

Kumaragara, Rakshakarma and Special Care Neonatal Unit: A Critical Review

Review Article

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Abstract

The protective rites of a newborn are an important part of neonatal care according to Ayurvedic principles. Similar to the organization of Special Care Neonatal Unit (SCNU) which is essential for reducing neonatal mortality and improving quality of life of survivors, Ayurveda advises meticulous organization of *sutikagriha* (the puerperial room) and *kumaragara* (the infant care room) along with *rakshakarma* (protective rites) for maintaining strict asepsis and providing a healthy environment to the mother and infant. An understanding of these protective rites and infant care room is mandatory to incorporate the Ayurvedic neonatal care into the modern neonatal care which is attempted in this paper. Relevant Ayurvedic treatises like Charaka Samhita, Susruta Samhita, Kasyapa Samhita, Ashtanga Sangraha and Ashtanga Hridaya were studied along with the guidelines by National Neonatology Forum of India for the setting up of a Special Care Neonatal Unit (SCNU). A comparison of the *kumaragara* and *rakshakarma* with Special Care Neonatal Units of modern neonatology reveals that highly recommended aseptic measures in the form of *rakshas* or amulets, *dhupana* or fumigation, vigil for *graharoga* or infectious diseases, etc. were followed in Ayurvedic nursing homes even before the advent of modern neonatology and construction and standard of care in a *kumaragara* is similar to that in an SCNU. There are a lot more principles to be adopted from Ayurveda for guiding future integrative medicine.

Key Words: *Kumaragara, sutikagara, rakshakarma, protective rites, dhupana, SCNU.*

Introduction

The protective rites of a newborn are an important part of neonatal care according to Ayurvedic principles. The care of the pregnant lady, care during delivery, care of puerperial woman and infant care are continuous and intricately related. Similar to the organization of Special Care Neonatal Unit (SCNU) which is essential for reducing neonatal mortality and improving quality of life of survivors, Ayurveda advises meticulous organization of *sutikagara* (the puerperial room) and *kumaragara* (the infant care room) along with *rakshakarma* (protective rites) for maintaining strict asepsis and providing a healthy environment to the mother and infant. Specific measures are advised for the care of the newborn which involves immediate care till *pranapratyagamana* (resuscitation) followed by general care throughout neonatal period and beyond. These protective rites are observed in the *sutikagara* (the puerperial room) and *kumaragara* (the infant care room).

When the process of delivery gradually shifted from homes to hospitals, sterile environments for labour

in the form of labour room and neonatal care units were established. Government of India has launched an initiative to establish SCNU's at all district hospitals. An understanding of protective rites and infant care room is mandatory to incorporate the Ayurvedic neonatal care into the modern neonatal care which is attempted in this paper.

Materials and Methods

Relevant Ayurvedic treatises like Charaka Samhita, Susruta Samhita, Ashtanga Sangraha and Ashtanga Hridaya were studied along with the guidelines by National Neonatology Forum of India for setting up of SCNU's along with previous research in the field.

Results

All treatises have recommended the establishment of *sutikagara* (the puerperial room) and *kumaragara* (the infant care room) along with *rakshakarma* (protective rites) for providing a healthy environment to the mother and infant. There is very little research and review in the topic presently. The following results were obtained after studying the treatises and guidelines followed by National Neonatology Forum of India.

Goals of *Rakshakarma* and *Kumaragara*

Similar to the functions of SCNU, the goals of *rakshakarma* and *kumaragara* are-

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- Care at birth including resuscitation of asphyxiated newborns.
- Care of the mother infant dyad after delivery.
- Protection from deadly infections and communicable diseases (*graha* and *upasarga-roga*).
- Care of sick newborns.

Sutikagara and Kumaragara

A special room for delivery called *sutikagara* is mentioned to which the mother and baby are confined till *sutikothana* (tenth day rites after delivery). After

this, *kumaragara* or special room for baby and mother is advised. In olden times, delivery was conducted by experienced *Prasuti* (obstetric) women who visited houses to conduct deliveries. Only complications were managed by *Salyatantra* (Surgery) experts like for obstructed labour. Elaborate descriptions of *kumaragara* are given which have to be built according to principles of *Vastu* (the Indian science of architecture). The establishment of *kumaragara* is mentioned by Acharya Charaka and Acharya Vagbhata-I as follows (Table 1):

