Lic. Andrea Canepari

Ventilación No Invasiva

SAP
Sociedad Argentina de Pediatría
Por un niño sano en un mundo mejor.

4° Congreso Argentino de Neonatología
"En el marco de la Semana de Congresos y Jornadas Nacionales 2019"

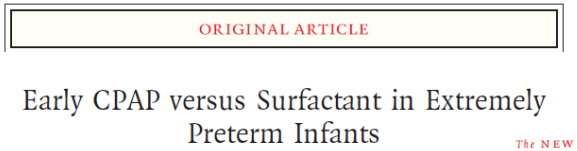
Terapia de Alto Flujo

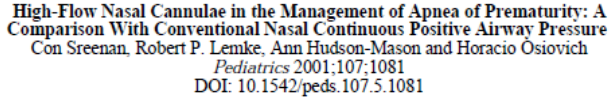
HOSPITAL ITALIANO de Buenos Aires

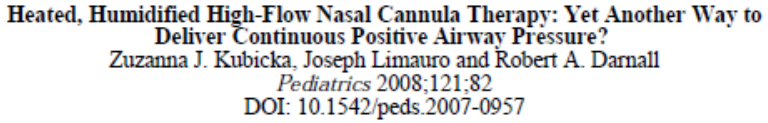
Sección de Cuidados Respiratorios y
Rehabilitación Pulmonar
Servicio de Kinesiología
Hospital Italiano de Buenos Aires
Coordinadora de Pediatría y Neonatología

Soporte ventilatorio

- Inicial
  - AVM
  - VNI
    - nCPAP
    - nIPPV
    - CAFO2
- Post extubación
  - VNI
    - nCPAP
    - nIPPV
    - CAFO2







Definición

- La Terapia de Alto Flujo es un ***sistema abierto*** de entrega de una mezcla de aire y oxigeno calentado y humidificado, a través de una cánula nasal, que ***cubre las demandas de flujo inspiratorio*** del paciente, entregando una ***FiO2 conocida*** y constante.

*Se considera TAF a la entrega de **flujos ≥ 1-2 L/min hasta 8 L/min en neonatos**, ≥ a 4 L/min hasta 25 L/min en niños y ≥ 6 L/min hasta 70 L/min en adolescentes y adultos.*

- La oxigenoterapia de alto flujo (OAF) consiste en aportar un flujo de

Aporte de un flujo de aire, solo o mezclado con O2

Oxigenoterapia de alto flujo F.J. Pilar Orive, Y.M. López Fernández. An Pediatr Contin. 2014;12(1):25-9

Efecto fisiológico

Reducción del espacio muerto nasofaringeo (volumen VA extratoracica RN 3 ml/kg vs 0,8 ml/kg adulto)

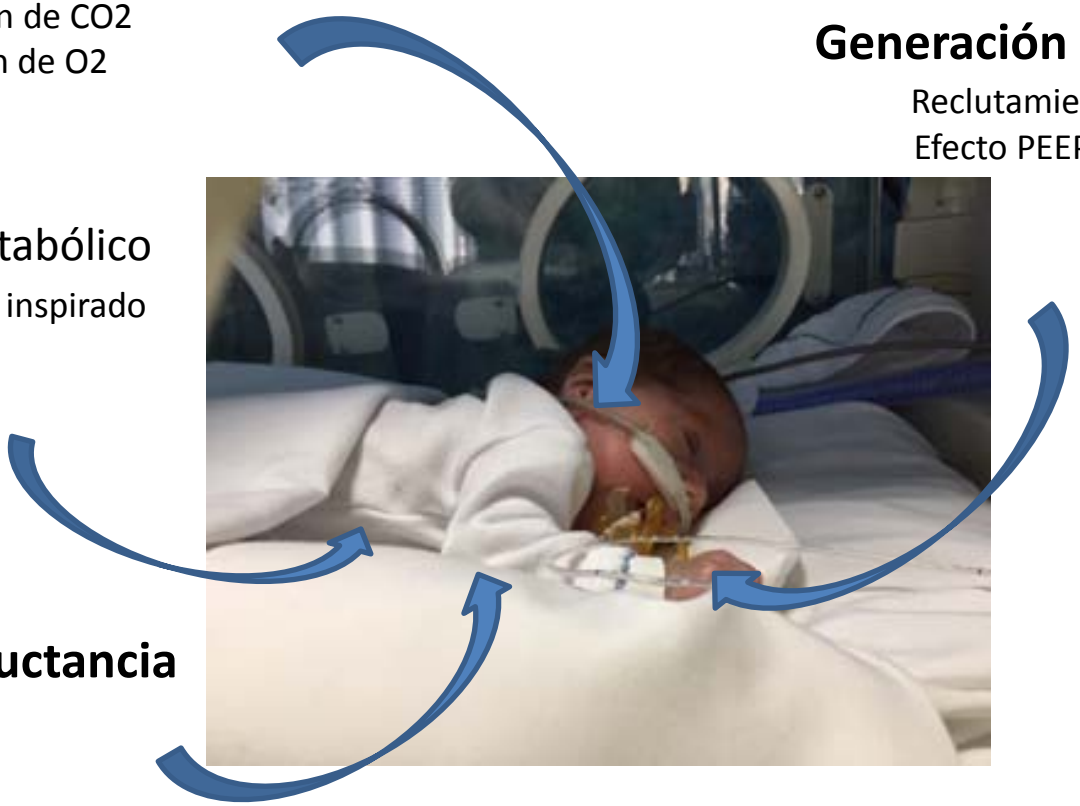
Reduce la reinhalación de CO2
Aumento del volumen de O2

Generación de Presión

Reclutamiento alveolar
Efecto PEEP

Reducción del Gasto Metabólico

Acondicionamiento del gas inspirado



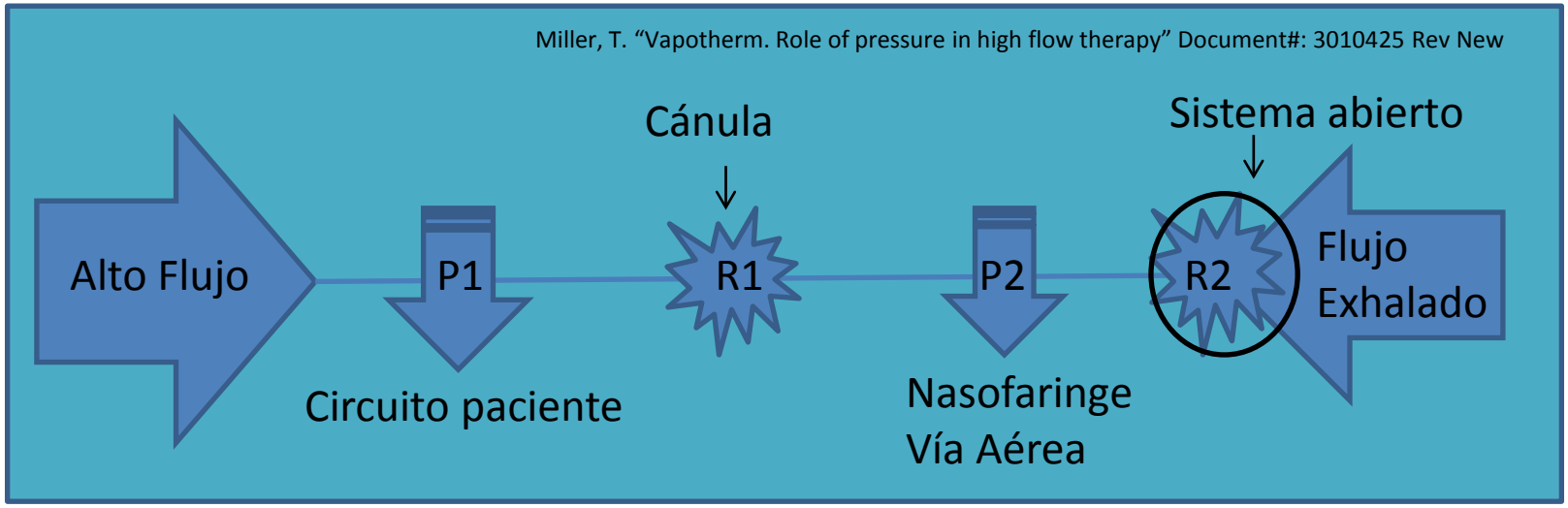
Aumento de la inductancia inspiratoria

Flujo Inspiratorio

Efecto sostén de la VA

Dysart, K; Miller, T. “Research in high flow therapy:Mechanisms of action”. Respiratory Medicine (2009) XX, 1-6

