

# Go with the flow



A bi-annual newsletter connecting Optiflow users from around the globe. Inside, leading respiratory specialists share their stories to help you deliver **better patient outcomes**. To learn more about one of the world's fastest growing respiratory therapies visit [www.myoptiflow.com](http://www.myoptiflow.com) today.

## WELCOME

One of the joys of working in the medical profession is being part of a community that's so willing to share experiences for the good of all. There's an ever-present willingness to contribute and listen in open and honest ways. This newsletter is a small contribution to the community we support. Our goal is to share stories and connect people around the world. If you're short on time, here are a few highlights.

### From ICU to the Emergency Department

Jean-Damien Ricard from Louis Mourier Hospital, France has conducted a study into the use of Nasal High Flow as a first-line therapy in the ED, revealing new opportunities for reducing overall costs and delivering better patient outcomes.

### Reducing BiPAP days by 45%

At Bon Secours St. Francis Health System in Greenville, USA, Joseph Whitten is part of a clinical transformation team that used heated humidification with Optiflow to achieve a 45% reduction in BiPAP days.

### Good news for high BMI patients

John Fraser and Amanda Corley from The Prince Charles Hospital, Australia used electrical impedance tomography to measure the increase in lung volume created by Nasal High Flow. The study showed good results for high BMI patients.

### Introducing BiPAP-free hours

Kenneth Miller at Lehigh Valley Hospital, USA, discusses the use of Optiflow with a wide variety of patients from those who are weaning to those requiring breaks from NIV.

*Our thanks to our talented contributors.*

*Kind regards,*

*Your Optiflow Team*

## Nasal High Flow shines in emergency department

In France, a prospective observational study into the feasibility and acceptability of Nasal High Flow oxygen therapy in a hospital emergency department, has confirmed positive outcomes. Hypoxemic patients with acute respiratory failure were treated with Nasal High Flow oxygen as a first-line therapy, at a median flow rate of 40Lpm through an Optiflow nasal cannula.



WRITTEN BY: PROFESSOR JEAN-DAMIEN RICARD, ICU doctor, Louis Mourier Hospital, Colombes.

### ICU success turns focus to emergency department

Professor Jean-Damien Ricard is a doctor in the ICU at Louis Mourier Hospital, Paris. With the ICU less than 20m from the emergency department, Professor Ricard saw the opportunity to investigate the delivery of Nasal High Flow oxygen as a first-line therapy.

"We already had a very positive experience using Nasal High Flow oxygen therapy in the ICU, with dramatic improvement in patients with severe hypoxemic respiratory failure," explains Jean-Damien. "So the idea was to see if this technique could be applied for similar patients in the emergency department, from a practical point of view."

### Patient indications

Pneumonia, Cardiogenic pulmonary oedema, Carbon monoxide poisoning, Pleural effusion,

Pneumothorax, Pulmonary embolism, Severe asthma, Septic shock, Alcohol intake.

### Improved patient outcomes and high caregiver acceptance

- Respiratory parameters (see table) improved as early as 15 minutes after the Nasal High Flow oxygen therapy was started
- The improvements persisted throughout the 60 minute assessment period
- There were no changes in pH and the partial pressure of carbon dioxide
- 90% of patients rated the comfort of Nasal High Flow with Optiflow as better than a non-rebreather mask
- All caregivers thought the Nasal High Flow system was more efficient than a non-rebreather mask
- 82% of caregivers thought it was more comfortable and had the same ease of use.

	Baseline	NHF oxygen therapy	P value
Dyspnoea:			
Borg score	5.0	2.5	<0.0001
VAS score	5.3	3.2	<0.005
Respiratory rate (breaths per minute)	27.8	23.6	<0.005
SpO2 (%)	91.1	96.0	<0.0001
PaO2 (kPa)	8.7	19.4	<0.05

**Conflict of interest statement:** No conflict of interest to declare.

Article continued from cover:

“The improvements suggest that Nasal High Flow oxygen therapy has potential as a first-line therapy for respiratory failure in the emergency department” JD Ricard et al.

“Not only were we able to show that there was an improvement in gas exchange and oxygen saturation, but also in breathing rate and comfort,” says Jean-Damien. “And the staff found it no

more difficult to set up and manage than oxygen therapy, once they’d been trained on the device.”