Table 1: Description of Kumaragara by Charaka (1) and Vagbhata-I (2)

Charaka	Vagbhata-I	Description
<i>Vasthuvidyaakusala: prasastham ramyam</i>	<i>Prasastha vaasthusaranam</i>	The <i>kumaragara</i> should be built according to <i>Vastu</i> principles by an expert architect in the best possible manner for proper lighting and ventilation, asepsis and air pressure control. It should be beautiful.
<i>Atamskam</i>	<i>Atamaskam cha sasyate</i>	Not dark. Well lighted rooms allowing entry of sunlight for UV disinfection and prevention of fungal growth.
<i>Nirvaatam pravaata ekadesam</i>	<i>Nirvaatam cha pravaatam cha (Indu-Nirvatam ekadeshe, ekadeshe pravatam)</i>	Free from draughts of air/strong winds but well ventilated. Charaka and Indu advise only one corridor.
<i>Dridam</i>		Made of strong material/ sturdy.
<i>Apagata swapada pashu damshtri mooshika pathanga</i>	<i>Nirmatkuna aakhu masakam</i>	It should give protection from wild animals, dogs, cattle, fanged creatures like snakes, rodents, insects like mites, mosquitoes, flies, moths, etc.
<i>Suvibhakta salila ulookhala mutra varcha-staana Snaanabhumi mahaanasam</i>	-	It should have well separated areas for water storage and washing, medicine preparation, baby care, toilets, bath areas of newborns, and kitchen.
<i>Ritu-sukham yatharthu sayana aasana aastharana sampannam kuryaat</i>	-	It should be conditioned according to the season and comfortable to live in all seasons, furnished with proper and ample supply of seatings, beddings, blankets, spreads, etc.
<i>Tatha suvihita rakshavidhana balihoma prayaschittam</i>	-	It should be equipped with facilities for proper conduction of protective rites, worship/offerings, oblations, atonements, etc.
	<i>Sajjopakaranam</i>	Provided with functional equipments ready for use at any time. These include <i>sastras</i> or sharp instruments, supplies for immediate care of newborn like sterile cotton, honey, ghee, rock-salt, <i>ardhadhara sastra</i> (scalpel) for cutting of umbilical cord, utensils of different sizes, linens, etc. and medicines for emergency use and fumigation.
<i>Suchi</i>	<i>Suchi</i>	Clean.
<i>Vridha-vaidya anurakta sampoornam</i>	<i>Vridha stree vaidya sevitam</i>	The service of experienced physicians/ pediatricians and elderly/ experienced nurses preferably females who are passionate in the care of newborns should be available.

Trained nurses/ personnel in kumaragara (3)

Personnel is the most important part of *kumaragara*. Females who are proficient in nursing care of newborns should engage day and night for first 10-12 days. Close friends and relatives and well-wishers should keep them happy taking care of mother and child's nutrition. *Suthika paricharya* (care of the

puerperial woman) parallel to neonatal care should be followed to prevent infections and promote lactation.

Immediate protective rites during and after birth

The protective rites of newborn immediately after delivery include *pranapratyagamana* (resuscitation), *ulbavishodhana* (clearing the vernix caseosa), *balataila parisheka* (smearing of medicated

oil), *karnayor moole asmanor ghattanam* (striking stones near ears for arousal), *mukha-kanta sodhana* (clearing the mouth and throat), *garbhodaka vamana* (emesis of amniotic fluid), *nabhinadi-chedana* (cutting of the umbilical cord), *jatakarma* (birth rites) *prashana* (prelacteal feeds), and other *rakshakarma* (protective rites) that follow (4). *Bala taila* is needed for smearing the newborn after clearing the vernix with rock salt and ghee. Clearing the mouth and throat requires sterile cotton. Cold and lukewarm water as per season is needed for thermal stimulation. Emesis of amniotic fluid is stimulated using a mixture of ghee and honey which is given as an electuary. This can also be done using mild suction with mucous suction apparatus. *Garbhodaka vamana* causes *urakanta visuddhi* (clarity of chest and throat), *laghava* (lightness) and *abhilasha* (eagerness/appetite) (5). The importance of *garbhodaka vamana* (emesis of amniotic fluid) and its impact on prevention of acidosis in newborns should be subject to further study. Cutting of the umbilical cord is done with *tikshna sastra* (scalpel made of gold/silver/iron) above 4 *angulas* (finger measure) followed by smearing of *kushta taila* on the umbilical stump (6). As part of *jatakarma* or birth rites, *madhu ghrita prashana* (prelacteal feed made from honey and ghee), *stanapana* (breastfeeding) and *udakakumbha sthapana* (placing of pot filled with water to maintain humidity) are done (7). *Srothra sringataka* (ears and vital point at the joining of ears, nose and mouth) is smeared with cloth piece smeared with oil (8).

