

PERINATAL LESSONS FROM THE PAST

Julius Hess, MD, (1876–1955) and the premature infant

Peter M Dunn

Julius Hayes Hess was born in Ottawa, Illinois on 26 January 1876.¹ He graduated from Northwestern University Medical School in 1899 and served his internship at the Alexian Brothers' Hospital in Chicago, 1899–1900. Early on he had become interested in the care of children, and studied at Johns Hopkins University Hospital in 1900. Returning to Chicago in 1901, Hess went into practice, visiting his patients in a "horse and buggy". On 15 April 1902, he returned to Ottawa to marry his boyhood sweetheart, Clara Merrifield. They subsequently had two daughters, Jean and Carol. At that time he joined the staff at Englewood Hospital as a pathologist. He also served as an instructor at Rush Medical College (1902–1908) and Northwestern University Medical School (1908–1913). In 1913 he joined the faculty of the University of Illinois becoming Professor of Pediatrics and chief of staff at Cook Community Hospital the following year, posts he held until his retirement in 1944. During the Great War he served in the US army from 1917 as a major. Hess was a dignified man of medium height with a commanding and somewhat austere presence (fig 1). Colleagues and friends alike addressed him as Dr Hess. He had boundless energy and was most interested in the welfare of his patients to whom he was kind and gentle, though firm when necessary. He was an excellent teacher and beloved by his students. No other physician in Chicago gave more time to the medical problems of the community.

Hess and his teacher, Isaac Abt, were among the first paediatricians to establish a role for their discipline within the obstetric hospital. Hess travelled to Europe several times in the period 1900–1910 and no doubt absorbed the ideas of Credé and Budin. He also became a warm friend of Martin Couney, a pupil of Budin, who commercially exhibited premature infants in incubators in the States between 1905 and 1939. Hess published his first article on the feeding and care of the newborn in 1911, and designed the open Hess heated bed in 1914. It was essentially an electrically heated version of Credé's Warmewannen. The bed combined a double water jacket with insulation to prevent heat loss and electric heating from a large plate with rheostat control. Later (1934) the bed was converted into a chamber for the



Figure 1 Dr Julius Hess, 1876–1955.

provision of oxygen, 40% being the usual concentration provided to premature infants. The advantages of the Hess bed (fig 2) were its safety, economy of construction and operation, and its ability to control temperature and humidity and provide extra oxygen. Hess also designed a transport incubator in 1922 (fig 3).

On prematurity and low birth weight²

In 1922 Hess wrote:

"According to the general use of the term, we designate as premature all infants who are born before the end of normal term of pregnancy (forty weeks); but in common usage the term refers only to those infants whose gestation period was 260 days or less. There is another class of infants who may be considered the weaklings, infants born at term or nearly term, who have suffered more or less severely during their intrauterine existence through factors which interfered with their development."

In so doing he anticipated modern views on the quality and duration of intrauterine growth.

Department of Child Health, University of Bristol, Southmead Hospital, Southmead, Bristol BS10 5NB, UK
Peter M Dunn

Correspondence to:
Professor Dunn
p.m.dunn@bristol.ac.uk

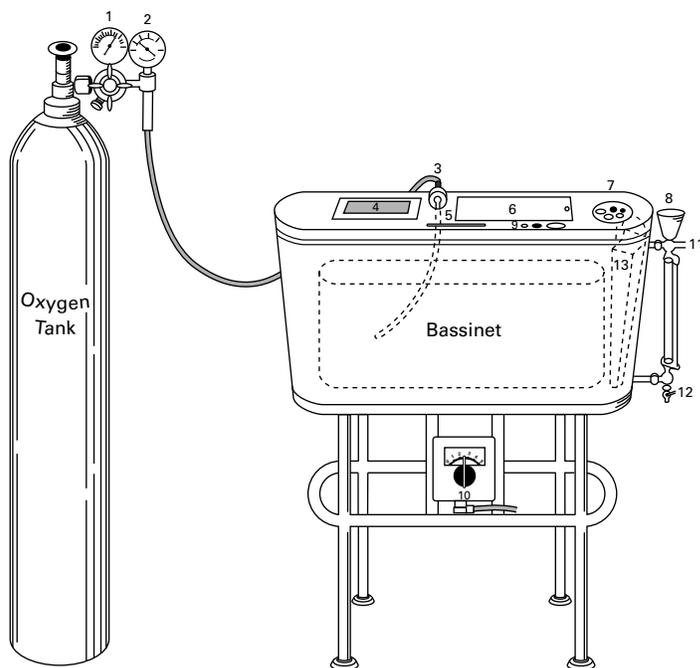


Figure 2 The Hess incubator (1934).