#### Randomized control trial to follow

Professor Ricard is now planning a randomized control trial comparing face mask oxygen with Nasal High Flow oxygen in the emergency department. The trial will also consider practical implications, such as patient flow, protocols and equipment allocation.

“It’s really something that’s very easy to do with these simple nasal cannulae. So while it perhaps won’t fit all emergency departments and pneumology wards, I think for a number of them it could be very helpful,” explains Jean-Damien. “We know that respiratory failure and dyspnea are very common in people who

come to the emergency department, so it could benefit quite a large number of patients.”

#### To learn more

Sztrymf B, Messika J, Bertrand F, Hurel D, Leon R, Dreyfuss D, Ricard JD: Beneficial effects of humidified high flow nasal oxygen in critical care patients: a prospective pilot study. *Intensive Care Med*, 2011 37: 1780-1786

Sztrymf B, Messika J, Mayot T, Lenglet H, Dreyfuss D, Ricard JD: Impact of high flow nasal cannula oxygen therapy on ICU patients with acute respiratory failure: a prospective observational study. *J Crit Care* 2011 in press  
Lenglet H, Sztrymf B, Leroy C, Brun P, Dreyfuss D, Ricard JD. Humidified high flow nasal oxygen in the emergency department: feasibility and interest. *Am Respir Crit Care Med* 2010; 181: A6042

## Economic and patient benefits revealed

In April 2010, Bon Secours St. Francis Health System in Greenville, South Carolina, USA, introduced heated humidification for BiPAP and Optiflow to reduce costs and improve patient outcomes. The results were quite remarkable, with a 45% reduction in the number of days patients were on BiPAP and a 4.5 day reduction in the average hospital length of stay for patients receiving BiPAP during the 2011 fiscal year.



WRITTEN BY: **JOSEPH WHITTEN, Director Respiratory Care Services**, Bon Secours St. Francis Health System, Greenville, South Carolina, USA.

#### Background

Bon Secours St. Francis Health System established special project groups, known as clinical transformation teams, to identify ways to reduce costs. Joseph Whitten, Director Respiratory Care Services was part of the ICU clinical transformation team. After a Fisher & Paykel Healthcare presentation on heated humidification and Optiflow, the team recognized the immediate benefits this could provide and ordered seven units for throughout the hospital.

“Once we started implementing heated humidification and Optiflow, it just caught on. People were so impressed with it,” says Joseph.

#### Clinicians onboard

Initially, the prospect of delivering up to 60L/min through a nasal cannula was hard to imagine for some of the hospital’s nursing staff and doctors. Things changed once they were given the chance to try Optiflow on themselves.

“The staff that tried Optiflow said it was nothing like they’d imagined it would be,” explains Joseph. “In fact one of our pulmonologists said it felt like power steering for your breathing.”

#### Patient types

Bon Secours St. Francis Health System is using heated humidification and Optiflow in their critical care units and emergency departments. They’re also using it with their COPD patients, oncology patients and for palliative care.

“We’ve used it for patients who may have otherwise needed BiPAP and had to remain in an ICU. We’ve been able to move them out to the oncology floor and manage them with Optiflow instead,” explains Joseph.

In one case, during the early stages of implementing Optiflow, an end-stage COPD patient was having difficulty breathing and didn’t want to be put on a breathing machine.

“The respiratory therapist was ‘all out of tricks’ for this lady. He went and got an Optiflow humidified high flow nasal cannula and within minutes she settled down. The patient’s daughter was really grateful,” explains Joseph.

“The therapist was so excited he called me right away and said ‘hey man I’ve got to tell you this story’.

#### Collaboration a key factor

The ICU clinical transformation team included people from all disciplines – RTs, physicians, nurses, nursing administration, a clinical pharmacist and a case manager – so everyone came to understand and

see the value of heated humidification and Optiflow at the same time.

“Everyone looked at everything from their own area of expertise,” explains Joseph. “I think in health care today, a true interdisciplinary approach to any initiative is going to help with success. The biggest thing is to have everybody on board with it, educated about it and ready to go with it.”