After immediate neonatal care, protective rites are followed for 10-12 days continuously in the puerperal care room and after *suthikothana* (tenth day rites/ bathing of puerperal woman) the mother and baby are transferred to a *kumaragara* with all amenities for newborn care equipped in it.

General protective measures in *kumaragara*

Charaka has elaborately described the protection of the child care room by disinfection techniques and restriction of entry (9). Twigs of *Adani*, *Khadira* (*Acacia catechu* Willd.), *Karkandhu* (*Zizyphus nummularia* W. & A.), *Peelu* (*Salvadora persica* Linn.), *Parushaka* (*Grewia asiatica* Linn.) are spread around the nursery for disinfection and to keep away insects and rodents. Vagbhata-I mentions *Adari*, *Vidari* (*Pueraria tuberosa* Willd.) and *Nimba* (*Azadirachta indica* A. Juss) also for fanning the child and spreading around *sutikagara*. Indu comments *Adari* as *Kakahantali*, *Thoya*, or *Khadiravalli* (10). Susruta has advised spreading of *Sarshapa* (*Brassica juncea* (L.) Czern), *Atasi* (*Linum usitatissimum* Linn.), *Tila* (*Sesamum indicum* L.), etc. inside *sutikagara* (11). *Swasthi karma* or *shantikarma* in the form of *balihoma-karma* (sacrifices) by brahmanas twice a day is also advised till naming ceremony on 10th day. Indu mentions utility of *balikarma* as '*bhootopaharam*' or warding off of infective agents. Vagbhata-I also mentions the reciting of mantras like *mayuri*, *mahamayuri* and *aryaratnaketudharini* twice a day in the *sutikagara*. Indu comments it on as *laghumayuri* or

saptasathi vidya and *mahamayuri* or *chathu:sahasri vidya mantras*. (12)

To restrict entry of visitors, Charaka has advised *musala* (pestle or club) to be placed obliquely at the entrance. He also advises *Vacha* (*Acorus calamus* Linn.), *Kushta* (*Saussuria lappa* C. B. Clarke), *Kshoumaka* (*Linum ussitassimum* Linn.), *Hingu* (*Ferula narthex*), *Sarshapa* (*Brassica campestris* (L.) Czern), *Atasi* (*Linum ussitassimum* Linn.), *Lasuna* (*Allium sativum* Linn.), *Kana* (*Piper longum* Linn.) and similar protective drugs to be tied in packets and hanged on upper beam of entrance door. These should also be tied around the neck of mother and baby. These drugs should be spread around water pots, plates, cooking vessels, bedsteads, etc. and about both the entrances.

For prevention of hypothermia in newborn continuous fire is advised (13). For this firewood of *Tinduka* (*Diospyros peregrina*) and '*kana kantaka tinduka indhana*' should be stocked for continuous provision of fuel. (14) Indu comments *kana* as *khandatandula* (broken rice) and *kantaka* as *tandulakshodana churnam* (rice husk). (15) Throughout day and night vigil is to be kept by loving and friendly females over the mother and infant and fire.

Baby care

Baby should be wrapped well in clean *kshouma-vastra* (linen cloth) and placed on bed covered with *kshouma-vastra* (linen cloth). (16) The baby should be laid with head towards the east on soft cloths and beds with a pot of water placed near head side and near both sides of the door (17). Head should be daily anointed with oil-soaked tampon. Fanning should be done with branches of *Peelu* (*Salvadora persica* Linn.), *Badari* (*Zizyphus mauritiana* Lamk.), *Nimba* (*Azadirachta indica* A. Juss) and *Parushaka* (*Grewia asiatica* Linn.). *Dhoopana* (fumigation) with *rakshoghna* drugs should be done daily. The newborn should be cared for with strict aseptic precautions as if like caring a wounded- explained in *vranithopasaneeya* chapter (18).