Generación de presión



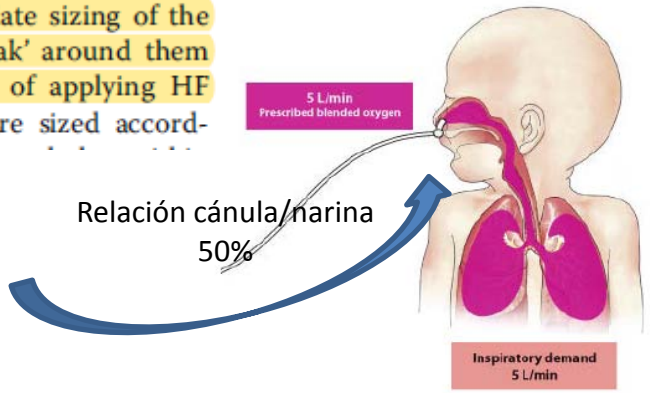
High-flow nasal cannula: Mechanisms, evidence and recommendations

Brett J. Manley [a, b, *], Louise S. Owen [a, b, c]

Seminars in Fetal & Neonatal Medicine xxx (2016) 1–7

that result in increased distending pressure during HF treatment: increasing gas flow, increased ratio of the diameter of the cannulae to that of the nares, and lower infant weight [16–18]. Appropriate sizing of the cannulae, such that there is a gas 'leak' around them in the nares, is an important aspect of applying HF safely. Studies in which the prongs are sized accord-

HF may produce distending pressure in the lung, similar to CPAP pressures, however clinicians have raised concerns regarding the potentially unpredictable pressures generated by HF. Finer [27,28]



Relación cánula/narina
50%

Selección del flujo

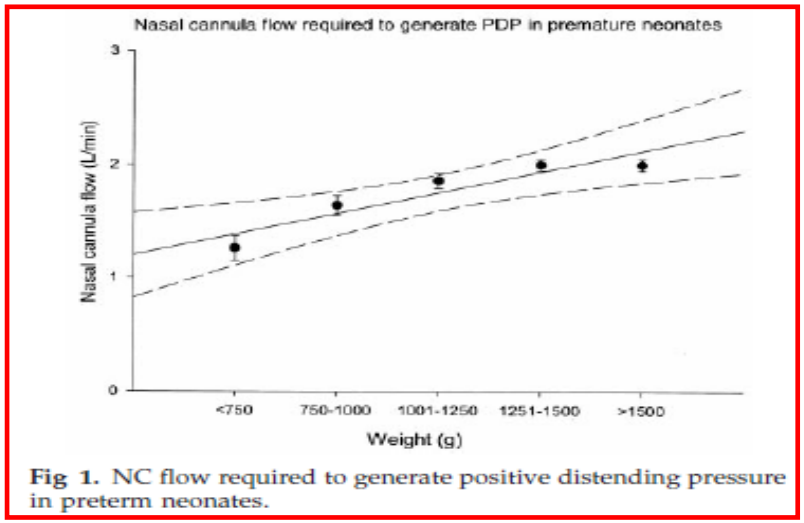


Fig 1. NC flow required to generate positive distending pressure in preterm neonates.

Flujo Insp = 0,5 l/kg/min

Flujo (L/min) = 0,92 + 0,68 x peso (kg)

Correlación=0,72

Sreenan, C; Lemke, R. "High-Flow Nasal Cannula in the Management of Apnea of Prematurity:A Comparison With Convencional Nasal Continuous Positive Airway Pressure"
Pediatrics 2001;107(5):1081-1083

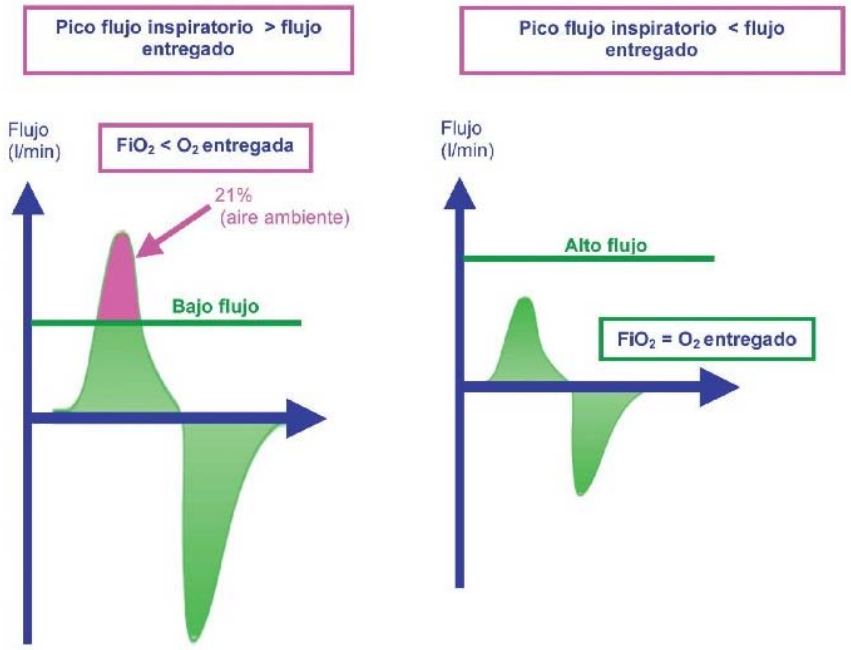
Nasal high flow treatment in preterm infants

Roberts and Hodgson *Matemal Health, Neonatology, and Perinatology* (2017) 3:15
DOI 10.1186/s40748-017-0056-y

Calum T. Roberts[1,2*] and Kate A. Hodgson[1]

Work of breathing

The nasopharynx has a relatively large surface area with resulting resistance to gas flow, which might be minimised by the use of HF to provide a gas flow at or above the peak inspiratory flow of the patient [15]. Physiological studies,



Oxigenoterapia de alto flujo F.J. Pilar Orive, Y.M. López Fernández. An Pediatr Contin. 2014;12(1):25-9

Journal of Perinatology (2008) 28, 42–47

www.nature.com/jp

ORIGINAL ARTICLE

Pharyngeal pressure with high-flow nasal cannulae in premature infants

DJ Wilkinson[1,2], CC Andersen[1,3], K Smith[4] and J Holberton[1]

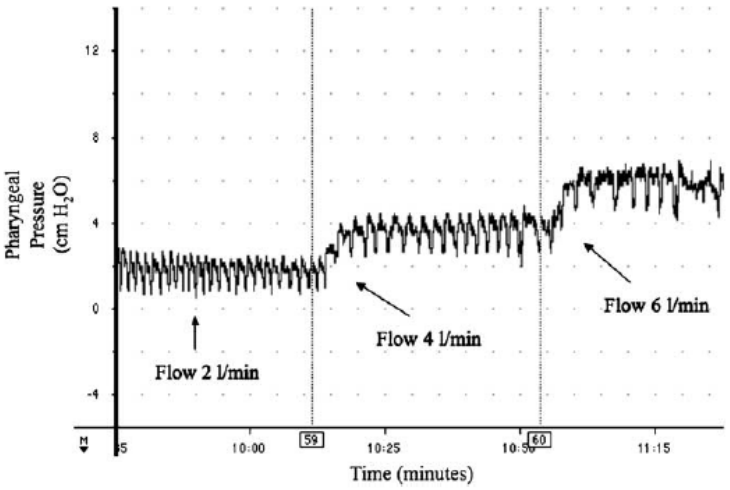
Objective: The aim of this study was to measure pharyngeal pressures in preterm infants receiving high-flow nasal cannulae.

Study Design: A total of 18 infants were studied (median gestational age 34 weeks, weight 1.619 kg). A catheter-tip pressure transducer was introduced into the nasopharynx. Flow was sequentially increased to a maximum of 8 l min^{-1} and decreased to a minimum of 2 l min^{-1}.

Result: There was a strong association between pharyngeal pressure and both flow rate and infant weight ($P<0.001$, $r^2=0.61$), but not mouth closure. This relationship could be expressed as pharyngeal pressure (cm H_2O) $=0.7+1.1$ F (F = flow per kg in l min^{-1} kg^{-1}).

