1312 PHYSICAL AND SOCIAL ECOLOGY OF THE NICU. Allen Gottfried, Patricia Wallace-Lande, Susan Sherman-Brown, Joan E. Hodgman. Univ. of So. Calif. Sch. of Med.,LAC-USC Med. Ctr., Dept. of Ped., L.A. and Cal. State Univ. Fullerton.

Management of prematures in the NICU has reduced neonatal mortality and morbidity; however, deficits in cognitive and sensory functioning persist. The environment of the NICU may be responsible for newly recognized iatrogenic problems and may not be conductive for optimal development. We studied the quantity, quality, organization, and diurnal rhythmicity of physical and social stimulation in the NICU. Observations were conducted every half hour over 3 days. Physical recordings included light and sound levels, sound spectra, and occurrence of nonspeech, speech, and radio sounds. This information was collected both in the units and in incubators. Social data included the frequency of nursing care, feeding, social touching, rocking, and talking when in contact with an infant. There were 405 recordings for each physical variable and 1551 infant observations. The same illumination was always present. Infants were exposed incessantly to nonspeech sounds. Sound levels at times were excessively high. Incubators did not shield infants from stimulation. 19% of the observations included social contact of which 17% involved handling. Infants in the NICU suffered not from a lack of visual auditory, and tactile stimulation, but from a low frequency of sensory coordinated experiences. There was no diurnal rhythmicity in the physical or social stimulation across days. The nature of environmental stimulation in NICU's may contribute to the deficits associated with prematurity.

1313 CRANIOSTENOSIS: CORRELATION OF ETIOLOGY WITH SUTURAL HISTOLOGY AND RESPONSE TO SURGERY. John M. Graham Jr., Sterling K. Clarren, Leena Koskinen-Moffett, J. Timothy Stuntz, John D. Loeser, David W. Smith, Dysmorphology Unit, Depts. of Pediatrics, Neurosurgery and Orthodontics, Univ. of Washington Schools of Medicine and Dentistry, Seattle.

Retrospective studies have implicated fetal head constraint as one cause for sagittal, coronal and metopic craniostenosis. Early sutural patency is contingent on persistent dural growth stretch. We hypothesize that fetal head constraint in a particular plane is one mechanism through which one or more sutural regions may be relieved of growth stretch, enhancing the liability towards synostosis at that region. This hypothesis is supported by animal studies and we present sutural histology from 15 instances of sagittal craniostenosis for which gestational histories implicated fetal head constraint as the cause in 13 instances. We also present histology from 2 constraint-related cases of metopic craniostenosis. In each case there was ectocranial bone deposition, endocranial bone resorption and demonstrable sutural synostosis. A Sayers partial calvariectomy procedure was performed at or before 6 mos. in all instances. This dramatically restored head shape to normal with reformation of the calvarium and sutures. This sutural histology and restoration to normal form by surgery differed from that found in 6 instances of coronal craniostenosis which occured as part of a broader pattern of intrinsic malformation, such as Pfeiffer or Saethre-Chotzen syndromes. In these latter instances, the altered craniofacial form tended to persist despite early calvariectomy.

1314 EFFECT OF ARM POSITION ON HYPOVENTILATION DUE TO DIAPHRAGMATIC PARALYSIS. Rachel A. Griffith, Adney M. Pichanick. (Spon. by Ben H. Brouhard). University of Texas Medical Branch, Department of Pediatrics, Galveston.

We report a 3970 gm term infant who sustained bilateral Erb's palsies, left facial palsy, and right hemidiaphragm paralysis because of a difficult delivery. Cyanosis, tachypnea and shallow respirations persisted, requiring mechanical ventilation and oxygen supplementation. We hypothesized that placing the arms above the head would expand the chest, allow more efficient use of intercostal and accessory muscles, and improve ventilation. This was tested by measuring arterial blood gases when the arms were extended down at the sides and when the arms were up beside the head:

Position	Time	pH	paO_2	PCO_2	Resp. rate and pattern
Arms down	30 min.	7.41	66	33	65, shallow,nasal flaring
Arms up	10	7.43	85	34	55, less labored
Arms up	30	7.43	118	28	60,comfortable,no flaring
Arms down	30	7.43	69	28	70, shallow,nasal flaring

Summary and conclusions: Ventilation is markedly improved by positioning the arms above the head. This has relevance in management of hypoventilation due to neuromuscular problems, flail chest from rib fractures, severe rickets, and chest deformities.

1315 ORAL AGAR IS AN EFFECTIVE ADJUNCT TO PHOTOTHERAPY OF HYPERBILIRUBINEMIA. G.R. Gutcher, P. Whittington, G. Yang, G.B. Odell. Univ. of Wisc. School of Med., Dept. of Peds., Madison, Wisconsin.

