

# Comparative Study of Newborns with Respiratory Pathologies, Preterm Limitrophe and Term in Use of Intensive Care Incubators and the Neonatal Laminar Flow Unit

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## Introduction

The use of incubators in the management of newborn infants dates to more than one hundred years of history, however, even today there are limitations to its use, such as poor isolation, difficulty in accessing and managing the newborn, noises and high levels of magnetic fields [1-5]. The neonatal laminar flow unit was created and developed in Brazil in 2004, and its concepts and studies have already been published for its use in therapeutic hypothermia [6-8].

## Objective

To compare the results of 46 preterm newborn infants and term infants in intensive care unit with varied respiratory pathologies, using intensive care incubator and neonatal laminar flow unit.

## Materials And Methods

46 newborns with gestational age ranging from 35 to 42 weeks, who had no malformations and who presented respiratory pathologies such as tachypnea, respiratory distress syndrome, intrauterine pneumonia and aspiration of meconium were compared in terms of weight, gestational age, body temperature, incidence of bacterial infections and urinary volume.

All newborns to be included in the study should have axillary temperature <36.5 °C and the family would have to sign an informed consent.

The presence of bacterial infections was evidenced by the association between the clinical picture and the presence of a hemogram and PCR compatible with the diagnosis.

18 neonates used the neonatal laminar flow unit and 28 intensive care incubators; the hydration regimen was the same for the two groups with initial water volume of 60ml / kg / day for the term newborns (with 38s or more of GI) and 80ml / kg / day for the borderline preterm to between 35 at 37ws of GA IG), with a 20% discount in this volume in newborns undergoing cpap, bipap or mechanical ventilation.

The statistical analysis comparing weight, gestational age, temperature and urinary volume was by Student's T; the analysis of the frequency of infections was by logistic regression.

## Results

In relation to weight we can observe the results in table 1 below

**Table 1**

Total	Minimum	25%	Median	75%	Maximum	Mode
1(UNFLA) 18	1520	2290	2842	3225	4275	1520 (g)
2(INC) 28	1490	1850	2240	3000	3665	2950(g)
(t Student)p=0,1704						

Regarding gestational age, we can observe the results in table 2 below

**Table 2**

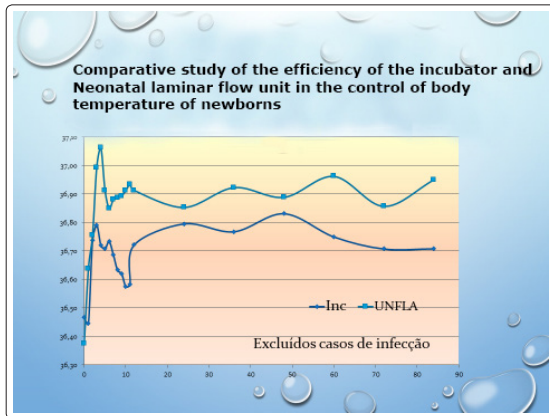
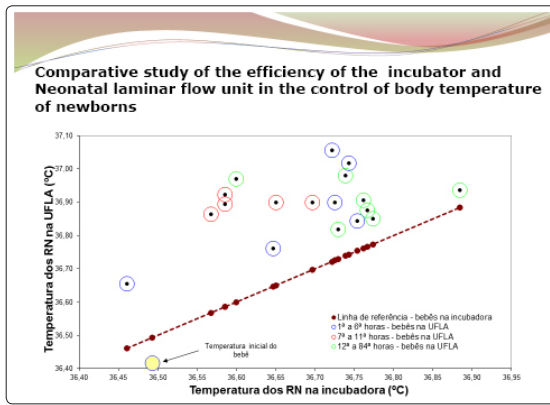
Total	Minimum	25%	Median	75%	Maximum	Mode
1(UNFLA) 18	35.3s	37s	38,2s	38,9s	42s	38,2s
2(INC) 28	35,2s	37s	38,1s	38, 8s	42s	38,1s
(t Student)p=0,103						

We did not observe significant differences between the two groups in relation to weight and gestational age.

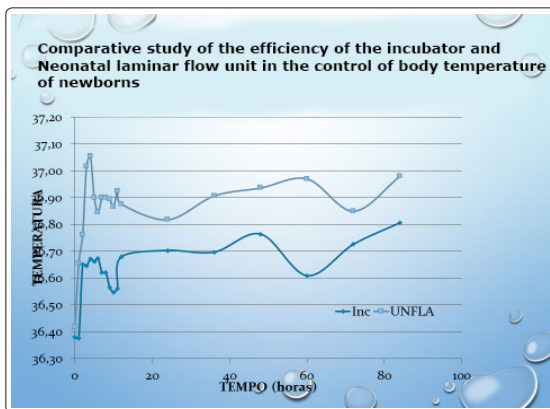
Regarding body temperature, we can observe the results in graphs 1,2 and 3 below

