

Giraffe™ Carestation™

Neurodevelopmentally supportive,
family-centered critical care
environment for newborns



Neutral thermal environment



Minimizing negative touches



Managing sound and promoting
normal growth and development



Managing light, managing stress



Family-centered
developmental support



Enhancing the user experience

Clinical challenge:

Cold stress and heat stress may have serious consequences for all newborns^{1,2}. In small-for-gestational-age and preterm infants (<2500 g) these consequences may be devastating and may increase mortality rates. All infants need to maintain specific thermal control and more specifically, their core body temperature within a narrow range, in order to survive³. For both healthy and medically challenged babies^{3,4} careful attention must be paid to the thermal environment from the moment of birth to the time they are capable of temperature regulation.



- (1) Blackburn, S., et al. (2001). Neonatal Thermal Care, Part III: The Effect of Infant Position and Temperature Probe Placement; Neonatal Network Vol. 20 No. 3, April, pp. 25-30.
- (2) Blackburn, ST (2003). Maternal, Fetal, & Neonatal Physiology: A Clinical Perspective (2nd.ed.). Philadelphia: W.B. Saunders.
- (3) Bissinger, R. (2004). Neonatal Resuscitation – Thermoregulation; emedicine.com.
- (4) British Columbia Reproductive Care Program Policy Manual (2003) Newborn Guidelines: Neonatal Thermoregulation.

Thermoregulation

Giraffe Carestation Solution:

Neutral thermal environment

1. **Comfort zone** to provide thermal guidance for setting and activating the desired temperature.
2. **Clinical trends** assist the caregiver in reviewing thermoregulation data for detection of early signs of sepsis.
3. **Uninterrupted uniform heat** provided by the Giraffe OmniBed™ Carestation during transition from incubator to warmer.
4. **Air boost** to improve open-door thermal performance.
5. **Cascade control algorithm** designed to minimize baby's temperature swings.
6. **Heated internal components** during open bed mode to support transition to closed bed mode.
7. **Radiant heater** in Giraffe OmniBed Carestation placed inside canopy and shielded when in incubator mode.
8. **Warm-up mode** default setting at 100% for rapid preparation of bed.
9. **Giraffe Shuttle** for intra-hospital transport. One baby. One bed.
10. **Preheat mode** default setting at 25%, with silenced alarms, for admission preparation.
11. **Servo humidity system** for added thermal support and skin protection designed with universal precautions and sterility in mind to protect against infection.
12. **In-bed scale** to reduce time out of the heated environment.
13. **Smart alarms** to allow quick alerts to maintain desired thermal environment.
14. **Double wall construction** with actively heated inner walls.
15. **Skin temperature monitoring** on or off the bed.



Touch

Giraffe Carestation Solution:

Minimizing negative touches

1. **One-touch canopy lift and foot pedal** converts the Giraffe OmniBed Carestation into a radiant warmer without disturbing the baby due to bed to bed transfer.
2. **Bi-directional mattress** brings the baby closer to promote swaddling, Kangaroo Care, and to assist in rotating the mattress for clinical procedures.
3. **Baby Susan mattress** with full 360° rotation for procedural ease.
4. **Pressure diffusing mattress** to support skin management and pressure redistribution.
5. **X-ray without moving the baby**—large canopy surface, x-ray tray, radiolucent mattress and wide opening between canopy and mattress to accept digital x-ray imaging.
6. **Hands-Free alarm silence** allowing caregiver to quickly silence the alarms while providing care inside the canopy with universal precautions.
7. **Smooth and continuous tilt** minimizing stimulation to the baby.
8. **Giraffe Shuttle** for intra-hospital transport. One baby. One bed.
9. **In-bed scale** with reweigh to reduce transfers in and out of the bed.



Clinical challenge:

Exposure to excessive handling in neonatal ICUs may have an adverse impact on neurodevelopment in medically challenged newborns. While some types of touch are needed and/or may be beneficial to the infant, most handling is considered stressful^{1,2,4,6}. Evidence suggests even routine procedures can cause significant physiological instability and excessive handling may exacerbate acute pain responses^{3,4,5}. The goal is to minimize stressful touches by reducing the need to move or reposition the baby for required procedures.



