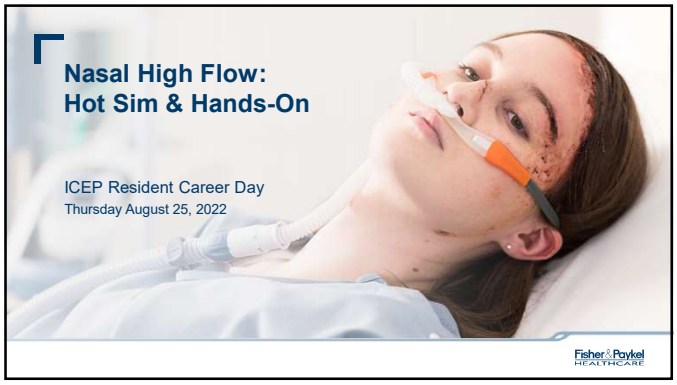
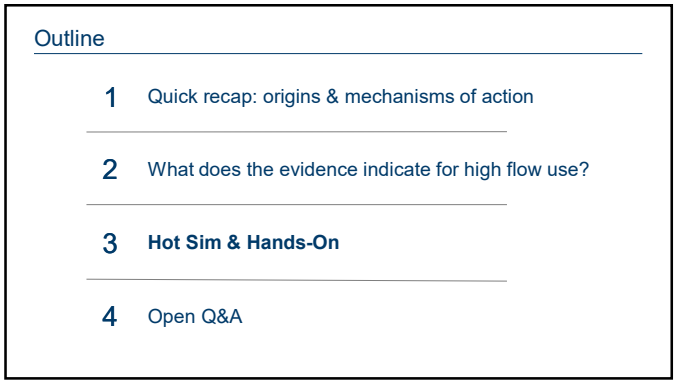

Nasal High Flow:
Hot Sim & Hands-On
ICEP Resident Career Day
Thursday August 25, 2022
Fisher & Paykel HEALTHCARE

1


Disclosures
Chris Hutchinson, PGDip, BE
Director of Clinical Affairs
Fisher & Paykel Healthcare
Corporate Affiliate Member, ACEP, ATS & SCCM
Member, AARC
Married to Kate with three sons Alex (15), Matthew (13) & Oliver (1)
Crazy about the New Zealand All Blacks Rugby Team

2


Outline
1 Quick recap: origins & mechanisms of action
2 What does the evidence indicate for high flow use?
3 Hot Sim & Hands-On
4 Open Q&A

3

History & background

1214 DECEMBER 7, 1968 PRELIMINARY COMMUNICATIONS THE LANCET

tests demonstrated severe delayed hypersensitivity reaction, maximal at 48–72 hours. This response was to the first application after transplant and approximately 3 months after previous tests. It is probable that small amounts of the chemicals remained in the tissues and when thymic function was established, sensitisation occurred. Biopsy of a lymph-node 8 months after implantation of thymic tissue was normal for an infant of this age (fig. 4b). This finding, coupled with normal numbers of circulating lymphocytes, indicated repopulation of peripheral lymphoid tissue with small lymphocytes. After operation

CONTINUOUS CONTROLLED HUMIDIFICATION OF INSPIRED AIR

Summary It has been observed that gases can be administered through the nose at high flow-rates provided that they are at body-temperature and fully saturated with water-vapour. A simple and easily portable system has been devised for delivering gases in this way, and has been shown to be effective in volunteers. It is now proving satisfactory in clinical use, both for continuous humidification and for administration of oxygen.

Department of Anæsthesia, Rigshospitalet, Copenhagen, Denmark

NIELS LOMHOLT M.D. Copenhagen

4

History & background

1214 DECEMBER 7, 1968 PRELIMINARY COMMUNICATIONS THE LANCET

tests demo
action, max
first applic
months aft
amounts of
thymic fun
Biopsy of
thymic tiss
This findin
lymphocyte
phoid tissu

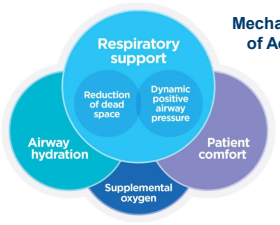
Most of the problems of humidification could be solved by the use of water-vapour instead of aerosols. This would more nearly reproduce the physiological mechanism of humidification in the respiratory tract. Such a method became practicable when the author discovered that gases could be blown into one nostril at 20–30 litres per minute without discomfort, and even without perception, provided that the gas was at body-temperature and 100% saturated with water-vapour. (The highest tolerable flow of dry, cool gas is normally regarded as 6–8 litres per minute.)