Conclusion: High-flow nasal cannulae at flow rates of 2 to 8 l min^{-1} can lead to clinically significant elevations in pharyngeal pressure in preterm infants. Flow rate and weight but not mouth closure are important determinants of the pressure transmitted.

Journal of Perinatology (2008) **28**, 42–47; doi:10.1038/sj.jp.7211879; published online 8 November 2007



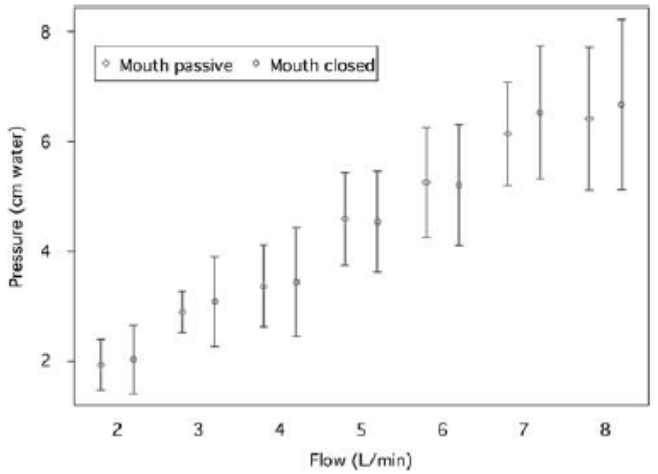


Figure 2 Mean pharyngeal pressure (with 95% confidence intervals) recorded at flow rates 2 to 8 l min^{-1}.

↑ 0,8 cmH2O por cada ↑l/min de flujo
↓ 1,4 cmH2= por cada ↑kg de peso

Association Between High-Flow Nasal Cannula and End-Expiratory Esophageal Pressures in Premature Infants

Narayan P Iyer MD and Maroun J Mhanna MD MPH

RESPIRATORY CARE • MARCH 2016 VOL 61 NO 3

Table 1. Subjects' Demographics

Parameters	Values ($N = 19$)
Birth weight, mean ± SD g	904 ± 574
Weight at observation, mean ± SD g	1,458 ± 828
Gestation at birth, mean ± SD wks	26.6 ± 3.1
Gestation at observation, mean ± SD wks	33.3 ± 4.9

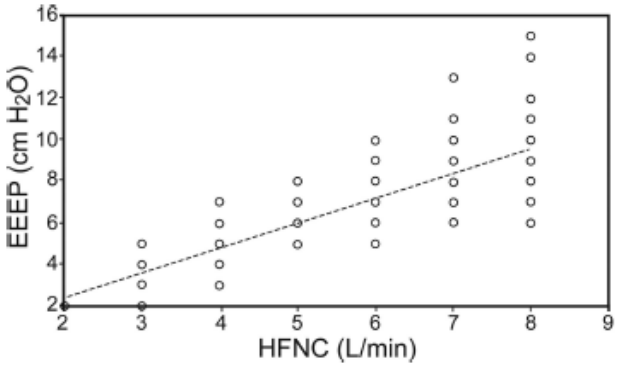


Fig. 1. Association between high-flow nasal cannula (HFNC) and generated end-expiratory esophageal pressures (EEEP) in premature infants. EEEP = 1.18 × flow ($r^2 = 0.95$; $P < .001$). Each point represents an individual EEEP measurement in a subject on a given HFNC flow.

independent variable, there was a significant correlation between the 2 variables: end-expiratory esophageal pressure (cm H_2O) = 1.18 × HFNC (L/min) ($r^2 = 0.95$, $P < .001$). CONCLUSIONS: HFNC-associated end-expiratory esophageal pressure is measurable in premature infants. There is a significant association between flows and generated esophageal pressures. There is also variability in the amount of end-expiratory esophageal pressure generated. These observations should be kept in mind when using high HFNC flows in preterm infants. *Key words: very low birthweight; prematurity; infants; high-flow nasal cannula; end-expiratory esophageal pressures.* [Respir Care 2016;61(3):285–290. © 2016 Daedalus Enterprises]

Flujo Máximo 2 l/kg/min?
3 l/kg/min? 4 l/min/kg?
4-6 l/m? 6-8 l/m?

Evidence Support and Guidelines for Using Heated, Humidified, High-Flow Nasal Cannulae in Neonatology

Oxford Nasal High-Flow Therapy Meeting, 2015

Charles C. Roehr, MD, PhD[a,b,*], Bradley A. Yoder, MD[c], Peter G. Davis, MD[d], Kevin Ives, MD[a]

Journal of Perinatology (2017) 00, 1–5

www.nature.com/jp

ORIGINAL ARTICLE

Consensus approach to nasal high-flow therapy in neonates

BA Yoder[1], B Manley[2], C Collins[3], K Ives[4], A Kugelman[5], A Lavizzari[6] and M McQueen[7]

Table 1
Consented guide to the initiation and alteration of nasal high flow therapy in neonates

Current Weight	Initiation of Flow	Escalation of Flow	Weaning Flow	Discontinuing nHFT
<1500 g	4–6 lpm	Fio_2 >35% or ↑ RR, WOB	↓ by 0.5 lpm Q 12–24 h	Typically at flow = weight (kg)
1500–3000 g	5–7 lpm	Fio_2 >35% or ↑ RR, WOB	↓ by 0.5–1 lpm Q 6–12 h	Typically at 2 lpm
> 3000 g	6–8 lpm	Fio_2 >35% or ↑ RR, WOB	↓ by 0.5–1 lpm as indicated	Typically at 2 lpm
Comments	Max flow 8 lpm	↑ by 1–2 lpm Q 15–20 min PRN	Typically slower wean with BPD	—

Consensus agreement	*Comment*
Adequate gas heating	Maintain at 34–37 °C
Adequate gas humidification	100% Relative humidity
Allowance for gas leak from nares	Preferred cannula to nares ratio ~0.50 Should be <0.80
Maximum allowed flow = 8 l min^{-1}	Per manufacturer's design/ approval
Postextubation support ⩾28 weeks	From multiple randomized trials
Transition off nasal CPAP	Consensus with limited trial data
Wean FiO_2 first	Wean to <0.30 before weaning flow
Increase flow	For increasing FiO_2 and/or WOB
General agreement	
Initial flow rate	Begin at 4–6 l min^{-1}
Decrease flow	When stable FiO_2, RR and WOB for >12–24 h
Change to other NIV mode	If FiO_2 consistently >0.40 If consistently increased WOB If excessive or severe apnea
Primary therapy for neonatal RDS	Not unanimous; see Table 2
No agreement	
Stopping nHFT	Range of 1–4 l min^{-1}

European Consensus Guidelines on the Management of Respiratory Distress Syndrome – 2019 Update

David G. Sweet[a] Virgilio Carnielli[b] Gorm Greisen[c] Mikko Hallman[d] Eren Ozek[e] Arjan te Pas[f] Richard Plavka[g] Charles C. Roehr[h] Ola D. Saugstad[i] Umberto Simeoni[j] Christian P. Speer[k] Maximo Vento[l] Gerhard H.A. Visser[m] Henry L. Halliday[n]

Neonatology
DOI: 10.1159/000499361

Heated humidified HFNC are increasingly used as an alternative to CPAP. With HFNC, heated/humidified gas is delivered to the nostrils with nasal catheters that are specifically designed not to occlude the nostrils, typically at flows of between 2 and 8 L/min, with weaning of flow rate determined clinically by FiO_2 remaining low and judgement of work of breathing [101]. Whilst an amount of pressure is invariably generated within the nasopharynx, the primary mode of action probably relates to gas conditioning and nasopharyngeal dead space CO_2 washout. In clinical trials, HFNC is broadly equivalent to CPAP for babies >28 weeks coming off MV with greater ease of use and less nasal trauma, although there is less evidence for smaller babies [102]. Centres familiar with

Generadores de PEEP

nCPAP (Presión constante y flujo variable)

- Válvula espiratoria
- Columna de agua (Bubble CPAP)
- Pérdida

Mecánicos

CAFO2 (Flujo constante y presión variable)

- Flujo
- Dimensiones de la VA
- Pérdida

Anatómicos

La Presión de distención pulmonar generada por el Sistema de Alto Flujo es **dinámico** dependiendo de la fase del ciclo respiratorio

Evidencia es controvertida

Fallo de extubación Revisiones

Cochrane Library

Cochrane Database of Systematic Reviews

Cochrane Database of Systematic Reviews 2016, Issue 2. Art. No.: CD006405.
DOI: 10.1002/14651858.CD006405.pub3.