Handling of baby

The baby should be handled or held in a gentle and comfortable manner. Babies should not be beaten or battered. Battered child develops physical deformities due to fractures and also mental disorders later. The baby should not be roused suddenly as it can frighten the baby and cause shock. The baby should not be taken or transferred suddenly nor should be raised or held up suddenly. This may cause *vata* (*vitiating of doshas especially vata*). Shaken baby syndrome can also develop. The baby should not be made to sit before fifth month (*upaveshana samskara* during fifth month). Early sitting can cause *kaubjya* or hump-back/kyphosis. Baby should be kept happy, only then he grows and remains disease-free. (19). Vagbhata-I mentions that by waking up the baby from sleep and putting him up in air, shock or tremors and *vega-rodha* (suppression of urges) can happen (20).

Forbidding fearful measures to make the child obey

Further it is advised not to frighten the child even if not obeying or inconsolable as it can cause shock and *graharogas*. Baby should also be protected from clothes falling on face, from being handled by persons other than close ones and also from *langhana* (hunger, thirst, sun, wind, etc.) (21). Baby uncared for does not grow well or gain weight. This is a general advice for not just neonates but for all children of all ages. Charaka also advises that even when the child cries and not takes food or disobeys, the baby should not be frightened by mentioning the names of *rakshasa*, *pisacha*, *pootana*, etc. (22)

Bathing of the neonate

The baby is advised to be bathed after resuscitation and thereafter daily in water boiled with *Ksheerivriksha* (barks of latex exuding trees of ficus species), *Sarva Gandha* (all fragrant drugs), *Kapitha Pathra Kashaya* (decoction of leaves of *Feronia limonia* Linn.) or any antiseptic drugs available as per season. The water should be lukewarm (23).

Dressing and beddings of baby

Clothes washed, clean, ironed, and without folds, soft dressings, covers and beddings should be used for newborns and should be fumigated by *rakshoghna* drugs. (24) The beddings, blankets, bedsheets, etc. for newborn should be soft, light in weight, clean and of pleasant smell. Clothings and diapers soiled with urine and faeces or wet with sweat and infected or infested with microbes and insects should be removed. There should be ample supply of clothings. Disposables are preferred. If not available/affordable reuse after washing well, disinfecting, drying and fumigating is advised (25).

Dhoopana (fumigation)

Fumigation is an important mode of disinfection (26). Vagbhata-I advises '*vanoktaishcha guggulwadibhir dhoopam kurvita*' or fumigation with *Guggulu* (*Commiphora mukul*) etc mentioned for fumigation of ulcers. (27) Indu comments that it is *dhupa* mentioned in *Sutrasthana sastrakarmavidhana -Guggulu* (*Commiphora mukul* Engl.), *Agaru* (*Aquillaria agallocha* (Lour.) Roxb.), *Sarjarasa* (*Vateria indica* L.), *Vacha* (*Acorus calamus* Linn.), *Gourasarshapa* (*Sinapis alba* L.). For fumigation, feathers of dead crow with *Trivrit* (*Operculina turpethum* (L.) S. Manso) or with *Vacha* (*Acorus calamus* Linn.), ghee, *Kushta* (*Saussuria lappa* Clarke), *Sriveshta* (*Pinus roxburghii* Sarg.), *Sarshapa* (*Brassica campestris* (L.) Czern), etc are advised on daily basis. (28) Charaka advises fumigation of clothes and beddings also with *Yava* (barley), *Sarshapa*, *Atasi*, *Hingu* (*Ferula narthex* Boiss), *Guggulu*, *Vacha*, *Choraka* (*Angelica glauca* Edgew.), *Vayastha* (*Bacopa monnieri* (L.)), *Golomi* (type of *Vacha*), *Jatila* (*Nardostachys jatamansi* DC.), *Palamkasha* (type of *Guggulu*), *Asoka* (*Saraka indica* Sensus Bedd.), *Rohini*

(*Picrorhiza kurroa* Royle), *Sarpanirmokta* (slough of snake) mixed with ghee and burnt for fumigation of clothes etc. (29).