- (1) Catlett AT, Holditch-Davis D. Environmental stimulation of the acutely ill premature infant: physiological effects and nursing implications. Neonatal Network, June 1990; 8(6):19-26
- (2) Long JG, Philip AG, Lucey JF. Excessive handling as a cause of hypoxemia. Pediatrics 1980 Feb; 65(2):203-7
- (3) Gottfried AW, Gaither JL. Infant stress under intensive care: Environmental neonatology. 1984; Baltimore; University Park Press.
- (4) Gottfried AW, Hodgman J. How intensive is newborn intensive care? An environmental analysis. Pediatrics 1984; 74: 292-294.
- (5) Gressens P, Rogido M, Paindaveine B, Sola A. The impact of neonatal intensive care practices on the developing brain. Pediatrics 2002; 140 (6): 646-653.
- (6) White-Traut RC, Nelson MN, Burns K, Cunningham N. Environmental influences on the developing premature infant: Theoretical issues and applications to practice. J Obstet Gynecol Neonatal Nursing 1994; 23: 393-401.

Clinical challenge:

Responses to loud noises (> 80 dB) in the NICU have been linked to physiological response (hypoxemia) in infants¹. In addition, exposure to noise and other environmental factors in the NICU may disrupt the normal growth and development of medically challenged (and preterm) infants^{2,3,4}. The AAP publishes guidelines for NICU acoustical design outlining the suggested sound levels for equipment, voice and background noises.



Sound

Giraffe Carestation Solution:

Managing sound and promoting normal growth and development

1. **Alarm speaker** placed low, beneath the body of the bed.
2. **Adjustable alarm volume** to maximize alert while minimizing sound.
3. **Smart alarms** disabled during pre-heat mode.
4. **Alarm defaults** designed to minimize nuisance alarms during transitions.
5. **Hands free alarm silence** allows caregiver to quickly silence the alarms while providing care inside the canopy and maintaining a quiet environment.
6. **Low noise fan** to reduce noise levels within the bed.
7. **Hood cover** to dampen external noise.



- (1) Long, J.G., Lucey, J. F., & Philip, A. G. (1980). Noise and hypoxemia in the intensive care nursery. *Pediatrics*, 65, 143-145.
- (2) Zahr, L. K., & Balian, S. (1995). Responses of premature infants to routine nursing interventions and noise in the NICU. *Nursing Research*, 44, 179-185.
- (3) AAP Guidelines, 5th Edition, 2002 Altmanier, 2002, p.231
- (4) Graven SN. Sound and the developing infant in the NICU; conclusions and recommendations for care. *J Perinatol*. 2000 Dec;20(8 pt 2);S88-93

Light

Giraffe Carestation Solution:

Managing light, managing stress

1. **Visual device indicator** placed out of baby's field of vision.
2. **Giraffe exam light** is adjustable for appropriate lighting.
3. **Hood cover** to minimize impact of overhead lighting, even in open mode, with flexible viewing arrangements.
4. **Screen brightness control** — Selectable, low, medium, and high viewing.



Clinical challenge:

Evidence suggests that light levels should be dimmed for at least part of the day for some infants, to facilitate diurnal cycle development in mature infants¹. Continuous bright light has been related to infant stress, indicated by increased activity levels, decreased sleep and bradycardia. Cycled light has the potential to promote circadian rhythm, with benefits that include hormonal regulation, activity-rest cyclicity and vital sign regulation². Light reduction is optimal in reducing stress, retinal protection and promoting sleep.

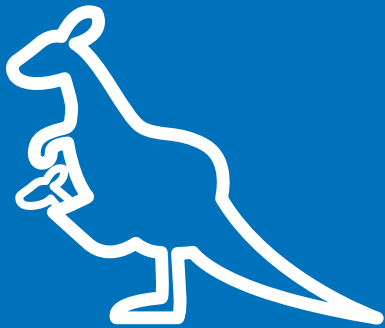


(1) Recommended Standards for Newborn ICU Design (2002).

(2) Brandon DH, Holditch-Davis D, Belyea M. Preterm infants born at less than 31 weeks' gestation have improved growth in cycled light compared with continuous near darkness. *Journal of Pediatrics*. 2002 Feb;140(2):192-9.