High flow nasal cannula for respiratory support in preterm infants (Review)

Wilkinson D, Andersen C, O'Donnell CPF, De Paoli AG, Manley BJ

2016

Safety and Efficacy of High-Flow Nasal Cannula Therapy in Preterm Infants: A Meta-analysis

Sarah J. Kotecha, BSc, SRD[a], Roshan Adappa, MRCPCH, MD[b], Nakul Gupta, MRCPCH[b], W. John Watkins, PhD[a], Sailesh Kotecha, FRCPCH, PhD[a], Mallinath Chakraborty, MRCPCH, PhD[a,b]

Cochrane Library
Cochrane Database of Systematic Reviews

[Intervention Review]

High flow nasal cannula for respiratory support in preterm infants

Dominic Wilkinson[1,2], Chad Andersen[2,3], Colm PF O'Donnell[4], Antonio G De Paoli[5], Brett J Manley[6,7]

Figure 3. Forest plot of comparison: 3 HFNC versus CPAP to prevent extubation failure, outcome: 3.2 CLD.

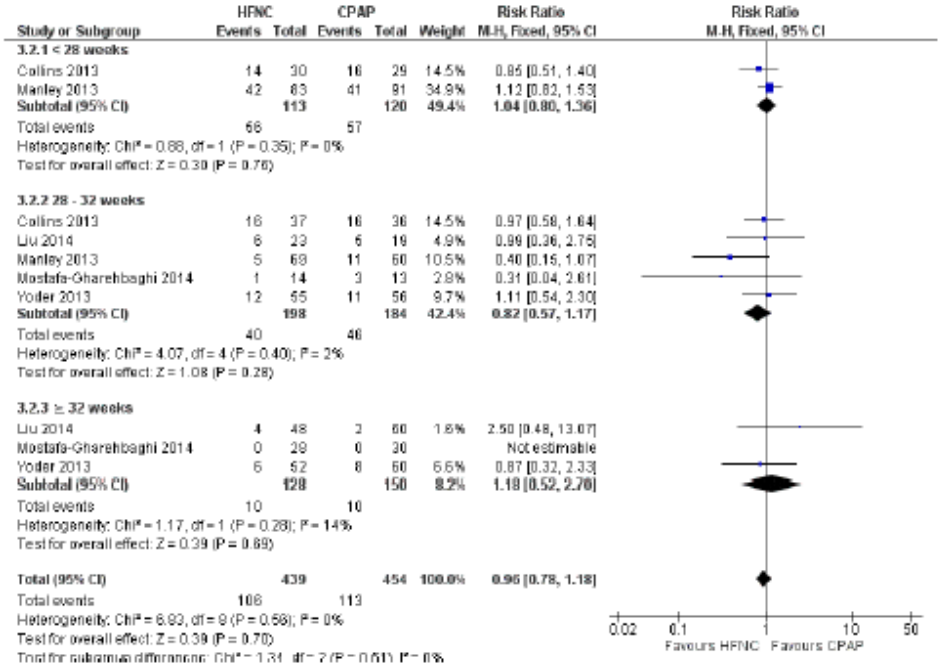
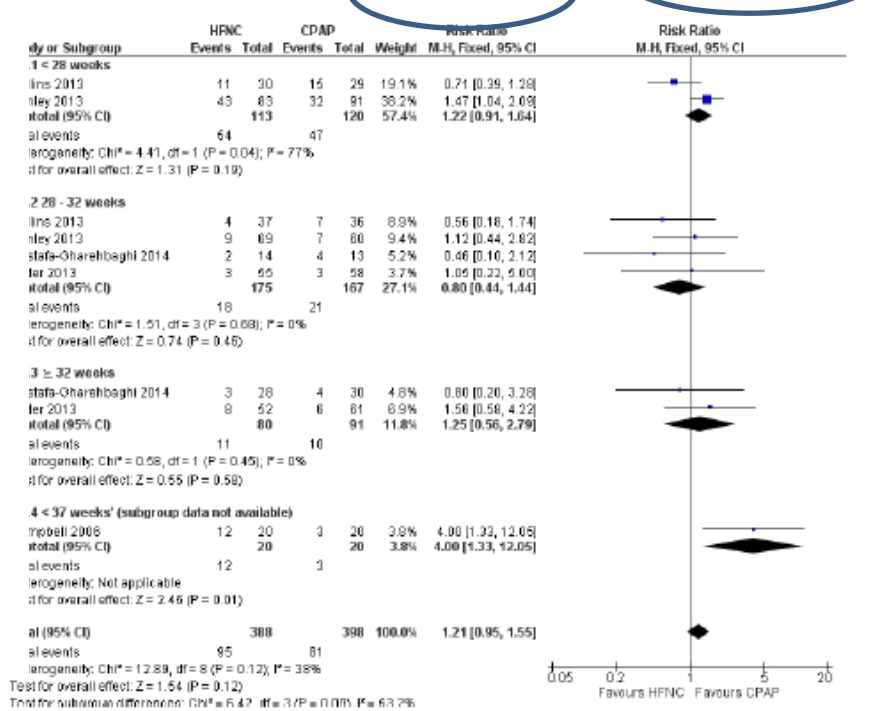


Figure 4. Forest plot of comparison: 3 High Flow Nasal Cannula versus CPAP to prevent extubation failure, outcome: Treatment failure.



Authors' conclusions

HFNC has similar rates of efficacy to other forms of non-invasive respiratory support in preterm infants for preventing treatment failure, death and CLD. Most evidence is available for the use of HFNC as post-extubation support. Following extubation, HFNC is associated with less nasal trauma, and may be associated with reduced pneumothorax compared with nasal CPAP. Further adequately powered randomised controlled trials should be undertaken in preterm infants comparing HFNC with other forms of primary non-invasive support after birth and for weaning from non-invasive support. Further evidence is also required for evaluating the safety and efficacy of HFNC in extremely preterm and mildly preterm subgroups, and for comparing different HFNC devices.

Evidencia

Safety and Efficacy of High-Flow Nasal Cannula Therapy in Preterm Infants: A Meta-analysis

PEDIATRICS Volume 136, number 3, September 2015

Sarah J. Kotecha, BSc, SRD[a], Roshan Adappa, MRCPCH, MD[a], Nakul Gupta, MRCPCH[a], W. John Watkins, PhD[a], Sailesh Kotecha, FRCPCH, PhD[a], Mallinath Chakraborty, MRCPCH, PhD[ab]

BACKGROUND AND OBJECTIVE: High-flow therapy is the most recent, and popular, mode of respiratory support in neonates. However, the evidence supporting its efficacy and safety has not yet been established. We conducted a systematic review and meta-analysis of clinical trials comparing efficacy and safety of high-flow therapy compared with other modes of noninvasive ventilation (NIV) in preterm infants.

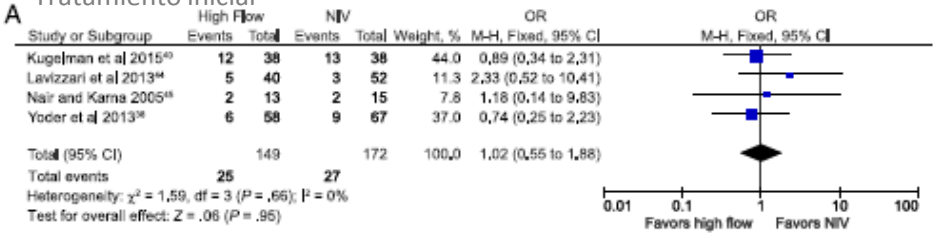
METHODS: Articles were indexed by using Medline, Embase, Scopus, OpenSIGLE, Health Management Information Consortium, and Cochrane Central Register of Controlled Trials. Randomized or quasi-randomized clinical trials involving preterm infants, comparing high-flow therapy with other modes of NIV, and reporting extractable data on relevant outcomes, were selected. Data on efficacy, safety, and other common neonatal outcomes were extracted on predesigned forms.