## Graph 1

N- UNFLA-18  
N- INCUBATOR- 28



**Graph 2:** Graphical comparison of temperature of newborns in the incubator and neonatal laminar flow unit  
N- UNFLA-18  
N-INCUBATOR- 28



**Graph 3:** Graphical comparison of temperature of newborns in the incubator and in the neonatal laminar flow unit; excluding newborns with infectious conditions.  
N- UNFLA-18  
N-INCUBATOR- 28

In graphs 1 and 2 observed a faster response in the increase of in body temperature of neonates in the neonatal laminar flow unit when compared to newborns in the incubator; even with the exception of newborns diagnosed with infections, with hypo- or hyperthermia.

We observed that, in relation to the median body temperature of newborns in incubators (other color), neonates in the neonatal laminar flow unit had a body temperature of 0.11°C above the incubator group, being statistically significant ( $p < 0,05$ ) with a 95% confidence interval; we can also observe that during the first 6 hours of use of the equipment (blue spheres), as well as 7 to 11 hours of equipment use (red spheres) and 12 to 84 hours of equipment use (green spheres), body temperature of the neonatal laminar flow unit group is always higher than that of the incubator group.

In relation to urinary volume, the incubator group presented 3.1 ml/kg / hour versus 3.2 ml / kg / hour of the neonatal unit of laminar flow, with no statistically significant difference.

Regarding infections, we had two cases in the neonatal laminar flow unit group and 9 cases in the incubator group, we show below table 3 of the statistical analysis.

**Table 3**

- Comparing the infection rate between the two groups (UNFLA as a reference):

Infection	odds Ratio	Std. err.	z	P>[z]	P	95% conf. interval
Incubator	3,368421	2,897834	1,41	0,158	<b>0,6239393</b>	<b>18.18488</b>

Although we can speculate, due to the Odds Ratio = 3.3648, that there was a trend towards a lower incidence of infections in the group using the neonatal laminar flow unit, it is probably not possible to confirm the size of the samples.

## Discussion

The two groups are fully comparable in relation to weight and gestational age; because the neonatal laminar flow unit has an air velocity of around 0.5 m / s against the incubators with around 0.1 m / s, we believe that the analysis of the urinary flow is important for an indirect evaluation of the insensible losses ; this analysis did not show statistically significant differences, which leads us to believe that there is no increase of the insensible losses, since the two groups had a similar volume of hydration; most likely because of the moisture also provided by the neonatal laminar flow unit (between 50-60%).

Regarding the comparison of the body temperature of the newborns, we observed a greater efficiency in the convection heat supply of the neonatal laminar flow unit in relation to the incubator group, which is explained by the higher air velocity (0.5 m / s × 0.1m / s)

Regarding the incidence of infections, it is clear that we need to increase the n of the two groups so that we can find a statistically significant difference.

## Conclusion

In this comparative study between a group of neonates in intensive care incubators and a group using a neonatal laminar flow unit, this group was more effective in the recovery of the body temperature of the newborns; we did not find significant differences in the incidence of infections and urinary flow, not proving an increase of the insensible losses due to the greater air velocity or difference in the incidence of infections. It is clear the need for further studies with a larger sample for confirmation of the incidence of infections.

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## References

1. Baker JP (2000) The incubator and the medical discovery of the premature infant. *J Perinatol* 20: 321-328.
2. Veco flow. Environmental contamination report of Neonatflow equipment, Vision incubator and Radiant heat cradle Total Care (2015).
3. Rodarte MDO, Scochi CGS, Leite AM, Fujinaga CL, Zamberlan NE (2005) O Ruído gerado durante a manipulação das incubadoras: implicações para o cuidado de enfermagem. *Rev. Latino Ame. Enfermagem* 13: 79-85
4. Söderberg KC, Naumburg E, Anger G, Cnattingius S, Ekblom A (2002) Feychting M. Childhood leukemia and magnetic fields in infant incubators. *Epidemiology* 13: 45-49.
5. Instituto de Pesquisas Tecnológicas- IPT- Laudo Técnico- 2014- Níveis de Campos Magnéticos nos equipamentos Neonat flow e incubadoras Vision.
6. Perez JMR, Golombek SG, Fajardo C, Sola A (2013) A laminar flow unit for the care of critically ill newborns infants. *Med Devices (Auckl)* 6: 163-167.
7. Perez JMR, Alpan G, Feldman A (2015) Treating Hypoxic Ischemic Encephalopathy with Hypothermia. *Neo reviews* 16: e413-e419
8. Perez JMR, Golombek S, Alpan G, Sola A (2015) Using a novel laminar flow unit provided effective totalbody hypothermia for neonatal hypoxic encephalopathy. *Acta Paediatr.*

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