#### Measured benefits post implementation

For patients receiving BiPAP, when compared with the 2009 data there was:

- a two day reduction in the average hospital length of stay during the 2010 financial year
- a 4.5 day reduction in the average hospital length of stay during the 2011 financial year

The hospital has also:

- reduced the total number of cases receiving BiPAP by 37 cases
- reduced the total number of patient days for patients who received BiPAP by 1320 days
- achieved a 45% reduction in BiPAP utilization
- achieved a 41% reduction in direct cost to the Bon Secours St. Francis Health System for patients who received BiPAP
- reduced ventilator use by 9%

“We have basically halved our total number of days on BiPAP,” explains Joseph. “Many people seeing that would expect our ventilator days to have gone up. But our ventilator cases actually went down by 116 cases or a total decrease of 641 patient days for patients who received mechanical ventilation.”

# Study confirms Nasal High Flow increases lung volume

A prospective observational study at The Prince Charles Hospital, Brisbane, Australia, used electrical impedance tomography (EIT) to assess patient lung volumes. Readings were taken while patients were on face mask oxygen, and then on prescribed Nasal High Flow oxygen, through an Optiflow nasal cannula at a flow rate tolerated by the patient (35 to 50Lpm).



WRITTEN BY: JOHN F FRASER MB ChB PhD MRCP FRCA FFARCSI FCICM. Director Critical Care Research Group, University of Queensland, The Prince Charles Hospital, Queensland, Australia.



WRITTEN BY: AMANDA CORLEY, RN, BN, Grad Cert Health Science. Nurse Researcher; Critical Care Research Group, University of Queensland, The Prince Charles Hospital, Queensland, Australia.

## Background

John Fraser, director of the hospital's critical care research group, wanted to investigate the extent to which positive airway pressure was contributing to the success of Nasal High Flow oxygen in adult patients. He'd been using EIT to assess lung volumes in the animal lab for some time and recognised the technology's relevance to this investigation. An observational study team was formed that included nurse researcher, Amanda Corley.

## Nasal High Flow increases EELV by 25.6%

Analysis of the readings showed a difference in the mean values that equates to a 25.6% increase in end expiratory lung volume (EELV) while on Nasal High Flow, compared with face mask oxygen.

## Nasal High Flow increases tidal volume by 10%

The readings were also used to compare mean values for tidal variation. The results showed a difference that equates to a 10% increase in tidal volume while on Nasal High Flow, compared with face mask oxygen.

"I was surprised at how big an improvement there was in FRC," explains John. "And also at the drop in respiratory rate, down by 3.8 breaths per minute, that's quite a lot."

Another benefit of Nasal High Flow noted by John and Amanda is that patients can talk, eat and walk. "One of the main aspects of good post-cardiac surgical ICU is getting patients to mobilise quickly," explains John.

## Assessing lung volume at the bedside

Electrical impedance tomography allows direct assessment of lung volumes by measuring changes in thoracic impedance distribution. It's non-invasive and radiation free.

A belt containing 16 electrodes is placed around the patient at intercostal space 5-6. Small electric currents are applied through one electrode pair, and the resulting impedances simultaneously measured at the other pairs. The current is then applied to the next pair and the process continues in rapid rotation around the belt, creating 208 impedances per image and up to 50 images per second.

## Study population

- 20 patients - 5 female and 15 male
- All post on-bypass cardiac surgery
- Nasal High Flow prescribed as part of treatment
- Diagnosed lung disease
  - 2 COPD, 4 asthma, 2 OSA
- Smokers - 5 never, 13 reformed, 2 current



A patient, not from the study, watches live video of her lung volume, via EIT. As you'd expect, patients were not shown their EIT video or data during the study.



Example of an EIT belt in place (patient not in study).

- Aged 51 to 77 with a mean age of 65.3
- BMI 22 to 45 with a mean of 32

## Even better for patients with a higher BMI

With baby boomers becoming such a large patient group, both in number and BMI, Nasal High Flow is becoming increasingly relevant. The study showed that the improvement in lung volume provided by Nasal High Flow, compared with face mask oxygen, steadily increases with patient BMI.

"Statistical analysis showed the lower BMI patients benefited a little bit, but the high BMI patients got a much better improvement on Nasal High Flow," says John.

"I was surprised at the interaction between FRC and the BMI. I didn't pick that. That's why we're now doing a randomized control trial, with patients who have a BMI of 30 or more, because that's an area that needs further exploration," explains Amanda.