RESULTS: In this analysis, we included 1112 preterm infants, participating in 9 clinical trials. High-flow therapy was similar in efficacy to other modes of NIV in preterm infants when used as primary support (odds ratio of failure of therapy, 1.02 [95% confidence interval: 0.55 to 1.88]), as well as after extubation (1.09 [0.58 to 2.02]). There were no significant differences in odds of death (0.48 [0.18 to 1.24]) between the groups. Preterm infants supported on high-flow had significantly lower odds of nasal trauma (0.13 [0.02 to 0.69]).

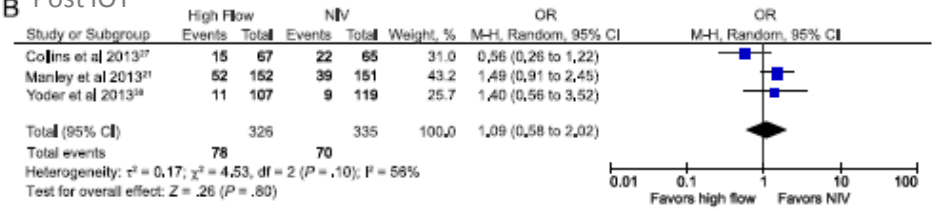
CONCLUSIONS: High-flow therapy appears to be similar in efficacy and safety to other conventional modes of NIV in preterm infants. It is associated with significantly lower odds of nasal trauma. Caution needs to be exercised in extreme preterm infants because of the paucity of published data.

Objetivo 1rio: eficacia (falla de tratamiento)

Tratamiento inicial



Post IOT



GURE 3
oled estimates of odds of failure of therapy of HHHFNC compared with other modes of NIV in preterm infants, when used as (A) primary mode of spiratory support, and (B) after extubation from MV.

Objetivo 1rio: efectividad (mortalidad, escape de aire, lesión nasal)

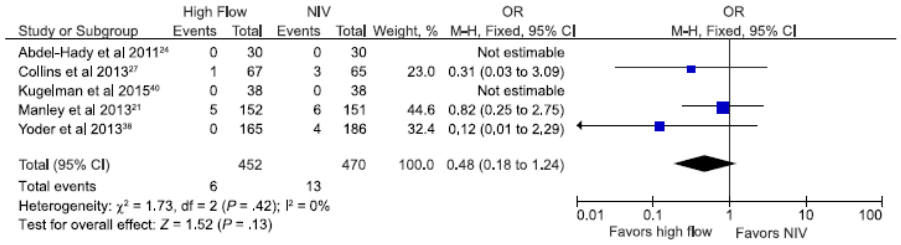


FIGURE 5
Pooled estimate of odds of death in preterm infants supported on HHHFNC compared with other modes of NIV.

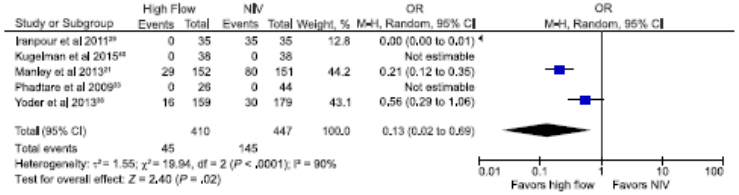


FIGURE 7
Pooled estimate of odds of nasal trauma in preterm infants supported on HHHFNC compared with other modes of NIV.

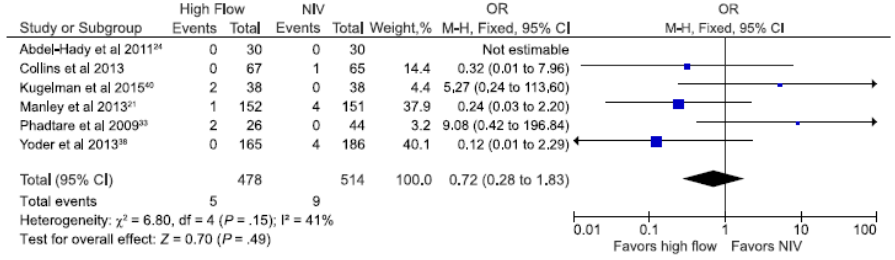


FIGURE 6
Pooled estimate of odds of pulmonary air leaks in preterm infants supported on HHHFNC compared with other modes of NIV.

Fallo de extubación RCT

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

High-Flow Nasal Cannulae in Very Preterm Infants after Extubation

Brett J. Manley, M.B., B.S., Louise S. Owen, M.D., Lex W. Doyle, M.D., Chad C. Andersen, M.B., B.S., David W. Cartwright, M.B., B.S., Margo A. Pritchard, Ph.D., Susan M. Donath, M.A., and Peter G. Davis, M.D.

N Engl J Med 2013;369:1425-33.

The effects of nasal continuous positive airway pressure and high flow nasal cannula on heart rate variability in extremely preterm infants after extubation: A randomized crossover trial

Samantha Latremouille MSc[1] | Wissam Shalish MD[1] | Lara Kanbar MSc[2] | Philippe Lamer NNP[1] | Smita Rao RA[1] | Robert E. Kearney PhD[2] | Guilherme M. Sant'Anna MD, PhD[1]

2013 2017 2019

A Randomized Controlled Trial to Compare Heated Humidified High-Flow Nasal Cannulae with Nasal Continuous Positive Airway Pressure Postextubation in Premature Infants

Clare L. Collins, MBChB, FRACP[1], James R. Holberton, MBBS, FRACP[1], Charles Barfield, MBBS, FRACP[1], and Peter G. Davis, MD, FRACP[2]

(J Pediatr 2013;162:949-54).

Heated Humidified High-Flow Nasal Cannula for Prevention of Extubation Failure in Preterm Infants

Sasivimon Soonsawad[1] · Buranee Swatesutipun[2] · Anchalee Limrungsikul[2] · Pracha Nuntnarumit[2]

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

High-Flow Nasal Cannulae in Very Preterm Infants after Extubation

Brett J. Manley, M.B., B.S., Louise S. Owen, M.D., Lex W. Doyle, M.D., Chad C. Andersen, M.B., B.S., David W. Cartwright, M.B., B.S., Margo A. Pritchard, Ph.D., Susan M. Donath, M.A., and Peter G. Davis, M.D.

CONCLUSIONS

Although the result for the primary outcome was close to the margin of noninferiority, the efficacy of high-flow nasal cannulae was similar to that of CPAP as respiratory support for very preterm infants after extubation. (Funded by the National Health and Medical Research Council; Australian New Zealand Clinical Trials Network number, ACTRN12610000166077.)

Table 1. Characteristics of the Infants and Their Mothers.*

Characteristic	Nasal-Cannulae Group (N=152)	CPAP Group (N=151)
Mothers		
White race — no. (%)†	127 (83.6)	120 (79.5)
Primigravida — no. (%)	61 (40.1)	59 (39.1)
Exposure to antenatal glucocorticoids — no. (%)	142 (93.4)	143 (94.7)
Cesarean section — no. (%)	101 (66.4)	101 (66.9)
Infants		
Gestational age		
No. of wk	27.7±2.1	27.5±1.9
<26 wk — no. (%)	32 (21.1)	31 (20.5)
Birth weight — g	1041±338	1044±327
Male sex — no. (%)	89 (58.6)	72 (47.7)
Multiple birth — no. (%)	49 (32.2)	52 (34.4)
Intubated in the delivery room — no. (%)	102 (67.1)	91 (60.3)
Median Apgar score at 5 min (IQR)	7 (6–8)‡	8 (6–8)
Surfactant treatment — no. (%)	141 (92.8)	144 (95.4)
Caffeine treatment before extubation — no. (%)	151 (99.3)	148 (98.0)
Median postnatal age at extubation (IQR) — hr	43.2 (20.8–115.7)	38.5 (22.8–101.7)
Median duration of mechanical ventilation before extubation (IQR) — hr	36 (19.5–101.5)	36 (20–93)
pH before extubation§	7.33±0.06	7.32±0.06
Partial pressure of carbon dioxide before extubation — mm Hg§	44.2±9.2	43.6±9.0
Fraction of inspired oxygen before extubation	0.23±0.04	0.23±0.04

A Randomized Controlled Trial to Compare Heated Humidified High-Flow Nasal Cannulae with Nasal Continuous Positive Airway Pressure Postextubation in Premature Infants

Clare L. Collins, MBChB, FRACP[1], James R. Holberton, MBBS, FRACP[1], Charles Barfield, MBBS, FRACP[1], and Peter G. Davis, MD, FRACP[2]

Results A total of 132 ventilated infants younger than 32 weeks' gestation were randomized to receive either HHHFNC (n = 67) or NCPAP (n = 65). Extubation failure occurred in 15 (22%) of the HHHFNC group compared with 22 (34%) of the NCPAP group. There was no difference in the number of infants reintubated in the first week. Treatment with HHHFNC reduced the nasal trauma score 3.1 (SD 7.2) versus NCPAP 11.8 (SD 10.7), $P < .001$.