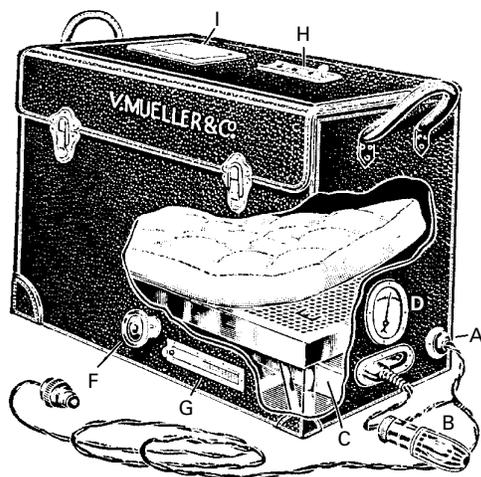


Figure 3 The Hess transport incubator (1922).

Yet, some years later, a meeting of the American Academy of Pediatrics (1935) over which he presided accepted the earlier suggestion of Yllpö (1919) that, for statistical purposes, a premature infant was one that weighed 2500 g or less at birth, regardless of the period of gestation, a proposal that was subsequently adopted by the WHO (1950–1975).

Also in 1922 Hess published the first American text dealing solely with the care of premature and congenitally diseased infants.³ That year, with the aid of funds bequeathed by Hortense Schoen Joseph, he established at the Sarah Morris Hospital the first premature infant station in the United States. With Evelyn Lundeen, RN, he directed this station for 30 years, during which time 9022 premature infants were given care, with a 73% survival. Their approach was a conservative one in which trained nurses played a leading role. The

emphasis was on preserving temperature immediately after birth and matching the environmental temperature to the individual needs of the baby. Other important aspects of care included special feeding techniques, the provision of breast milk, strict procedures for the prevention of infection, and minimal handling. Hess's approach was not only copied throughout America but also by Dr Victoria Mary Crosse when she opened the Sorrento Nursery in Birmingham, England in 1931. Dr Crosse's programme⁴ was in its turn widely adopted by others throughout the United Kingdom during the years that followed.

The Chicago plan for the care of the premature infant⁵

In the city of Chicago from 1934 onwards, all premature births had to be reported to the Board of Health by telephone within one hour of delivery, followed by written confirmation within 24 hours. As soon as the report of a premature birth was made, the Board of Health contacted the physician, if one had been in attendance, for his permission to transport the infant to a premature station if such a request had not been made at the time the birth was reported. All transportation of these babies, whether from a home to a hospital or from one hospital to another, was carried out by the Board of Health in a specially designed and equipped ambulance. The nurse who accompanied the ambulance had had special training in the handling of the infant during transportation, especially in emergency treatment. Hess described his programme in 1941:

- “1. A 24-hour ambulance service for the conveyance of the premature infant to a hospital station when that is considered necessary.
2. Premature-ward care where oxygen and other types of emergency therapy are available.
3. The nursing service, both in the field and in the hospital, is rendered by a personnel with special training in the care of the premature infant.
4. Breast milk is available to all when required. The breast milk is supplied free of charge to the premature infants . . .
5. A visiting nurse service. The field nursing is of inestimable value in cutting down hospital days . . . The promotion of breast-milk secretion in the home through the field nursing service usually means that an infant who is going home to receive breast milk from its mother can be discharged from the hospital at least one to three weeks sooner than the infant who is going home on an artificial feeding. The education of the mother through the early visits of the field nurse to the home during the child's stay in the hospital, and the visit made immediately preceding its return to the home, are of great educational value to the family.
6. A simple type of heated bed that can be loaned to the family . . .

7. An outpatient clinic maintained for instruction of mothers and the care and supervision of graduates not having private physicians.

The success of the Chicago City-wide Plan (was) well illustrated . . . (by) the fall in neonatal mortality in Chicago from 30.9 in 1934 to 20.3 in 1940. In the whole of Illinois the infant mortality fell from 55.8 in 1930 to 37.4 in 1939.”

The further extracts that follow give some idea of the approach of Hess and Lundeen to newborn care.

Breast milk²

“By far the best results are obtained with the premature infant that weighs 1,500 grams or less when it is fed human milk . . . Since breast milk is not available to the infant from its own mother for several days after birth, milk for the infant must be secured from other sources. If the baby is born in the hospital, milk may usually be obtained from a wet nurse, if at hand, or from some mother having a surplus . . . the mothers of the babies at the Premature Infant Station of the Sarah Morris Hospital are expected to express their milk at home and send it to the hospital to be used. Breast milk from such outside sources must be boiled to be a safe food. Since about 80 per cent of the babies are born in the home or are transferred to us from other hospitals, it is necessary to get in contact with the mother early to give her instructions relative to the expression of her milk. The other institution or the mother’s physician is requested to encourage the mother to pump her breasts . . . A diet slip is included, since diarrhea in the baby may result if the mother eats improper foods. Although such indiscretion may not affect a full-term baby, it may prove disastrous to a premature infant . . . The mother is advised to use a hand pump when engorgement is excessive. Hand expression is encouraged by the end of the first week, since it is the best method of stimulating the secretion of breast milk. The importance of expressing both breasts at least four times daily, and preferably five times, is stressed. We ask the family to bring the milk to the hospital every day, and when necessary, carfare is furnished.”

