JIVD

15th International Conference on Home Mechanical Ventilation

Journées Internationales de Ventilation à Domicile

ERCA

6th European Respiratory Care Association Congress

Congrès de European Respiratory Care Association

March 15-17, 2018 - Lyon • 15-17 Mars 2018 - Lyon

This book belongs to / Ce livre appartient à :

.....

.....

Program and abstracts book • Programme définitif et livre des résumés

Le SEUL

Désinfecteur PPC automatisé à 1 seule étape

The ONLY

1-Step Automated PAP Equipment Disinfector

« Je recommande SoClean à mes patients car il tue 99,9% des germes et bactéries, ce qui réduit significativement le risque d'infection du fait d'un PPC mal nettoyé. »

Joseph Krainin M.D., FAASM / Fondateur de Singular Sleep

"I recommend SoClean to my patients because it kills 99.9% of bacteria and germs, significantly reducing the risk of infection from an improperly cleaned PAP." - Joseph Krainin M.D., FAASM / Founder of Singular Sleep

- ✓ Pas de démontage du PPC
  No Disassembly of PAP
- ✓ Désinfecte tout en une étape facile
  Disinfect Everything in One-Easy Step
- ✓ Tue 99,9 % des germes & bactéries
  Kills 99.9% PAP Germs & Bacteria
- ✓ Efficacité testée par un laboratoire indépendant
  Published Independent Lab Efficacy Tests
- ✓ Enregistré auprès de la FDA
  FDA Registered

Pour en savoir plus
www.SoClean.com

SoClean.

Learn More
www.SoClean.com

↘ EXECUTIVE COMMITTEE ↘ COMITÉ DE PILOTAGE

Patrick Léger, JIVD, President
Kathleen Grant, ERCA, President

Borel J.C. (FR)
Chatwin M. (GB)
Contal O. (CH)
De Halleux Q. (CH)
Escarrabill J. (SP)
Fauroux B. (FR)
Gonzalez J. (FR)
Hart N. (GB)
Hill N. (US)
Janssens J.P. (CH)
Jennequin J. (FR)
Joud P. (FR)
Lavirotte A. (FR)
Make B. (US)
Martin F. (FR)
Martin J.P. (FR)
Norrenberg M. (BE)
Orlikowski D. (FR)
Pépin J.L. (FR)
Piquilloud L. (CH)
Pons M. (SP)
Rabec C. (FR)
Simonds A. (GB)
Toussaint M. (BE)
Vitacca M. (IT)

↘ INTERNATIONAL ADVISORY BOARD ↘ COMITÉ INTERNATIONAL DE CONSEILLERS

Ambrosino N. (IT)
Andersen T. (NO)
Argaud L. (FR)
Audag N. (BE)
Bach J. (US)
Banfi P. (IT)
Belmondo B. (CH)
Benditt J. (US)
Brivio A. (IT)
Chaulet J. (FR)
Cotting J. (CH)
Cuvelier A. (FR)
D'Abrosca F. (IT)
Diaz Lobato S. (SP)
Elliott M. (GB)
Ergün P. (TR)
Farré R. (SP)
Ferreyra G. (IT)
Fondenes O. (NO)
Frigerio P. (IT)
Goldstein R. (CA)
Goncalves M. (PT)
Gregoretti C. (IT)
Hernandez C. (SP)
Hov B. (NO)
Jonquet O. (FR)
Kampelmacher M.J. (NL)
Laier Groeneveld G. (DE)
Lanza A. (IT)
Lazzeri M. (IT)
Markussen H. (NO)
Masa F. (SP)
McKim D.A. (CA)
Mellies U. (DE)
Midgren B. (SE)
Muir J.F. (FR)
Nava S. (IT)
Navalesi P.(IT)
Norregaard O. (DK)
Nygren-Bonnier M. (SE)
Perrin C. (FR)
Pinto T. (PT)
Pirttimaa R. (FI)
Ptacinsky L. (IT)
Repossini E. (IT)
Reychler G. (BE)
Rios A. (SP)
Rodriguez-Hortal C. (SE)
Schoenhoffer B. (DE)
Servera E. (SP)
Sommariva M. (IT)
Szkulmowski Z. (PL)
Thomas A. (GB)
Wijkstra P.J. (NL)
Windisch W. (DE)
Zuffo S. (IT)