Conclusions HHHFNC and NCPAP produced similar rates of extubation failure. *(J Pediatr 2013;162:949-54).*

Table II. Primary outcome for infants assigned to receive either Vapotherm HHHFNC or NCPAP for postextubation respiratory support and by subgroup

	Vapotherm, n = 67	NCPAP, n = 65	*P* value
Failed extubation by composite criteria in 1st week after extubation, n (%)	15 (22)	22 (34)	.14
Apnea (%) >1/h for 6 h or 1 req IPPV, n (%)	14 (21)	17 (26)	.48
Acidosis (%) pH < 7.25 and pCO_2 >65 mmHg, n (%)	0	3 (5)	.08
>0.15 increase in FiO_2, n (%)	7 (10)	12 (18)	.19
Reintubated in 1st week, n (%) ≥≥28 completed weeks' gestation	7 (10) n = 37	8 (12) n = 36	.74
Failed extubation by composite criteria in 1st week after extubation, n (%)	4 (11)	7 (19)	.30
Reintubated in 1st week, n (%) <28 completed weeks' gestation	2 (5) n = 30	1 (3) n = 29	.57
Failed extubation by composite criteria in 1st week after extubation, n (%)	11 (37)	15 (52)	.24
Reintubated in 1st week, n (%)	5 (17)	7 (24)	.48

IPPV, intermittent positive pressure ventilation; *pCO_2*, partial pressure of CO_2.

Heated Humidified High-Flow Nasal Cannula for Prevention of Extubation Failure in Preterm Infants

Sasivimon Soonsawad[1] · Buranee Swatesutipun[2] · Anchalee Limrungsikul[2] · Pracha Nuntnarumit[2]

Infant's characteristics	HHHFNC (*N* = 24)	CPAP (*N* = 25)	*p* value
Gestational age (wk)*	27.5 (26, 30)	28 (25, 29.5)	0.72
<28 wk, n(%)	14 (58.3)	15 (60)	0.91
≥28 wk, n(%)	10 (41.6)	10 (40)	
Birth weight (g)*	990 (800, 1333)	980 (740, 1237)	0.63
Male, n(%)	11 (45.8)	17 (68.0)	0.15
Multiple birth, n(%)	7 (29.2)	7 (28.0)	0.93
Apgar score at 5 min*	6 (4, 9)	6 (4, 8)	0.71
Cesarean section, n(%)	18 (75)	20 (80)	0.74
Surfactant, n(%)	15 (62.5)	17 (68)	0.76
Completed course of antenatal steroid, n(%)	18 (75)	19 (76)	0.93
Characteristics at enrollment			
Post menstrual age (wk)*	28.5 (27, 32)	30 (29, 30.5)	0.23
Chronological age (days)*	7 (3, 13)	7 (3, 25)	0.19
Body weight (g)*	1015 (840, 1180)	1060 (865, 1285)	0.47
Hematocrit (%)*	40 (35.2, 44.5)	42 (37, 46.5)	0.71
PEEP (cm H_2O)*	6 (5, 6)	6 (5, 6)	0.96
FiO_2*	0.23 (0.21, 0.25)	0.25 (0.21, 0.30)	0.57
Duration of mechanical ventilator (days)*	5.5 (3, 9.7)	6 (1.5, 25.5)	0.11

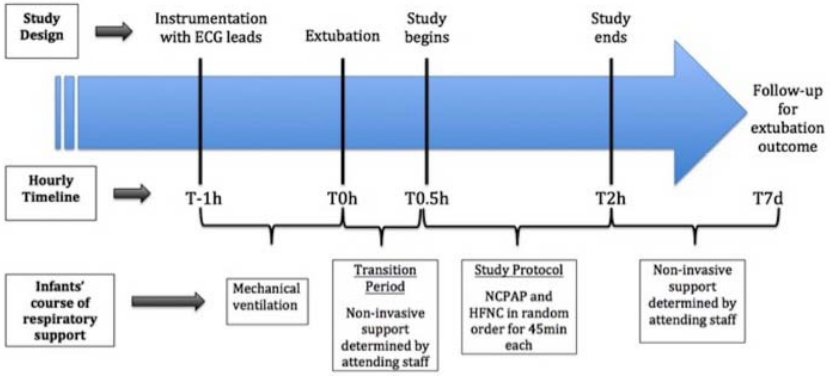
In conclusion, the present study shows that there is no significant difference between HHHFNC and CPAP in extubation failure rate within 72 h after endotracheal tube removal. HHHFNC could be considered as an alternative respiratory support for infants after extubation. However, a

the index study, 71% of infants who met the extubation failure criteria and all of the infants who needed reintubation were born at <28 wk of gestation. This finding is supported by a previous study [12] showing that using HHHFNC in infants <26 wk of gestation has very high extubation failure rate.

found that 75% and 66% of infants who met failed extubation criteria in HHHFNC and CPAP groups could be rescued by bilevel CPAP. These may be explained by the enhancement of

The effects of nasal continuous positive airway pressure and high flow nasal cannula on heart rate variability in extremely preterm infants after extubation: A randomized crossover trial

Samantha Latremouille MSc[1] | Wissam Shalish MD[1] | Lara Kanbar MSc[2] | Philippe Lamer NNP[1] | Smita Rao RA[1] | Robert E. Kearney PhD[2] | Guilherme M. Sant'Anna MD, PhD[1]



5 | CONCLUSION

In a cohort of extremely preterm infants, the use of NCPAP or HFNC had no effect on HRV parameters when assessed during the first hours after extubation. However, significant differences were noted in infants successfully extubated, with higher HRV during HFNC as compared to NCPAP for some HRV parameters. Further research using a larger sample size is needed to validate our results and better understand the physiological and clinical significance of our findings.

Soporte inicial RNPT Revisiones

Cochrane Library

Cochrane Database of Systematic Reviews

Cochrane Database of Systematic Reviews 2016, Issue 2. Art. No.: CD006405.
DOI: 10.1002/14651858.CD006405.pub3.

High flow nasal cannula for respiratory support in preterm infants (Review)

Wilkinson D, Andersen C, O'Donnell CPF, De Paoli AG, Manley BJ

2016

Review

High-flow nasal cannula: Mechanisms, evidence and recommendations

Brett J. Manley [a, b, *], Louise S. Owen [a, b, c]

Seminars in Fetal & Neonatal Medicine xxx (2016) 1–7

[Intervention Review]

High flow nasal cannula for respiratory support in preterm infants

Cochrane Database of Systematic Reviews 2016, Issue 2. Art. No.: CD006405.
DOI: 10.1002/14651858.CD006405.pub3.

Dominic Wilkinson[1,2], Chad Andersen[2,3], Colm PF O'Donnell[4], Antonio G De Paoli[5], Brett J Manley[6,7]

Figure 1. Forest plot of comparison: 1 HFNC versus CPAP soon after birth for treatment or prophylaxis of RDS, outcome: 1.4 Treatment failure within 7 days of trial entry.