Raksha or Amulets

Vagbhata-I mentions the tying of *potalis* (packets) of *Hingu*, *Vacha*, *Turushkara*, *Rakshoghna* (*Sarshapa*), etc. on top wooden plank of the door. These *rakshoghna* (protective) drugs are advised for fumigation and for tying on hands, legs, head and neck of the child and mother. The tying of *Aryaparna sabari vidhya* and *Arya aparajita vidya* are also mentioned as *rakshas* (amulets). Indu comments on these as mantras written on *bhurjapatra* (birch leaf) using *Gorochana* (Ox gall) and tied on head and neck as amulets. (30)

Gemstones and horns taken from living horned animals should be tied on the newborns limbs as jewellery and for protection. Similarly, medicinal herbs *Aindryadi* ten drugs or *Jeevaka* (*Malaxis acuminta* D. Don) and *Rishabhaka* (*Microstylis muscifera* Ridley) are advised to be worn on body- neck, hands, head, etc. All drugs used by *Atharvavedavit brahmanas* are also advised for use in *kumaragara*. (31) *Vacha* (*Acorus calamus* Linn.) alone also can be used for *rakshoghna* (protective) purposes, and is advised to be worn on hands, neck, head, etc. daily all the time, and is said to promote longevity, intellect, memory, health, and give protection from *rakshas* and *uparakshas* (infective agents). (32)

Protection from physical harms

The baby should be protected from winds, sun, lightning/electric shocks, bright light, trees and creepers and climbers and should not be left in unclean or dirty places, or in the air (in hanging beds) or in places without roofs, or in irregular/uneven grounds, rain, dust and water. The baby should not be left alone in empty rooms or houses, low grounds or puddles and should be protected from eclipses or shadows of planets, and especially from severe *graha* or *upasarga rogas* (infectious and communicable diseases) etc. (33)

6th day rites

Rakshakarma and *balikriya* (sacrifices and prayers) are advised especially on the sixth day and relatives are advised to remain watchful and keep the mother and child happy. (34) Usually, umbilical cord falls on 5th day. Caution is advised here to look out for signs of sepsis/ tetanus due to sepsis from improper cutting of cord (latent period of tetanus neonatorum being 5-15 days). Tetanus and sepsis are caused due to lack of aseptic care at birth. Nowadays prevention of tetanus begins before birth with tetanus toxoid injections in mother to prevent neonatal tetanus.

10th day rites (*Suthikothana*, *namakarana samskara* and *Ayupariksha*) (35)

On completion of tenth day or on twelfth day, as per rituals of one's family/clan, *suthikothana samskara* or *snanotsava* (bathing the puerperial woman) and *namakarana samskara* (naming ceremony) of newborn should be done. Naming is done by father and

may be done also on 100th day or on completion of one year. Naming gives identity of the newborn in the society and is important in personality development. As a ritual, it is conducted after the child is bathed and adorned with *Manohwa* (realgar), *Haritala* (orpiment), *Rochana* (ox gall), *Agaru* (*Aquilaria agallocha* Roxb.), *Chandana* (*Santalum album* L.) on body and presented before relatives and friends. Two names are given- *nakshatra-devatayukta* (related to one's birth star and its lord), *baandhava* (one which is common among the relatives), usually a grandparent's name.

Following the naming ceremony, *ayu-pareeksha* (36) or examination of the baby is done as per treatises explaining normal features of newborns. The baby is to be placed in north or east direction during examination in a well-lighted room. Examination of newborn is done for assesment of anomalies/ dysmorphism and longevity (*ayusha: pramanajnaana heto:*). Charaka has given elaborate description of normal features of each body part. They should be *prakritisampannam* or normal and denotes a child with long life (*deerghayu*). Any deviation denotes lesser life span and is not desirable (*anishta*).

Sutikagara nishkramana vidhi (Taking the child out of sutikagara) (37)

Till 4 months confinement to *kumaragara* for most of the time is advised. The baby should be adorned and taken out after prayers in the fourth month to temples or places of worship. After the neonatal period, general care including *prashana* (electuaries) is continued to ensure the full potential growth and development of the baby. Vagbhata-I has advised to rear the child predominantly at home for one year and not to show bright lights, sun, fire or any brilliant objects. (38)

All *samskaras* or ceremonies which are important in physical, mental, social and spiritual growth of humans are advised by Ayurveda like, *upaveshana* (sitting), *annaprashana* (first feeding of cereals), *upanayana* (rites of passage), *vivaha* (marriage), etc.

