"Charge for the future of KC: a public health imperative"

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This paper presents evolutionary, anthropological, biological, physiological and neurobehavioural arguments for the hypothesis that maternal-infant skin-to-skin contact is the natural "habitat" or place for all newborns, and that in this habitat they have a programmed "niche" or behaviour, which in the immediate newborn period is to breastfeed.

Homo sapiens is a mammal, and defining for all mammals is that they have breasts (Latin mammae) for suckling their young. Biological research in numerous mammals has shown that the neural events in pregnancy are "highly conserved" (Keverne and Kendrick 1994), that is they are almost identical in all species. The subsequent endocrine priming of pregnancy, again, is "remarkably similar across species" (Keverne and Kendrick 1994). Once birth takes place, all mammals studied show a "set sequence of behaviours" (Rosenblatt 1994), which leads to the initiation and the sustaining of breastfeeding behaviour. These behaviours do differ, each species having its own set sequence. A surprising and key finding in this research has been the finding that it is the newborn's behaviour which is determining, the newborn's actions elicit care taking responses from the mother (Rosenblatt 1994). Once initiated by the newborn, "breastfeeding is established through a set of mutual complex sensory stimulations in mother and child" (Kjellmer and Winberg 1994). However, in all species, suckling "is a remarkably fragile and transient behaviour" (Alberts 1994), and is easily disturbed by any intervention (Christensson et al 1994). Another area of biological research of relevance is that of heat generation. Of three patterns observed in mammals (immature, altricial, precocial), Homo sapiens falls clearly in the altricial category. All altricial mammals use parental body warmth as a heat source for their offspring (Christensson et al 1994).

Biologists describe mammals as developing through a series of habitats, (uterus, mother's body, nest of siblings, the world), and in each habitat, the developing organism is physically capable and neurobehaviourally programmed to behave in such a way as to provide for its own needs (Alberts 1994). The key concept is that the developing organism is endowed with the behaviours required, those behaviours express themselves in the habitat for which they are designed, and it is the habitat that provides the needs of the organism. Removed from the correct habitat, all mammals exhibit an identical pre-programmed response, referred to as the "protest - despair response" (Alberts 1994), which was first described in human babies. He protest response is one of intense activity seeking reuniting with the habitat, the despair response a withdrawal and survival response of decreased temperature and heart rate, mediated by massive rise in stress hormones. Reunited with the correct habitat (mother), there is a rapid rise in heart rate and temperature.

Kangaroo Mother Care has been variously defined, but two essential components are skin-to-skin contact (SSC) and breastfeeding. From the biological perspective, in the immediate newborn period of Homo sapiens, skin-to-skin contact represents the correct "habitat", and breastfeeding represents the "niche" or pre-programmed behaviour designed for that habitat. I regard this biological or neurobehavioural hypothesis as the underlying mechanism for why KMC works so well. The habitat provides more than just nutritional needs. In the uterine habitat, it is clear to see that oxygenation is provided through the placenta and the cord, warmth from the uterus, nutrition from the placenta, and protection from the uterus. These are basic biological needs. Parturition (birth) represents a "habitat transition". In the new habitat, the basic needs remain the same. Research over the last ten years provides strong support for the contention that

it is the skin-to-skin habitat (which the mother provides by just being), and not the mother's actions or the health services, that provide these basic needs. Oxygenation has been shown to be improved on SSC, to the extent that KMC is used successfully to treat respiratory distress (Ludington-Hoe et al 1993). Infants removed from incubators and placed SSC show a rise in temperature (Syfrett 1994) and a dramatic drop in glucocorticoids (Mooncey et al 1997), as predicted by the "protest-despair response". Fullterm undrugged infants, left on their mother's chest and undisturbed, will all breastfeed spontaneously within one hour, with no help at all (Widstrom et al 1987). The stimulations the newborn gives the mother during SSC elicit care giving and protective behaviours from the mother. Gene Cranston Anderson has suggested ten rationales or hypotheses for the positive effects of KMC. All of these relate individually or in concert to ensure the newborns requirements in respect of the four basic needs described here.

In our Western paradigm, the newborn has generally been regarded as helpless, and requiring help for all its needs. For full term babies, the mother is seen as providing these needs, for prematures, the health service must remove the newborn from the mother and provide for it needs. He neurobehavioural hypothesis rejects this. For the fullterm infant, its sole requirement is the correct habitat, which is not the mother as a caregiver, but the mother as a provider of SSC. The fullterm infant is reasonably robust, the premature is frail. However, the premature's need for the correct habitat is even greater than the fullterm's. The premature is endowed with the same neurobehavioural programme and behaviours, but due to its physical immaturity, does require support. That support should be afforded to it, but without removal from the correct habitat. Such removal does elicit the "protest-depair response", with ten-fold increases in glucocorticoid levels, such levels are neurotoxic (Modi and Glover 1998). SSC was able to reduce these hormone levels by 74%, a profound effect, (Mooncey et al 1997). Separation stress also has powerful inhibitory effects on all gastrointestinal functions. Somatostatin is released, depressing all beneficial gut hormones, as well as growth hormone (Uvnas-Moberg 1989).