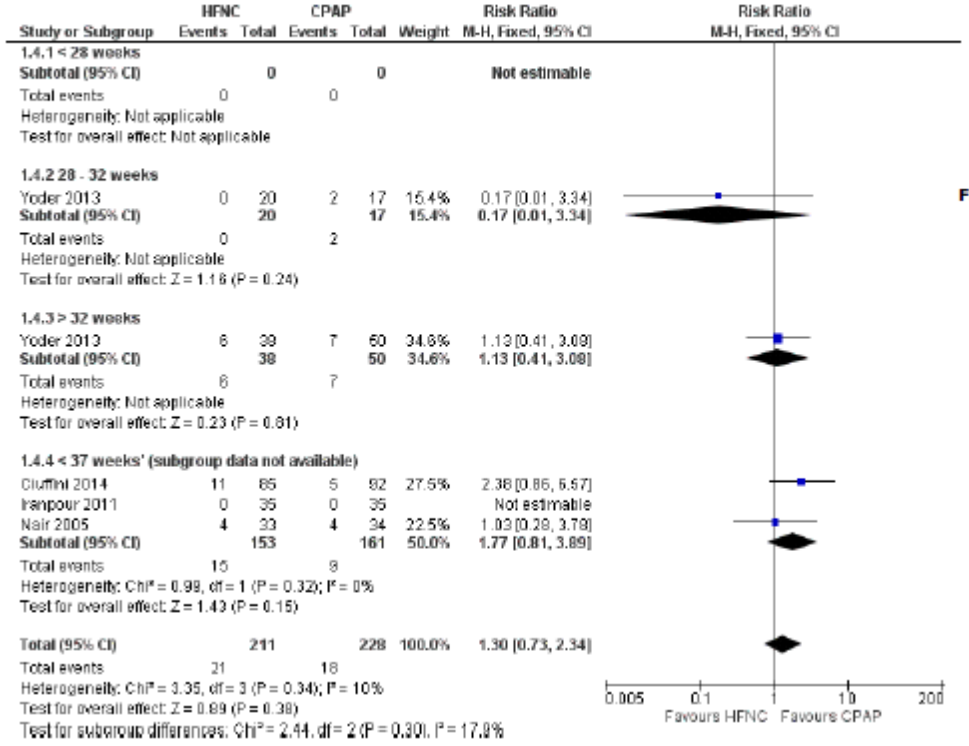
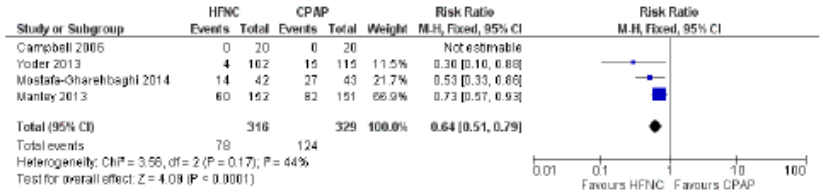


Figure 6. Forest plot of comparison: 3 HFNC versus CPAP to prevent extubation failure, outcome: Nasal trauma.



Review

High-flow nasal cannula: Mechanisms, evidence and recommendations

Brett J. Manley [a, b, *], Louise S. Owen [a, b, c]

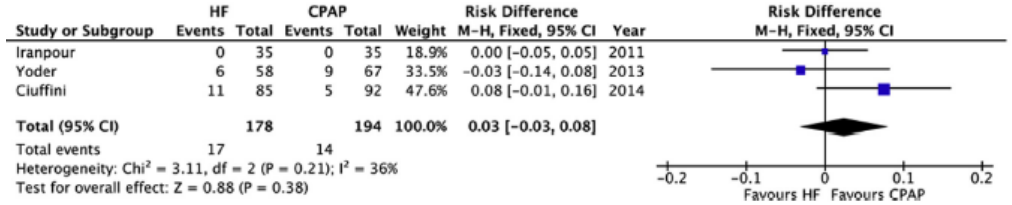


Fig. 2. High-flow nasal cannula (HF) therapy vs continuous positive airway pressure (CPAP) as primary respiratory support in preterm infants: treatment failure within 7 days (three studies).

Soporte inicial RNPT RCT

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Nasal High-Flow Therapy for Primary Respiratory Support in Preterm Infants

Calum T. Roberts, M.B., Ch.B., Louise S. Owen, M.D., Brett J. Manley, Ph.D., Dag H. Frøisland, Ph.D., Susan M. Donath, M.A., Kim M. Dalziel, Ph.D., Margo A. Pritchard, Ph.D., David W. Cartwright, M.B., B.S., Clare L. Collins, M.D., Atul Malhotra, M.D., and Peter G. Davis, M.D., for the HIPSTER Trial Investigators*

High-Flow Nasal Cannula versus Nasal Continuous Positive Airway Pressure for Primary Respiratory Support in Preterm Infants with Respiratory Distress: A Randomized Controlled Trial

Srinivas Murki[a] Jayesh Singh[a] Chiragkumar Khant[b] Swarup Kumar Dash[b] Tejo Pratap Oleti[a] Percy Joy[a] Nandkishor S. Kabra[b]

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Humidified High Flow Nasal Cannula versus Nasal Continuous Positive Airway Pressure as an Initial Respiratory Support in Preterm Infants with Respiratory Distress: a Randomized, Controlled Non-Inferiority Trial

2016 2017 2018

JAMA Pediatrics | Original Investigation

Heated, Humidified High-Flow Nasal Cannula vs Nasal Continuous Positive Airway Pressure for Respiratory Distress Syndrome of Prematurity

A Randomized Clinical Noninferiority Trial

Anna Lavizzari, MD; Mariarosa Colnaghi, MD; Francesca Ciuffini, MD; Chiara Veneroni, PhD; Stefano Musumeci; Ivan Cortinovis; Fabio Mosca, MD

BMJ Open

A multicentre, randomised controlled, non-inferiority trial, comparing nasal high flow with nasal continuous positive airway pressure as primary support for newborn infants with early respiratory distress born in Australian non-tertiary special care nurseries (the HUNTER trial): study protocol

Brett J Manley,[1,2] Calum T Roberts,[1,2] Gaston R B Arnolda,[3] Ian M R Wright,[4,5,6] Louise S Owen,[1,2,7] Kim M Dalziel,[8] Jann P Foster,[9,10,11] Peter G Davis,[1,2,7] Adam G Buckmaster[6,12]

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Table 2. Primary Outcome, Intubation within 72 Hours, and Outcomes in the Subgroup and Per-Protocol Analyses.

Outcome	High-Flow Group (N=278)	CPAP Group (N=286)	Risk Difference (95% CI)*	P Value
	no./total no. (%)		*percentage points*	
Primary intention-to-treat analysis				
Treatment failure within 72 hr	71/278 (25.5)	38/286 (13.3)	12.3 (5.8 to 18.7)	<0.001
Gestational age <32 wk	46/140 (32.9)	27/149 (18.1)	14.7 (4.8 to 24.7)	0.004
Gestational age ≥32 wk	25/138 (18.1)	11/137 (8.0)	10.1 (2.2 to 18.0)	0.01
Intubation within 72 hr	43/278 (15.5)	33/286 (11.5)	3.9 (−1.7 to 9.6)	0.17
Gestational age <32 wk	30/140 (21.4)	24/149 (16.1)	5.3 (−3.7 to 14.3)	0.25
Gestational age ≥32 wk	13/138 (9.4)	9/137 (6.6)	2.9 (−3.5 to 9.3)	0.38
Per-protocol analysis				
Treatment failure within 72 hr	64/264 (24.2)	36/279 (12.9)	11.3 (4.8 to 17.8)	<0.001
Intubation within 72 hr	39/264 (14.8)	33/279 (11.8)	2.9 (−2.8 to 8.7)	0.31

High-Flow Nasal Cannula versus Nasal Continuous Positive Airway Pressure for Primary Respiratory Support in Preterm Infants with Respiratory Distress: A Randomized Controlled Trial

Srinivas Murki[a] Jayesh Singh[a] Chiragkumar Khant[b] Swarup Kumar Dash[b] Tejo Pratap Oleti[a] Percy Joy[a] Nandkishor S. Kabra[b]