Clinical challenge:

The Kangaroo Care method is defined as: 'Early, prolonged, and continuous skin-to-skin contact between a mother and her newborn low birth-weight infant (<2500 g, viz. preterm and/or low birth weight infant), both in hospital and after early discharge, with (ideally) exclusive breastfeeding, and proper follow-up'¹. Kangaroo Care has been shown to improve physiological response and decrease pain response in preterm and very preterm infants^{2,3,4}. Additional benefits for mothers have been observed as reductions in stress and increased mother-baby bonding⁵.



- (1) Nyqvist KH; Anderson GC, Bergman N, Cattaneo A, Charpak N, Davanzo R, Ewald U, Ludington-Hoe S, Mendoza S, Pallás-Allonso C, Peláez JG, Sizun J, Widström AM. (2010). State of the art and recommendations. Kangaroo mother care: application in a high-tech environment. *Acta Paediatr.* 2010 Jun;99(6):812-9. Epub 2010 Mar 8.
- (2) Bauer K, Pyper A, Sperling P, Uhrig C, Versmold H. (1998). Effects of gestational and postnatal age on body temperature, oxygen consumption, and activity during early skin-to-skin contact between preterm infants of 25-30-week gestation and their mothers. *Pediatr Res.* 1998 Aug;44(2):247-51.
- (3) Ludington-Hoe SM, Ferreira C, Swinsh J, Ceccardi JJ. (2003) Safe criteria and procedure for kangaroo care with intubated preterm infants. *J Obstet Gynecol Neonatal Nurs.* 2003 Sep-Oct;32(5):579-88.
- (4) Johnston CC, Filion F, Campbell-Yeo M, Goulet C, Bell L, McNaughton K, Byron J, Aita M, Finley GA, Walker CD. Kangaroo mother care diminishes pain from heel lance in very preterm neonates: a crossover trial. *BMC Pediatr.* 2008 Apr 24;8:13.
- (5) Affonso D, Bosque E, Wahlberg V, Brady JP. Reconciliation and healing for mothers through skin-to-skin contact provided in an American tertiary level intensive care nursery. *Neonatal Netw.* 1993 Apr;12(3):25-32.

Kangaroo Care

Giraffe Carestation Solution:

Family-Centered Developmental Support

1. **Adjustable height** to accommodate seated access.
2. **Pass-through drawer** that allows parents seated access even in a wheelchair.
3. **Family centric away screen and themes** allow parents and family members to understand their babies' care status.
4. **All view display** with high visibility to patient data and alarms.
5. **Side panels** can be completely removed to aid in transition to parent for Kangaroo Care.
6. **Bi-directional translating mattress** to bring the baby closer and promote swaddling for Kangaroo Care ease.
7. **Baby Susan mattress** with full 360° rotation to offer gentle transfer.
8. **Air boost** to improve open-door thermal performance with friendly reminders/prompts to activate (example weighing screen).
9. **Air mode and manual mode** to maintain bed temperature while baby is held.
10. **Skin temperature monitoring** ability during Kangaroo Care.



User Experience

Giraffe Carestation Solution:

Enhancing the User Experience

1. **10.4" color display** with touch screen user interface, all view display and high visibility to vital signs and alarms.
2. **Hands free alarm silencing** without touching the display during a procedure and eliminating negative stimulation to the baby.
3. **Giraffe Shuttle: One Bed. One Baby.** The Giraffe Shuttle easily docks to the Giraffe Carestation for intra-hospital transport.
4. **Activation of comfort zone** with the touch of a button.
5. **Easy-view trending** to quickly follow changes in thermoregulation, humidity, servo oxygen and weights.
6. **Connectivity capabilities** allow communication with electronic healthcare records and hospital information systems; it is equipped for future updates and upgrades.
7. **Ergonomic design** with an elevating base, removable doors, and pass through drawer.
8. **Servo oxygen** with calibration notification and ease of calibration (if servo oxygen system installed in purchased device).



Clinical challenge:

As medical device technology continues to advance, it becomes increasingly important to design devices, interfaces, and interactions in a way that supports caregivers' skills.





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Imagination at work

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