On congenital syphilis²

“Most striking is the reduction of cases of congenital syphilis seen among premature infants at the Sarah Morris Hospital Station. There has been a decline from an average of 8.27% of all infants admitted during the first 12 years that the Station was in operation (1922–34), to less than 1% during 1940. In all probability, this is due to the rigid enforcement of the recent marriage laws in Illinois and to the practice of making serological tests of pregnant women, followed by the institution of treatment of infected mothers during the later months of pregnancy . . . In our Station, every infant

born of an actively syphilitic mother, who has either not been treated or has been indifferently treated, is considered a potential syphilitic and is subjected to an early course of treatment . . . arsenic and bismuth are the drugs of choice. The arsenical preparations, sulfarsphenamine and mapharsen, are given by intramuscular therapy.”

Vitamin K and haemorrhagic disease of the newborn²

“Vitamin K therapy promises most encouraging results in the prevention and treatment of hemorrhage in the newborn. The low prothrombin content of the blood of the premature infant seems to be due to failure to receive sufficient vitamin K in utero. The administrations of the vitamin to the mother, even as late as an hour or two before delivery, increases the infant’s prothrombin sufficiently to protect it from hemorrhage not caused by trauma. A similar response, possibly less striking, is obtained by giving vitamin K to the infant after birth. Some clinics have, as a prophylactic measure, established the custom of giving vitamin K subcutaneously to all premature infants shortly after birth. Vitamin K is found in . . . plants. It is also synthesized by intestinal bacteria, and for this reason, after the intestinal flora has been set up in the premature infant, an adequate amount of the vitamin is present. For its absorption from the gastrointestinal tract, bile is necessary, and for its synthesis to prothrombin (a factor necessary for normal coagulation of blood), a normally functioning liver is necessary. For this reason a hemorrhagic tendency is frequently associated with obstruction of the biliary ducts . . . One mg of the synthetic vitamin given at birth will usually hold the prothrombin at almost normal levels throughout the newborn period. It is our custom to give 1 mg. of a synthetic product intramuscularly, and if there is no apparent lessening of the bleeding within four hours, the dose is repeated. It can be repeated if hemorrhage continues.”

Developmental follow up of very low birthweight infants⁶

Hess was among the first to record the long term follow up of very low birthweight infants, reporting in 1953 the outcome of 370 infants (27% of those surviving) with birth weights between 605 and 1260 g that had been nursed at the Sarah Morris Hospital between 1922 and 1950. The study was remarkably complete (92%) and included psychometric as well as physical examination. Only 15% of the children were severely handicapped, although 41% had some other problem. There were 21 cases of retrolental fibroplasia, fewer indeed than might have been expected, no doubt because the Hess incubator was more leaky than most other contemporary incubators in the 1940s. Hess claimed that 85% of all the very low birthweight survivors were of good physical and mental development. He added: “I give you these statistics to support our original

belief that any effort expended in the care of these smallest prematurely born infants is of inestimable value. Nature has been kind to many who did not survive the ordeals of the early days.”

Hess was a prolific writer, making many contributions to medical journals as well as publishing five books on infant care. He was a member of many professional societies, including the American Medical Association, the American Pediatric Society, and the American Academy of Pediatrics. The latter presented him with their Borden Award in 1952 in recognition of his many contributions and achievements in the care of premature infants. He remained in active practice until his sudden

death at the age of 79 on 2 November 1955 while on a visit to the home of his eldest daughter, Jean, in Los Angeles. Hess is widely regarded as the Father of American neonatology.

- 1 Rambar AC. Julius Hess, MD. In: Smith GF, Vidyasagar D. *Historical review and recent advances in neonatal and perinatal medicine*. Delhi: Interprint, 1985:373–6.
- 2 Hess JH, Lundeen EC. *The premature infant. Its medical and nursing care*. Philadelphia: JB Lippincott Co, 1941.
- 3 Hess JH. *Premature and congenitally diseased infants*. Philadelphia: Lea and Febiger, 1922:170–204.
- 4 Crosse VM. *The premature baby*. Oxford: J & A Churchill, 1945.
- 5 Hess J. Chicago plan for care of premature infants. *JAMA* 1951;**146**:891–3.
- 6 Hess JH. Experiences gained in a thirty year study of prematurely born infants. *Pediatrics* 1953;**11**:425–34.