[a]Fernandez Hospital, Hyderabad, India; [b]Surya Hospital, Mumbai, India

Table 2. Primary outcome and need for mechanical ventilation

Variable	HFNC group (n = 133)	nCPAP group (n = 139)	Risk difference, % (95% CI)	p value
Treatment failure within 72 h	35 (26.3)	11 (7.9)	18.4 (9.7 to 27.1)	<0.0001
Ventilation within 3 days	8 (6.0)	11 (7.9)	−1.90 (−7.9 to 4.1)	0.55
Ventilation within 7 days	9 (6.8)	13 (9.4)	−2.6 (−9.0 to 3.9)	0.45
Time to treatment failure, h	3 (1–8)	22 (2–34)	−19.0 (−1.9 to −36.1)[a]	0.04
Time to ventilation, h	21 (4.7–72.7)	19 (2.25–32.5)	2.0 (−46.1 to 50.1)[a]	0.32
Reasons for treatment failure				
Increased oxygen need	16/35 (46)	3/11 (27)	−18 (−49 to 13)	0.30
Increased respiratory distress	14/35 (40)	4/11 (36)	−3.6 (−37 to 29)	0.84
Apnea	3/35 (8.6)	3/11 (27.3)	−18.7 (−46.6 to 9.20)	0.16
Shock or other reasons	2/35 (5.6)	1/11 (9.1)	−3.5 (−22.1 to 32.5)	0.69
Subgroup with SAS >5	54/133 (40.6)	64/139 (46.0)	−5.4 (−17.2 to 6.3)	0.37
Treatment failure within 72 h	21/54 (38.9)	6/64 (9.4)	29.5 (14.6 to 44.3)	0.0003
Ventilation within 3 days	4/54 (7.4)	6/64 (9.4)	−1.9 (−11.9 to 8.0)	0.72
Ventilation within 7 days	4/54 (7.4)	7/64 (10.9)	−3.5 (−13.9 to −6.8)	0.54
Subgroup with SAS ≤5	79/133 (59.4)	75/139 (54.0)	5.4 (−6.3 to 17.2)	0.37
Treatment failure within 72 h	14/79 (17.7)	5/75 (6.7)	11.1 (0.9 to 21.2)	0.04
Ventilation within 3 days	4/79 (5.1)	5/75 (6.7)	−1.6 (−9.0 to 5.8)	0.69
Ventilation within 7 days	5/79 (6.3)	6/75 (8.0)	−1.7 (−9.8 to 6.5)	0.70
Subgroup of infants with gestation <32 weeks	58/133 (43.6)	68/139 (48.9)	−5.3 (−17.1 to 6.5)	0.38
Treatment failure within 72 h	22/58 (37.9)	7/68 (10.3)	27.6 (13.2 to 42.1)	0.0002
Subgroup of infants with gestation ≥32 weeks	75/133 (56.4)	71/139 (51.1)	5.3 (−6.5 to 17.1)	0.38
Treatment failure within 72 h	15/75 (20.0)	6/71 (8.5)	11.5 (0.4 to 22.1)	0.05

JAMA Pediatrics | Original Investigation

Heated, Humidified High-Flow Nasal Cannula vs Nasal Continuous Positive Airway Pressure for Respiratory Distress Syndrome of Prematurity

A Randomized Clinical Noninferiority Trial

Anna Lavizzari, MD; Mariarosa Colnaghi, MD; Francesca Ciuffini, MD; Chiara Veneroni, PhD; Stefano Musumeci; Ivan Cortinovis; Fabio Mosca, MD

Table 2. Primary Outcome Results

Outcome	HHHFNC (n = 158)	nCPAP/BiPAP (n = 158)	95% CI of Risk Difference or Difference in Medians	*P* Value[a]
Mechanical ventilation within 72 h, No. (%)	17 (10.8)	15 (9.5)	−6.0 to 8.6	.71
Gestational age[b]				
29+0 to 32+6	10 (14.1)	8 (10.9)		.70
33+0 to 34+6	2 (3.8)	4 (7.5)		.67
35+0 to 36+6	5 (14.7)	3 (9.4)		.76
Age at start of mechanical ventilation, median (IQR), h	27.0 (8.0-36.0)	7.0 (3.0-19.0)	−24.5 to 0.0	.06
Duration of mechanical ventilation, median (IQR), d	3.2 (1.2 to 5.0)	3.0 (1.2 to 6.0)	−1.25 to 2.25	.72

BMJ Open

A multicentre, randomised controlled, non-inferiority trial, comparing nasal high flow with nasal continuous positive airway pressure as primary support for newborn infants with early respiratory distress born in Australian non-tertiary special care nurseries (the HUNTER trial): study protocol

Brett J Manley,[1,2] Calum T Roberts,[1,2] Gaston R B Arnolda,[3] Ian M R Wright,[4,5,6] Louise S Owen,[1,2,7] Kim M Dalziel,[8] Jann P Foster,[9,10,11] Peter G Davis,[1,2,7] Adam G Buckmaster[8,12]

Eligibility criteria

Infants are eligible for inclusion in the trial if:

1. They are born at ≥31 weeks' GA by best obstetric estimate and have birth weight ≥1200 g; and
2. They are admitted to the SCN of a participating centre and are <24 hours old at the time of randomisation; and
3. They require non-invasive respiratory support after admission to the SCN (at clinician discretion) or require any supplemental oxygen to maintain SpO_2 91%–95% for more than 1 hour.

and safety. If this trial demonstrates that nHF is non-inferior to CPAP as primary support for newborn infants in non-tertiary SCNs, then many units worldwide are likely to incorporate nHF into their routine practice. However,

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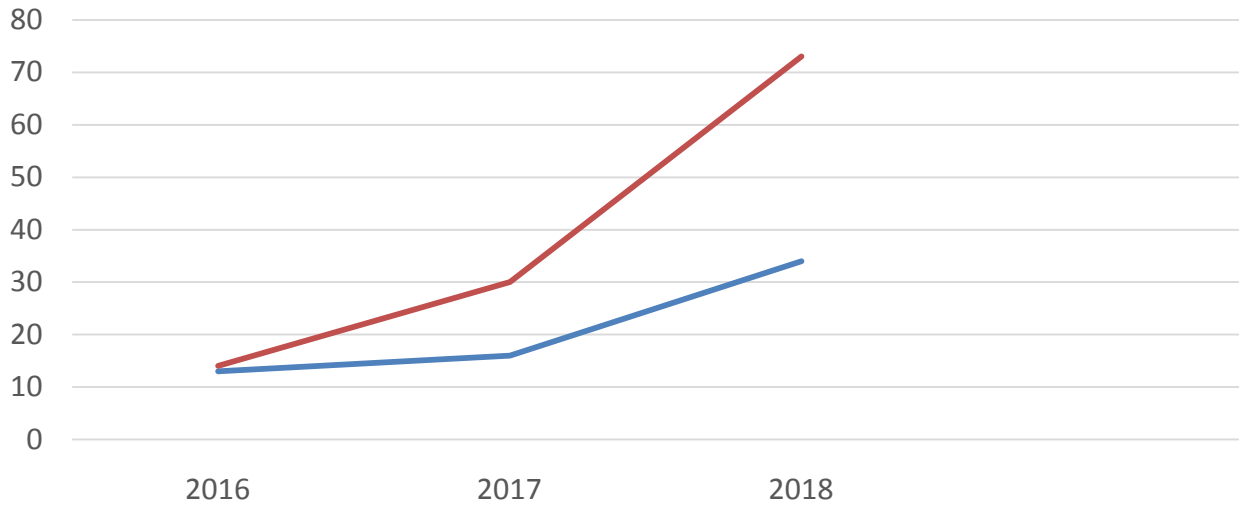
Humidified High Flow Nasal Cannula versus Nasal Continuous Positive Airway Pressure as an Initial Respiratory Support in Preterm Infants with Respiratory Distress: a Randomized, Controlled Non-Inferiority Trial

Table 2. Primary outcome for infants assigned to receive either HHFNC or nCPAP for the initial respiratory support

Outcomes	HHFNC (n = 42)	nCPAP (n = 43)	Risk difference (95% CI)* percentage points	*P* value†
Treatment failure	16 (38.1)	9 (20.9)	17.17 (−1.90–36.23)	0.099
Reasons				
Hypoxia	15 (35.7)	6 (14.0)	-	0.020
Respiratory acidosis	2 (4.8)	4 (9.3)	-	0.676
Additional management				
Endotracheal intubation	13 (31.0)	8 (18.6)	13.17 (−4.72–31.07)	0.216
Noninvasive devices	3 (7.1)	1 (2.3)	4.82 (−4.18–13.82)	0.360

Nuestra Experiencia
HIBA



Prema
RN

23 ptes 2016
46 ptes 2017
107 ptes 2018

Flujo

2016	Titulación por formula
2017	2 l/kg
2018/19	2-3 l/kg

RNPT

Días de uso 20 d (2-54)
20% fallo SEG 28 (EC <28-30 semanas)
80% éxito SEG 28-30 (EC >30 semanas)
Desvinculación CPAP (peep <= 5 cmH20)

POP CCV

Días de uso 12 d (6-17)
RNT o > 35 SEG
Prevención fallo extubación

POP otros (H. Diafragmatica/Tórax)

Días de uso 6 d (2-19)
RNT
Prevención fallo extubación
Desvinculación CPAP en AVM prolongada

Gracias!

HOSPITAL ITALIANO
de Buenos Aires

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