Improving Care & Outcomes

Macquarie Technology Day, 20 October 2011

- The Care Continuum - *Matthew Payton*
- F&P Optiflow - *Matthew Payton*
- F&P Info Technologies - *Lewis Gradon*
- ICON with SensAwake – *Emma Duckworth*
OSA Compliance Monitoring

  – 303 patients, Median follow-up was 13 months (range 7-18 months)
  – 63% still used the PAP device regularly
  – 27.4% had definitively discontinued PAP treatment
  – 9.5% discontinued PAP treatment within the first 3 months

• Propescu et al, Thorax 2001;56;727-733
  – 209 diagnosed
  – 196 tried CPAP
  – 153 continued after 2 weeks (22% drop out)
  – 131 data available after 1 year
  – 81% > 2 hours
  – 76.6% > 3 hours
  – 68.8% > 4 hours

OSA Compliance Monitoring

• US Medicare compliance 4 hours/night for 21 days, 30 day window, 90 day time period. Some private insurance companies moving to a yearly or 6 monthly check on patient usage
• France 3 hours average /night checked yearly from date the CPAP is issued
• Germany 3 hours /night average checked yearly
• Holland 4 hours /night checked yearly
• Italy and Spain depends on which region, similar

Trend towards reimbursement based on proof of usage
F&P Info Technologies™

- Advanced patient management system compatible with all F&P CPAP devices
- Computer or web-based application
- Data reporting available:
  - Compliance from first use (cumulative)
  - Usage and efficacy data for up to 365 days
  - Detailed efficacy data (7 nights)
F&P Info Technologies

Summary

• Designed to simplify data transfer and monitoring to keep business efficient and profitable
• Provide flexible data solutions
ICON™

The F&P ICON includes:

- ThermoSmart™ Technology for more humidity and comfort
- Contemporary, stylish design for bedroom appeal
- Forward facing clock with customizable AlarmTunes™
- Compact footprint including humidifier and power supply
- Info Technologies™ for flexible data communication options

SensAwake
Benefits of SensAwake

SensAwake Lowest Waking Pressure

- SensAwake pressure relief promptly reduces the pressure to the lowest most comfortable level as the patient wakes with the aim of:
  - Removing pressure awareness
  - Reducing conscious waking
  - Accelerating the return to sleep

Can less CPAP be more helpful?

- CPAP patients arouse from sleep up to 20 times/hr\(^1\)
  - Arousal can lead to full awakening
- During awake states, patients can become intolerant of delivered pressure
  - They often then abandon CPAP for the night
- The intuitive response is to reduce pressure quickly upon wakefulness

\(^1\) McArdle et al 2010
Benefits of SensAwake

**Automatic Ramp**
- Ramp is routinely activated by patients to enhance comfort by lowering pressure
- SensAwake automatically lowers the pressure upon sensing patient wakening
- Its responsiveness lets the patient comfortably transition back to sleep

How does SensAwake Work?

**How does it work?**
- Monitors patients breathing
- Senses the onset of awake breathing
- Lowers the pressure to the lowest most comfortable level
- Once sleep is resumed, pressure increases
How does SensAwake Work?

Airflow Signal on the PSG

- Regular breathing pattern during relaxed sleep
- Irregular breathing during transition from sleep to awake
- Irregularity during REM breathing does not display the same traits as the irregularity during awake breathing
How does SensAwake Work?

SensAwake Efficacy

Clinical Studies have shown

- SensAwake™ accurately detects the transition from sleep to wake using the flow signal alone\(^1\)
- AutoCPAP devices with SensAwake™ treat OSA as effectively and at a lower overall mean pressure than a traditional AutoCPAP\(^2\)
- CPAP devices with SensAwake™ treat OSA as effectively as conventional CPAP\(^3\)
- Patients prefer CPAP with SensAwake to conventional CPAP\(^3,4\)

\(^1\)Ayappa et al 2009; \(^2\)Dungan et al 2011; \(^3\)Cumin et al 2011; \(^4\)Powell et al 2011
### SensAwake Efficacy

**Proven to Treat**

- Delivering more awake comfort does not compromise therapy efficacy
- Despite the fact that pressures are lower than conventional therapy, the efficacy of the devices has been shown\(^1-3\)
- Both Auto and Premo\(^2\) devices have been validated in a clinical trials and AHIs are comparative
  - The long-term use of the Premo has been tested in a 150 patient trial\(^3\)

\(^1\)Dungan 2011; \(^2\)Cumin 2011; \(^3\)Powell 2011

### F&P SensAwake

- SensAwake pressure relief promptly reduces the pressure to the lowest most comfortable level as the patient wakes with the aim of:
  - Removing pressure awareness
  - Reducing conscious waking
  - Accelerating the return to sleep
- Efficacy of the devices with SensAwake to treat OSA is proven
- Now available in the Auto and Premo devices
The Care Continuum

Invasive Ventilation → Noninvasive Ventilation → Mask Oxygen → Cannula Oxygen → Humidity Therapy

MORE CRITICAL ← — — → LESS CRITICAL

The Care Continuum

Invasive Ventilation → Noninvasive Ventilation → Mask Oxygen → Cannula Oxygen → Humidity Therapy

Optiflow® High Flow → Airvo® High Flow → Airvo® Home

Critical Care → Hospital → Home
Higher Flows of Air/Oxygen Delivered Comfortably

The combination of optimal humidity with nasal cannula enables comfortable delivery of high flows