Kreedabhumi (Play place) and Kreedanaka (Toys)

As per Vagbhata-I the play place of the child should be even and free from sharp instruments/articles, rocks and pebbles and should be disinfected with decoctions of *Vidanga* (*Embelia ribes* Burm F.), *Ushna* (*Piper nigrum* L.), *Kana* (*Piper longum* L.), etc. or with neem decoction. Toys should be made of gum material, making sounds and with figures on it. It should not be frightening but be pleasant and large, without sharp ends, of the shapes of cow, horse, fruits or any other pleasant shapes. (39). Charaka explains further that toys should be not heavy and not of the size which the child can put inside the mouth and produce choking and death. (40)

Kumara-adhara (Caretaker of the child)

Vagbhata-I has advised to appoint a caretaker for the child. The time is not mentioned whether for newborn or for infant or beyond but the qualities of the caretaker is well explained. The person appointed to

look after the baby should be of high morals and should not be obese and greedy. He should be knowing the desires of the child easily. Immoral and gluttonous caretakers can make the child sick by overfeeding. (41)

Swasthavritha (Protection of health)

Charaka advises to follow *swasthavritha* during health to preserve health in children. All foods and regimen opposite to one's *desha* (region), *kala* (climate), *atmaguna* (physical and mental constitution) is to be followed. For example, hot food and regimen in cold regions and climate; *kapha* alleviating food and regimen in an excessively *kapha* predominant constitution. Slowly all *asatmya* (incompatible) food and regimen which is *ahita* or unfavourable for health should be relinquished and *hita upachara* (favourable food and regimen) should be adopted in a child's life. Thus, *bala-varna-sareera-ayus sampat* or excellence of strength, complexion, body and life span can be obtained. Till achieving youth, child should be brought up in this way for attaining skills and performing religious duties. (42). Texts also mention protective ghees like *Brahmyadi* and *Saraswata ghrithas*, *avalehas* (lickables) and *prashanas* (electuaries) etc. for prevention of diseases in the child and for ensuring unimpaired growth and intellect. (43)

Charaka extols the advantages of childcare saying that just like a city protected by valorous armed men is invincible to enemies, the body of a child who is taken care of following the *yathokta vidhis* or aforementioned advices is protected from all kinds of *grahas* (infections). (44)

Guidelines for setting up of Special Care Neonatal Unit as per National Neonatology Forum of India (45)

The establishment of a Special Care Neonatal Unit (SCNU) is similar to that of a *kumaragara* but caters a larger population in a hospital setting. There are specific guidelines for providing physical facilities of SCNU which include the following parameters-space, location, design, ventilation, lighting, environmental temperature and humidity, acoustic characteristics, electrical outlets, etc.

Space

Space should be according to the expected population to be served. There should be special care for 6-8 high risk infants in a unit having 2000 deliveries per year. Each infant should have a space of 100 sq. ft. Additional space for extramural babies should also be provided in referral units.

Location

Neonatal unit should be close to labour room and obstetric operation theatre for transfer of sick infants with an elevator close by for transfer of extramural babies.

Design

The SCNU should be designed in a square space /single corridor based rectangular unit. Split unit

on either side of corridor is avoided to prevent transfer of infections. It should facilitate constant surveillance and minimal walking distance for staff.

Nursery design

There should be separate baby care area, mother's area, examination area, handwashing & gowning room, handwashing stations, area for preparation of IV fluids, nurses' station, staff rooms, clean utility and soiled utility holding rooms, growing nursery, etc.

Baby care area should include areas and rooms for intramural babies, step down nursery, area for extramural babies and examination area. Infected infants should be isolated in a septic nursery room away from SCNU.

Mother's area, nurses' station and charting areas should be provided with washable glazed floors and walls and windows with two layers of panes to ensure heat and sound insulation. Mother's area is for breast feeding and expression of breast milk.

Examination area should be a small comfortable room with examination table, comfortable seating, sufficient light & warmth. Baby should be assessed before admission to nursery, cleaned and provided with nursery garments.

Handwashing and gowning room should be at the entrance with abundant space, self-closing doors, positive air pressure to prevent corridor air entering the SCNU. Street shoes should be changed to nursery slippers. Hand free elbow operated hand washing sink with liquid soap dispenser should be provided. Sink should be made of porcelain / stainless steel which is easily washable. Disposable napkins or hot air dryer for hand drying should be provided.