I suggest therefore that a generalisable definition of Kangaroo Mother Care should include three main components. The first is skin-to-skin contact, initiated from birth and practised without separation from mother (Kangaroo). The second is exclusive breastfeeding from birth, for prematures ensuring provision of mother's own milk (Mother, Milk). Finally, the third component could be labelled simply as "support" (Care). Support will be a very variable parameter, determined by the context. Whereas the mother provides SSC, the newborn establishes breastfeeding, support is the responsibility of the context, be it family or health workers. That support should ensure there is no separation, and that breastfeeding can take place. For prematures, that support may then include all the advanced technology available, that has revolutionised the survival prospects of these newborns in the First World. In other contexts it may mean early discharge from dangerous hospital environments, with support at home.

The above contrasts starkly with twentieth century high technology practice, in which separation of mother and child is accepted as necessary and normal. Two arguments will here be presented suggesting that our current paradigms of care are inappropriate, and require urgent redress. The first is research on human mother-infant separation, and the second is an evolutionary and anthropological one.

The "protest-despair response" was first described in humans, in orphans after WWII , it was subsequently studied in monkeys and then in many other mammals. "Separation distress calls" have been documented very carefully in rats (Alberts 1994). Very similar distress calls have been shown in human infants placed in cots, and such cot babies make 10 times as many cry signals as babies on SSC(Michelson et al 1996). The calls of SSC babies have a completely different

character, and it has been suggested they are intended to elicit assistance from the mother to reach the nipple for suckling (Christensson et al 1995). The distress of separated prematures has been documented in terms of elevated stress hormones, as above.

Evolutionarily, Homo sapiens is born extremely immature, with only 25% of final brain size, compared to 45% of chimpanzees and much higher in all other mammals (McKenna 1993). This has been suggested as being a compromise, the consequence of the narrowed pelvis and birth canal following bipedalism, and the enlarging brain wanting to get through the pelvis, the brain therefore grows after birth. Homo sapiens therefore developed mechanisms for coping with immaturity. Being born premature is therefore not such a serious mishap for Homo sapiens as for other animal species, as long as the correct habitat is provided. Some may feel that the human being with its massive forebrain cannot be compared to other animals. There has however been humaan anthropological research which supports the neurobehavioural hypothesis. Homo sapiens evolved as "tropical hunter gatherers" over the last 3 million years. Changes started 10000 years ago with the beginning of agriculture, but there are still tropical hunter gatherer peoples living, which have been studied by anthropologists (Lozoff and Brittenham 1979). Common for all groups is that newborns and infants are carried constantly, they sleep with their mothers, there is immediate feeding response to crying, feeding takes place every 1 or 2 hours, and breastfeeding continues for two years. In the last 100 years, the 3 million year pattern has been changed to one where the child is left lying still, separated from mother, ignored when crying, fed four hourly by the clock, with formula and substitutes from an early age. Lozoff et al (1977) state that these changes alter the initiation of the mother-infant relationship, which may be "strained beyond the limits of adaptability". Further, "separation causes changes in the fundamental efficiency of systems" (McKenna 1993). "Early separation can produce major shifts in susceptibility to stress-induced pathology" (Hofer 1994). "The origins of many behavioural deviations are unknown ... can some be traced back to violations of an innate agenda?" (Kjellmer and Winberg 1994).

The primary violation, the worst case scenario, to any newborn is separation from its habitat/mother. This applies to Homo sapiens as fully as to other mammals studied. This requires a new paradigm. For prematures, our present paradigm sees the incubator as the habitat and the bottle as the feeding method, and we have defined normal ranges for heart rates and temperatures in the incubator habitat. That habitat is one separated from mother, one with ten-fold increases in stress hormones, which produces despair with lowered heart rates and temperature. Our "normal values" will need redefining. In our health care we need to recognise the central place of the mother as the habitat which the newborn urgently and desperately needs. We need to recognise the capacities of the "newborn-in-its-habitat" to satisfy its own needs. While it was observed that ability to suck on a bottle only starts at 36 weeks post-conceptional age, recent research has shown that suckling, (a myographically distinct behaviour from sucking), from the breast is possible at 28 weeks (Anderson 1989). We need to design our health care and adjust our routines to ensure that primarily support is afforded to the mother to provide the habitat, and assistance is given to the premature to provide for its own needs, recognising that the neurobehavioural capability may not be matched with physical development.

I titled this presentation "The future of Kangaroo Mother Care - A Public Health Imperative". In a remote mission hospital, KMC was practised according to these principles, in the absence of any technology. Survival of infants 1000-1500g improved from 10% to 50% (Bergman and Jurisoo 1994). 96% of prematures born worldwide do not have access to any technology. They do however have access to the habitat they require to survive, which presently only our

ignorance denies them. If their survival could be improved as at that mission hospital, Infant Mortality Rates in low income countries could fall by one third.

Kangaroo Mother Care is a Public Health Imperative. It is the design of the past, and our future depends on it.