- Without Optimal Humidity
  - Tolerating high flows delivered directly into the nares would be impossible
  - Significant drying of the upper airway can occur
  - Patients are non compliant

Optiflow
Delivering Optiflow

F&P Optiflow Nasal Cannula

- Wide bore cannulae designed to deliver high flows without gas jetting
- Ergonomically designed for exceptional comfort around the nasal septum
- Lightweight and flexible
- Mobile condensate is reduced by the unique breathable film delivery tube
- Lanyard with quick release takes the weight of the circuit
Optiflow Benefits

• Clinical benefits → better outcomes
  – Fewer escalations of therapy
  – Shorter hospital stay
  – Lower costs
Mechanisms of Action

1. Comfort
2. Deliver up to 100% oxygen accurately
3. Flushing of anatomical deadspace
4. Positive airway pressure during the respiratory cycle
5. Optimised mucociliary clearance

Mechanisms of Action: Comfort

Comfortable, effective oxygen delivery

- Roca et al, Respiratory Care 2010
- Conclusions:
  - More comfortable than face mask oxygen therapy
  - Less mouth dryness
Mechanisms of Action: Accuracy

- With Nasal High Flow we aim to meet the patient’s inspiratory demand with flow.
- This enables the delivery of a set FiO₂, even when a patient’s respiratory mechanics change.

Mechanisms of Action: Accuracy

- When compared to face mask oxygen therapy, Sim et al demonstrated that to deliver greater than 85% FiO₂, a flow of 110 L/min is required for a face mask compared to 40 L/min with a nasal cannula.
Mechanisms of Action: Flushing of Anatomical Deadspace

• Continuous flushing of the upper airway (anatomical deadspace)
• Washout is caused by the continuous delivery of high flows

There are two key benefits of this flushing effect:
• Reduces re-breathing of expired CO₂
• A reservoir of fresh, oxygen enriched gas is created in the upper airway ready for each and every breath
• This may assist in more efficient gas exchange
Mechanisms of Action: Positive Airway Pressure

- Parke et al compared nasopharyngeal airway pressures with NHF and face mask oxygen therapy with mouth open and mouth closed

![Graph showing pressure over time](image)

Mechanisms of Action: Mucociliary Clearance

- Hasani et al used a radio-aerosol technique to measure mucociliary clearance before and after 7 days of domiciliary humidification
- Delivered optimally humidified flow of 20 – 25 L/min through nasal cannula for 3hrs each day
- Following humidification mucociliary clearance significantly improved

![Graph showing mucociliary clearance](image)
Physiological Outcomes

- Roca et al (Acute respiratory failure) found:
  - Less dyspnoea
  - Improved oxygenation
  - Reduced respiratory rate
  - No change in PaCO2

- Corley et al, Prince Charles Hospital, Critical Care Research Group, Queensland (using EIT on 20 post operative cardiac surgical patients) found:
  - Increased airway pressure
  - Increased end expiratory lung volume
  - Increased tidal volume
  - Improved oxygenation
  - Decreased respiratory rate
  - Subjectively assisted ease of breathing

Clinical Outcomes: NIV

- Parke et al, CVICU, Auckland City Hospital
- 60 patients with moderate hypoxemia were randomised to receive either nasal high flow or humidified high flow face mask oxygen therapy

- Compared with high flow face masks nasal high flow was associated with:
  - Improved therapy success
  - Fewer episodes of desaturation over time

- The rate of NIV in the nasal high flow group was 3/29 (10%) compared with 8/27 (30%) in the high flow face mask group
Clinical Outcomes: Exacerbations

• Rea et al 2010, Respiratory Medicine
• 108 patients diagnosed with COPD or bronchiectasis
• Daily humidification therapy 12 months
• Usual care for 12 months
• Measured outcomes:
  – Exacerbation rates
  – Lung function spirometry
  – quality of life
  – exercise capacity
  – measures of airway inflammation recorded at baseline, 3 and 12 months

Clinical Outcomes: Exacerbations

• Results:
  – Decreased exacerbation days (-44%)
  – Increased days to first exacerbation (57 vs. 27)
  – Decreased antibiotic use (22.8% vs 38.5% of days)
  – Compliance: 41/53 of patients (77%) chose to continue with humidification post 12 month study
## Patient Profiles

<table>
<thead>
<tr>
<th>Categories</th>
<th>Conditions</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airway disease</td>
<td>Bronchitis</td>
<td>Obstructed airways limit airflow and ventilation.</td>
</tr>
<tr>
<td></td>
<td>Asthma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emphysema</td>
<td></td>
</tr>
<tr>
<td>Diffuse lung disease</td>
<td>Pulmonary Fibrosis</td>
<td>Reduced lung compliance and lung volumes: reduced FRC</td>
</tr>
<tr>
<td></td>
<td>Pneumoconiosis</td>
<td></td>
</tr>
<tr>
<td>Infective pulmonary disease</td>
<td>Pneumonia</td>
<td>Secretion quantity and quality leads to mucus plugging and obstruction</td>
</tr>
<tr>
<td>Disorders of lung inflation</td>
<td>Atelectasis</td>
<td>Collapse of alveoli reduces lung surface area for gas exchange</td>
</tr>
</tbody>
</table>

## The Care Continuum

![Care Continuum Diagram](image-url)