D
) AIR
ases can be
ose at high
perature and
e and easily
ing gases in
volunteers,
oth for con-
n of oxygen.
; LOMHOLT
Copenhagen

5

Nasal High Flow

Nasal High Flow therapy is the delivery of heated and humidified air (w/ or w/o supplemental oxygen), up to 60 L/min, to a patient using a high flow nasal cannula (HFNC).



6

Acute adult nasal high flow

7

When a respiratory compromised patient presents in your ED

If hypoxemic:

Low levels of blood oxygen
- SpO_2 < 92%, ABG: PaO_2 < 75mm Hg

Frat. NEJM. 2015.
- 23 ctr RCT, 310 pts AHRF, NHF vs COT vs NIV
- NHF reduced mortality and need for intubation

Bell. Emerg Med Aust. 2015.
- 2 ctr RCT, 100 ED pts with acute undifferentiated shortness of breath, NHF vs COT
- NHF reduced escalation in ventilatory support

Ischaki. Eur Resp Rev. 2017.
- Literature review (99 papers) and treatment algorithm

Clinical Practice Guidelines
- ESICM, 2020 – **recommend HFNC over COT**
- ACP, 2021 – **use HFNC over NIV**
- SCCM, 2021 – **suggest HFNC over NIV**

If hypercapnic:

High partial pressure of blood carbon dioxide
- $PaCO_2$ > 45 mmHg, pH < 7.35

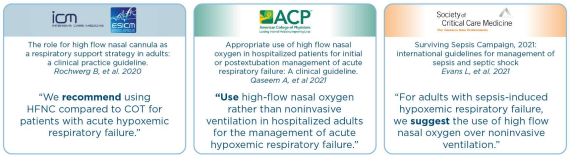
Jeong. Am J Emerg Med. 2015.
- Retrospective ABG analysis of 81 ED pts with ARF
- Reduced $PaCO_2$ and RR in hypercapnic group
- Increased PaO_2 and SpO_2 for hypercapnic and non-hypercapnic groups

Cortegiani. Crit Care. 2020.
- 9 ctr RCT, 79 pts AECOPD, NHF vs NIV
- NHF non-inferior to NIV as initial ventilatory support
- 32% of pts receiving NHF required NIV by 6h

Guidance
- Pantazopoulos. COPD. 2020.
  Literature review (9 RCTs) and treatment algorithm
  NHF recommended for patients with
  - pH between 7.25 – 7.35
  - escalate to NIV for pH < 7.25

8

Hypoxemic patients

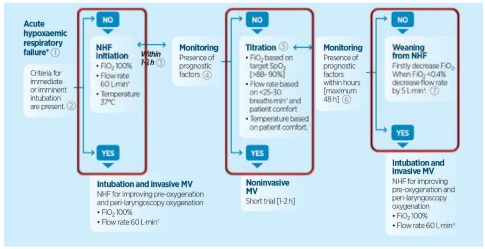


9

Treatment algorithm for AHRF patients

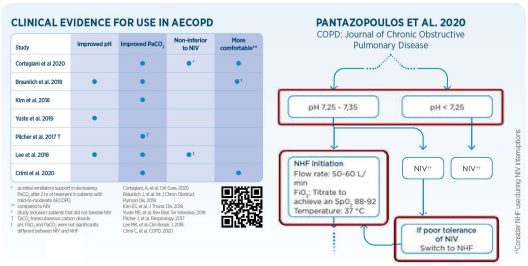
Ischaki et al. 2017

Ischaki. Eur Respir Rev. 2017.