Handwashing stations with sinks within 20 feet of every newborn bed, antiseptic solution for disinfection of hands and disposable paper napkins for drying hand should be provided.

Area for preparation of IV fluids should have separate areas for parenteral nutritional formulations, IV fluids, enteral feeds and medications. Boiling and autoclaving facilities should be available next to this area.

Staff rooms to meet professional, administrative and personal needs of resident staff on duty should be provided within the unit. Nurses station should be located in a central area where all babies can be observed.

Clean utility and soiled utility holding rooms are mandatory with negative air pressure maintained in soiled utility rooms.

Growing nursery-A separate bay for transitional care of high-risk babies by their mothers before discharge from hospital, to educate mothers in child craft activities and promoting practice of exclusive breast feeding, accurate weighing, etc. should be present.

Ventilation

Effective air ventilation of nursery is essential to reduce nosocomial infections. Exhaust fan in reverse

direction near ceiling for input of fresh uncontaminated air and another exhaust fan in conventional manner near floor are recommended for maintaining positive air pressure in the nursery.

Lighting

SCNU should be well illuminated and painted white or off-white to permit early detection of jaundice and cyanosis. Cool white fluorescent tubes / LED should be used. Light should be dimmed at night to simulate day-night pattern to promote hormonal surge and growth of babies.

Environmental temperature and humidity

Temperature should be maintained between 26-28 degree celsius to minimise effect of thermal stress on babies. Humidity levels is to be raised for preterm babies in incubators to reduce insensible water loss but this has increased risk of infections.

Acoustic characteristics

Sound intensity in nursery should not exceed 75 decibels to protect hearing of infants and personnel. Effective sound proofing of ceilings, walls, doors and floors is desirable.

Handling and social contacts

Gentle handling of babies is advised. Parents are allowed unrestricted entry into nursery.

Communication system

Intercom system to call for help and additional personnel in emergencies and direct line external telephone for parent contact are mandatory. Mobile phones are not to be used with in nursery as electronic equipments function.

Electrical outlets

8-12 electrical points at the height of 4-5 feets for each bed and uninterrupted servo-stabilized power supply are mandatory.

Personnel in SCNU

Highest priority of a nursery is sufficient number of adequately trained nurses. At least one trained nurse to provide coverage to 4 babies in SCNU is advised by National Neonatology Forum of India. Nurses should be well trained in neonatal nursing and maintenance of electronic equipments in SCNU. They must participate in monthly perinatal morbidity and mortality meetings. Unit should have an independent senior resident doctor and one junior resident doctor for every 8 babies, a lab technician, a biomedical technician for smooth functioning of equipments and a respiratory therapist to monitor ventilatory settings, tracheal suctioning and chest physiotherapy.

Equipments in SCNU

The following equipments are minimum required in an SCNU

- Resuscitation equipments- Emergency tray- in each infant care room of SCNU containing -Ambu bag and

- mask, laryngoscope, tracheal tubes of different sizes, sterile suction catheters, oral mucous suction traps & emergency drugs.
- Bag and mask resuscitator- Self inflating silicon rubber bag of 250-500ml capacity ideal for resuscitation of newborn - *Ambu bags or Laerdal bags*.
 - Oxygen and suction facilities- centralised sources of oxygen and compressed air and suction outlet consoles affixed on walls which are ideal with variable concentrations of oxygen and compressed air that can be used to obtain oxygen concentrations between 25-100%.
 - Suction catheter- De lee trap, suction catheters (ideal for use at birth), or centralized suction, venturi suction and electrical suction which are ideal for hospitals.
 - Catheters, syringes and needles- Nasogastric feeding tubes, umbilical vein catheters, small vein infusion sets, medi-caths, exchange transfusion sets, etc.
 - Resuscitation trolley- equipped with radiant warmer, timer, electrical suction, observation light and manual facilities, inbuilt pulse oximeter to monitor heart rate and oxygen saturation.
 - Feeding equipment and autoclave- Glass or stainless-steel bowls of adequate size-120 ml for collection of expressed breast milk, mixing and preparation of formulas, etc., hot air autoclaving oven used for sterilizing the equipments, etc.
 - Laminar flow system- useful for safe and aseptic formulation and mixing of drugs, parenteral fluids and nutrients.
 - Weighing machine- A sensitive beam type weighing scale with precision of +/- 10g is useful in the nursery. Electronic weighing machines are desirable.
 - Bassinets- It is desirable to use plexi-glass bassinets which are easily cleaned and equipped with locker and head-tilting mechanism.
 - Incubators- provide ideal microenvironment for high-risk babies. 1/3 of nursery bed should be incubators. Incubators are required for isolation, maintenance of thermoneutral temperature, desired humidity, administration of oxygen, to nurse ELBW babies below 1000g stable babies, etc. Sensory stimuli like light, sound etc. should be kept to barest minimum. Water in humidity tank should be changed daily and 1-2 ml of glacial acetic acid / vinegar should be added to prevent colonization
 - Radiant heat warmer/ open care system- to keep babies warm during procedures. After stabilization in an open care system, the baby should be covered with clothes/ thin polythene sheet to reduce evaporative fluid losses. Application of sterile liquid paraffin or non-irritating oil on the skin is associated with reduced evaporative losses from skin.
 - Thermometers- Low reading (30-40 degree C) rectal thermometer, electronic or tele-thermometers with acoustic and visual alarms.
 - Oxygen concentrator- to deliver various concentrations of oxygen.
 - Oxygen head box/oxihood- Square shaped box made up of transparent plastic / perspex which can enclose