Fifty two (52) infants required phototherapy for non-hemolytic jaundice and were also tolerant of enteral feedings. Thirty one (31) received 250 mg agar q8h while 21 served as controls. Treated and control infants were not significantly different for birthweight, sex distribution, serum bilirubins or salicylate saturation indices and bile acids at the initiation and cessation of phototherapy. The duration of phototherapy was 37.5±3.2(S.E.) hrs. in the agar-treated and 48.1±5.0 hrs. in the control infants ($p<0.05$).

	Duration Phototherapy <36 hrs.	>36 hrs.	
Control	6	15	$X^2 = 4.14$ ($p<0.05$)
Agar-fed	19	12	

Enteral agar administration is a useful adjunct to phototherapy in non-hemolytic neonatal hyperbilirubinemia.

1316 THE LASER-DETERMINED IN VIVO ACTION SPECTRUM OF BILIRUBIN. G.R. Gutcher, W. Yen, L. Luedtke and G. Odell. U.W. School of Med., Dept. of Pediatrics and Physics, Madison, Wisconsin.

Adult male jaundiced Gunn rats were exposed to monochromatic laser light at wavelengths 457.9, 476.5, 488.0 and 514.5 nanometers. The incident irradiance was 1.0mW/cm^2. The serum bilirubin levels were determined at -24, 0, 24 and 48 hours of irradiation by the diazo reaction. Study candidates needed bilirubin levels at -24 and 0 hrs. of >7mg%,<10mg% and within 1mg% of each other. Water and food was ad lib. Weight loss or Hct change of >5% of baseline were exclusion criteria. Data are expressed as % remaining diazo reactivity from baseline.

Wavelength	0 hrs.	24 hrs.	48 hrs.	n
457.9	100	81.5	67.3	6
476.5	100	85.6	76.8	6
488.0	100	70.2	61.9	6
514.5	100	92.5	82.3	6

Maximal decreases in serum bilirubin levels were observed at 457.9 and 488.0 nanometers with significantly less change observed at 476.5 and 514.5 nanometers ($P<0.05$). These data confirm the maximal effect of "blue light" but the action spectrum appears not to be identical to the absorption spectrum of protein-bound bilirubin. Rather, it extends well beyond the 475nm limit usually cited. Two peaks suggest a more complex in vivo mechanism(s) than previously suspected.

1317 THE CHALLENGE OF NEONATAL ICU (NICU) AND MECHANICAL VENTILATORS (MV) IN A DEVELOPING COUNTRY: A TWO YEAR EXPERIENCE. Eduardo Halac, Marcelo Arias, Jacobo Halac, and Rigel Numa. (Spon. by Enrique M. Ostrea, Jr.), Primer Instituto Privado de Neonatologia, Cordoba, Argentina.

The advances in neonatal medicine have led to a significant improvement in neonatal mortality and morbidity in leading nations of the world. The applicability of these advances, particularly in NICU and MV, in a developing country is yet unclear and is the subject of this report. RESULTS: Our neonatal center (exclusively outborn) receives referrals from the city of Cordoba and outlying provinces. From 1976-78, available ventilatory support consisted mainly of hood oxygen and CPAP. Overall mortality rate was 82%. Mechanical ventilators were introduced in 1978 and a total of 219 infants have since received mechanical ventilation: BW=2.0±0.82 kg (13% less than 1 kg) and GA=34.3±4.6 wks. The overall mortality rate decreased to 72.5% ($p<0.02$) with a trend towards decreasing mortality each year: 1978=83%, 1979=72.5% 1980=69.6%. Mean weight for dead infants= 2.04 kg and for survivors 2.14 kg. The indications for MV were: resp. failure (46.8%), septic shock (29.5%) and primary apnea (16.9%). The complications encountered during MV were: intracranial hemorrhage (8.2%), air leak (4.4%) and PDA (5%). Among the 57 survivors, 1 had RLF, 4 had BPD, 3 had severe neurologic sequaelae and 2 died of SIDS. COMMENTS: (1) Despite significant improvement with the introduction of MV, the overall mortality rate was still very high (72.5%). This is mainly due to the consistently poor condition of the infants upon admission (pH=7.11±1.5; PO_2=31.7±1.5 torr) caused principally by the notion among referring physicians that the tertiary center was a last resort, often when death was imminent. There was likewise difficulty among the staff to accept MV as regular supportive care. Parents were also eager to discontinue support of the infant upon the slightest suggestion of neurologic impairment. (2) Sepsis accounted for a high percentage of ventilatory support, (3) Cost analysis indicated that MV increased cost in the ICU by 35-42%. CONCLUSION: Our experience indicates that in a developing country, many serious problems need to be surmounted, particularly cost and education of the physician and the public, before the full impact of the advances in neonatal medicine can be realized.