10

Hypercapnic patients



11

Outline

1. Quick recap: origins & mechanisms of action
2. What does the evidence indicate for high flow use?
3. **Hot Sim & Hands-On**
4. Open Q&A

12

Everyone on this side of the room has presented hypoxemic

Everyone on this side of the room has presented hypercapnic

13

When a respiratory compromised patient presents in your ED

If hypoxemic:

Low levels of blood oxygen
- SpO_2 < 92%, ABG: PaO_2 < 75mm Hg

Frat. NEJM. 2015.
- 23 ctr RCT, 310 pts AHRF, NHF vs COT vs NIV
- NHF reduced mortality and need for intubation

Bell. Emerg Med Aust. 2015.
- 2 ctr RCT, 100 ED pts with acute undifferentiated shortness of breath, NHF vs COT
- NHF reduced escalation in ventilatory support

Ischaki. Eur Resp Rev. 2017.
- Literature review (99 papers) and treatment algorithm

Clinical Practice Guidelines
- ESICM, 2020 – **recommend HFNC over COT**
- ACP, 2021 – **use HFNC over NIV**
- SCCM, 2021 – **suggest HFNC over NIV**

If hypercapnic:

High partial pressure of blood carbon dioxide
- $PaCO_2$ > 45 mmHg, pH < 7.35

Jeong. Am J Emerg Med. 2015.
- Retrospective ABG analysis of 81 ED pts with ARF
- Reduced $PaCO_2$ and RR in hypercapnic group
- Increased PaO_2 and SpO_2 for hypercapnic and non-hypercapnic groups

Cortegiani. Crit Care. 2020.
- 9 ctr RCT, 79 pts AECOPD, NHF vs NIV
- NHF non-inferior to NIV as initial ventilatory support
- 32% of pts receiving NHF requiring NIV by 6h

Guidance
- Pantazopoulos. COPD. 2020.
  Literature review (9 RCTs) and treatment algorithm
  NHF recommended for patients with
  - pH between 7.25 – 7.35
  - escalate to NIV for pH < 7.25

14

How do we know if nasal high flow will be successful?

- First look at the ROX index: defined by three common noninvasive measurements:

$$\frac{SpO_2 / FiO_2}{RR} = \text{ROX index}$$

- Derivation (2016) and validation (2019) by Roca & colleagues to predict the success of HFNC in pneumonia patients with AHRF
- Oxygen saturation measured by SpO_2 / FiO_2 had a greater weight than RR

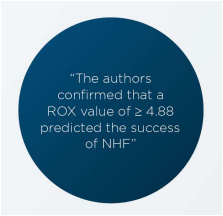
$$\frac{SpO_2/FiO_2}{\text{Respiratory rate}} = \text{ROX index}$$

'Healthy' example	'Patient' example
$\frac{95/0.21}{15} = 30.2$	$\frac{95/0.85}{37} = 3.0$

Roca et al. 2016

15

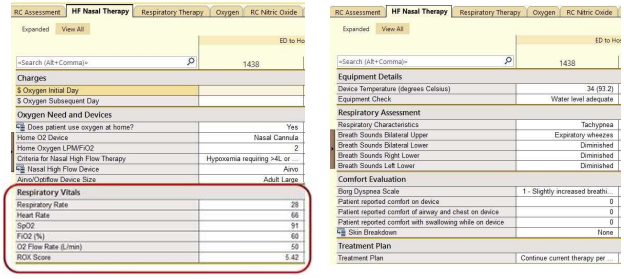
Using the ROX index to predict the outcome of Nasal High Flow



Roca et al. 2019

16

EPIC flowsheet



Courtesy of UnityPoint Health, Des Moines, IA

17

Review

1. Quick recap: origins & mechanisms of action
2. What does the evidence indicate for high flow use?
3. **Hot Sim & Hands-On**
4. Open Q&A

18

Thank you from Fisher & Paykel Healthcare

Open for any questions

19

Chris Hutchinson, Director of Clinical Affairs
chris.hutchinson@fphcare.com
@CPHutch
cphutchinson

20