the head of the infant for administration of higher concentration of oxygen.

- Oxygen analyser- monitors ambient oxygen concentration to protect infant against oxygen toxicity.
- Perspex heat shield- to reduce heat loss by radiation and evaporation. Sick infants with respiratory distress syndrome, nursed naked in incubator should be enclosed in perspex heat shield.
- Heart rate monitor- Ideal to monitor high risk infants during prolonged procedures.
- Respiratory rate and apnoea monitor- Electrode fixed on chest wall. When infant stops breathing emits a beep and displays red warning signal.
- BP monitor.
- Multichannel vital sign monitor- Displays and records all vital signs- heart rate, respiratory rate, apnoea alarm, invasive and non- invasive blood pressure, pulse oximetry, etc.
- Pulse oximeter- for continuous monitoring of hemoglobin saturated with oxygen. To safeguard against risk of hypoxia and retinopathy of prematurity, it is recommended that oxygen concentration is 95%.
- Phototherapy unit- for treatment of hyperbilirubinemia. Latest fiberoptic bili-blankets may also be used.
- Bilirubin analyser and transcutaneous bilirubinometer.
- Infusion pump- For relatively small quantities of fluids infused as minor errors prove lethal in LBW babies. Syringe based micropump is ideal for administration of drugs.
- Gamma radiation for sterilization.
- Liberal supply of disposables crucial for reduction of nosocomial infections.

Discussion

A comparison of the *kumaragara* and *rakshakarma* with Special Care Neonatal Units of modern neonatology reveals that highly recommended aseptic measures were followed in Ayurvedic nursing homes even before the advent of modern neonatology. The care of the newborn and the mother was not restricted to first 3-5 days even in normal delivery but upto 10 days and even beyond in a special care room called *sutikagara/kumaragara*. Restricted entry to visitors and service of experienced personnel were ensured to keep mother and child happy and also look for danger signs. Medicated oils and water to prevent hypothermia and infections, for cord care and healing of umbilical wounds/infections, *prashanas* to improve immunity and intellect and *dhupana* or fumigation to ward off infections, puerperial care to mother to ensure proper recovery of mother and ensure proper lactation, etc. are elaborately described in the treatises. Management of newborns like a *vrana rogi* (wounded) highlights the strict aseptic principles advised by Ayurveda. *Prashanas* can replace probiotics which are advised in modern neonatal care which has the added benefits of reducing oxidative stress, hyperbilirubinemia, hemolytic disease and improving

neurological outcomes. *Garbhodaka vama* (emesis of amniotic fluid) should be studied for its effects on acidosis and oxidative stress. Medicated oils can be substituted for paraffin to prevent water loss and hypothermia and aid in faster recovery. *Vastu* principles can be followed in designing SCNUs. Further research is needed for incorporating the advices of Ayurvedic neonatal care in NICU's and SCNU's.

Conclusion

A comparative study of *kumaragara* (special room for newborn), *rakshakarma* (protective rites) and Special Care Neonatal Unit (SCNU) has revealed similar standards of care of newborn in both *kumaragara* and SCNU. There are a lot more principles to be adopted from Ayurveda for guiding future integrative medicine.

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