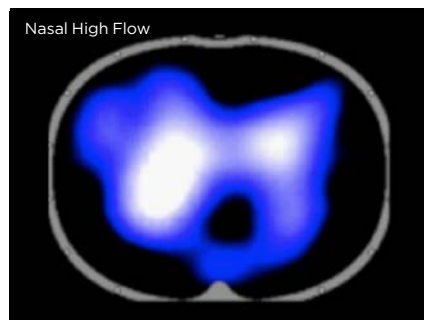
## To learn more about this study

Please visit the following link: <http://www.ncbi.nlm.nih.gov/pubmed?term=corley%2C%20eeli>

Corley A, Caruana L, Barnett A, Tronstad O, Fraser J: Oxygen delivery through high-flow nasal cannulae increase end-expiratory lung volume and reduce respiratory rate in post-cardiac surgical patients. *British Journal of Anaesthesia* 2011;E pub ahead of print.

**Conflict of interest statement:** Fisher & Paykel Healthcare partially funded the study. They had no part in the study design, data collection or data analysis.

## EIT images of peak tidal volume





## Education maximizes use and patient benefits



WRITTEN BY: **KEN MILLER, RRT, Respiratory Care Clinical Educator**, Lehigh Valley Hospital, Allentown, Pennsylvania, USA.

In the USA – at Lehigh Valley Hospital, Allentown, Pennsylvania – Optiflow is used to prevent escalation to BiPAP, wean patients off BiPAP and provide BiPAP-free hours. Through an inclusive education program and clear protocols, Optiflow has quickly become an integral part of the hospital's respiratory care delivery.

### Background

Optiflow was first used at Lehigh Valley Hospital in April 2009. Ken Miller, RRT and Respiratory Care Clinical Educator received an in-service on Optiflow. Two hours later he was using Optiflow in their medical and surgical ICU with positive patient outcomes.

Lehigh Valley Hospital has 1000 beds and today Optiflow is used in the hospital's ICU departments, emergency rooms and pediatric ICU. Optiflow training is included in the orientation program for any staff entering these units. It's also part of the hospital's critical care RN education course.

"The pulmonologists, nurses and respiratory therapists all see Optiflow as a positive weapon in the arsenal of respiratory care", explains Ken.

### Weaning patients with Optiflow

The hospital first used Optiflow on patients who had trouble transitioning from mechanical ventilation to conventional oxygen therapy.

"There's always that challenge of how do you transition patients off the BiPAP mask to conventional oxygen and Optiflow gave us a nice stepping stone," explains Ken.

The hospital developed a protocol for weaning with Optiflow using an algorithmic approach.

"We usually start all of our patients on 70% FiO<sub>2</sub> and 40L/min and titrate accordingly," explains Ken. Then we have an algorithmic approach, which means if you drop the FiO<sub>2</sub> by 10% then you drop the liter flow by 5% or something like that."

### Providing BiPAP-free hours

For patients that can't be liberated off non-invasive ventilation, Optiflow provides what we call 'BiPAP-free' hours. For example, a patient in the medical ICU was spending four hours on non-invasive ventilation followed by a two-hour break on Optiflow before returning to non-invasive ventilation for another four hours, and so on.

"It's something that Optiflow does nicely," says Ken. "While on Optiflow, the patient can communicate with family, eat, get some nursing care and there's less facial breakdown because the patient is not on the mask 24 hours a day."

In another example, a patient with pulmonary fibrosis, who went on to need open heart surgery, was experiencing problems post-surgery and required BiPAP almost

continuously. Reading was her great passion in life, but the mask would fog up her eyes and she couldn't wear her glasses.

"We put her on Optiflow and there were times when she could stay off the mask for almost 24 hours," explains Ken. "She was so impressed with the improvement in her quality of life that she asked to become a spokesperson for Optiflow. Unfortunately she developed a secondary infection and passed before that could happen."

### Education ensures awareness and uptake

"It's important that all members of the clinical team at least have some rudimentary understanding of how the device works," explains Ken. "Beyond that, the education is based on their role. For the physician it's really about the clinical indications and the clinical response, for nurses it's around monitoring and how to troubleshoot, and for respiratory therapists we focus on how to manage the device and titrate it appropriately."

### Measuring the benefits

While the use of Optiflow has clearly caught on at Lehigh Valley Hospital, Ken is quick to highlight the importance of gathering data to measure success.

He explains: "Even though you think a device is working well, it's important to at least monitor its effect on your length of stay in the ICU, on any mortality or morbidity and not just that it's something everyone thinks is going well."

"I've given lectures on Optiflow to other institutions in our region and almost every one of them is using Optiflow now because they can see some benefits."