at birth (-0.24±0.66 vs 0.25±0.66), higher CRIB score (4.3±3.3 vs 2.6±2.6), more days of oxygen therapy (34.7±45 vs 25.8.6±44) and mechanical ventilation (16.3±18.7 vs 9.9±23.3), more postnatal steroids use (57.8 vs 33.3%), greater cumulative deficit in energy (-83±318 vs +42±219 kcal/kg) and in protein (-14.7±27.4 vs -10.0±16.1g/kg) and a longer length of stay (76.6±21.5 vs 65.3±22.7) than no EUGR infants. In the multiple logistic regression analysis weight z score at birth (OR 0.18 CI95%0.09,0.38), CRIB score (OR 1.21 CI95%1.03,1.42), length of stay (OR 1.03 CI95%1.005,1.05) and cumulative deficit in energy (OR 0.995 CI95%0.992,0.997) were identified as independent predictors of EUGR. Cumulative deficit in energy emerged as one of the independent predictors also for poor growth in length (OR 0.999 CI95%0.998,1.000) and in head circumference (OR 0.997 CI95%0.995,0.999).

Conclusion: Cumulative energy deficit is associated to EUGR among very preterm infants; changing current practices to limit this deficit is essential to improve postnatal growth.