↘ CONGRESS SECRETARIAT ↘ SECRÉTARIAT DU CONGRÈS

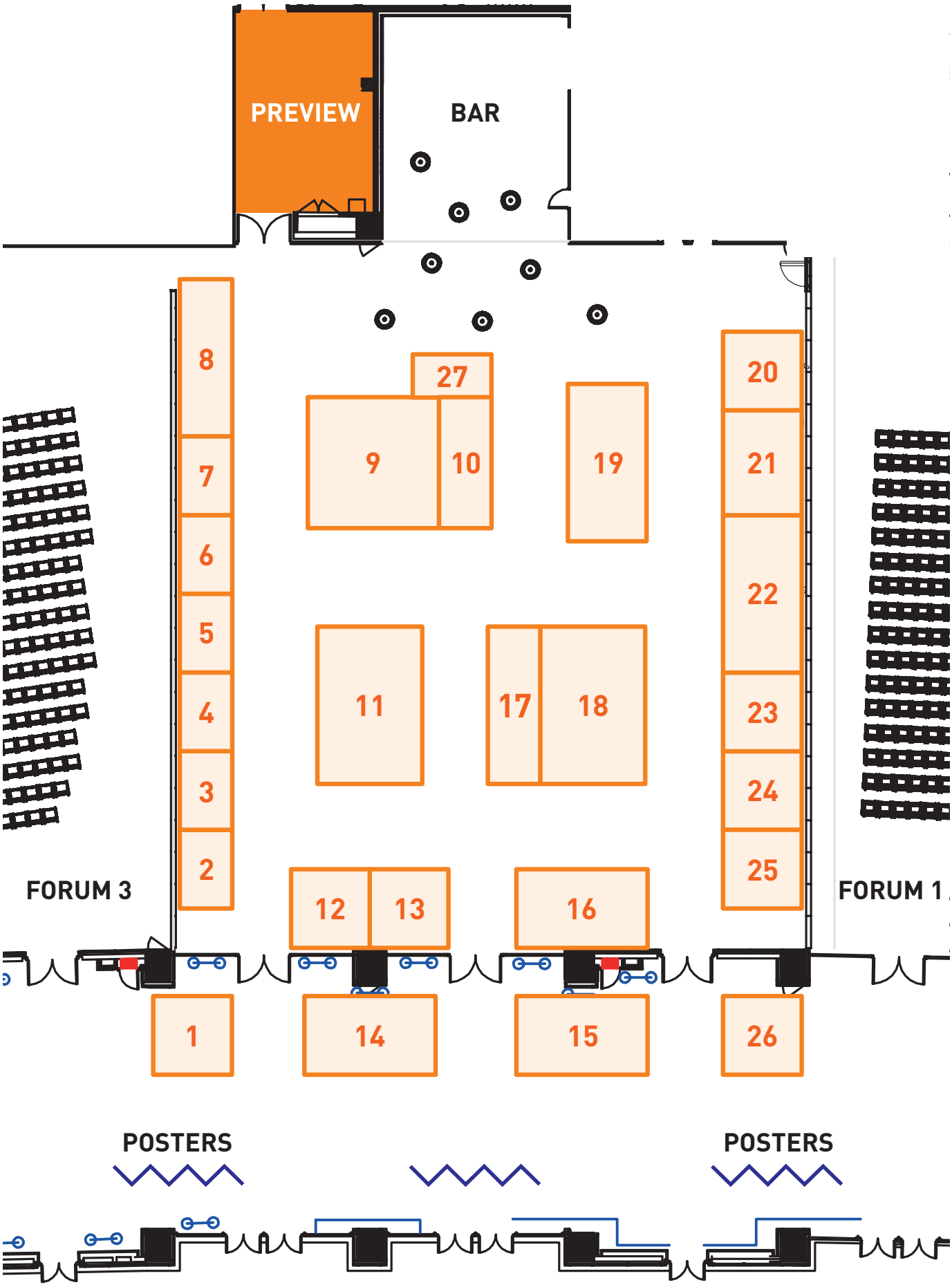
ERCA – JIVD / 3rd Joint International Meeting

Brigitte Hautier, Sylvaine Sazio - JIVD secretariat
Hospices Civils de Lyon
c/o BAL Congrès - 7 rue Belfort – 69004 LYON - France
Tél. : +33 (0)4 78 39 08 43

brigitte.hautier@jivd-aer.com
sylvaine.sazio@jivd-aer.com

www.jivd-aer.com

↘ CENTRE DES CONGRÈS Forums et foyers 1,2,3



↘ LIST OF EXHIBITORS ↘ LISTE DES EXPOSANTS

N° STAND	SOCIÉTÉ	N° STAND	SOCIÉTÉ
1	VITALAIRE	22	AGIR à dom
2	RESVENT	14	AIR LIQUIDE MEDICAL SYSTEMS
3	ELIVIE	21	ANTADIR ASSITANCE
4	OxyNov	20	ATROTECH / NEURORESP
5	BASTIDE MEDICAL	5	BASTIDE MEDICAL
6	SoClean	18	BREAS
7	MEDICAL PRODUCTS RESEARCH	3	ELIVIE
8	IMAPE - PERCUSSIONAIRE	15	EOVE MEDICAL INSPIRATION
9	RESMED	27	ERCA
10	ORKYN	13	FISHER & PAYKEL Healthcare
11	LÖWENSTEIN MEDICAL	8	IMAPE - PERCUSSIONAIRE
12	SNADOM	25	INTERSURGICAL
13	FISHER & PAYKEL Healthcare	24	LINDE HOMECARE France
14	AIR LIQUIDE MEDICAL SYSTEMS	11	LÖWENSTEIN MEDICAL
15	EOVE MEDICAL INSPIRATION	7	MEDICAL PRODUCTS RESEARCH
16	VIVISOL	10	ORKYN
17	SenTec AG	4	OxyNov
18	BREAS	19	PHILIPS
19	PHILIPS	23	PHYSIO ASSIST
20	ATROTECH / NEURORESP	9	RESMED
21	ANTADIR ASSITANCE	2	RESVENT
22	AGIR à dom	17	SenTec AG
23	PHYSIO ASSIST	12	SNADOM
24	LINDE HOMECARE France	6	SoClean
25	INTERSURGICAL	26	SOS OXYGENE
26	SOS OXYGENE	1	VITALAIRE
27	ERCA	16	VIVISOL

and the support of ADEP Assistance

PROGRAM AND BOOK OF ABSTRACTS
PROGRAMME ET LIVRE DES RÉSUMÉS

A Program and Book of Abstracts is available for all registrants. A limited number of copies will be available after the conference upon written request to the Congress Secretariat.

Un Programme et Livre des Résumés est donné à tout inscrit. Un nombre limité de copies sera disponible après le congrès sur demande écrite au secrétariat du congrès.

BADGES
BADGES

Participants are kindly requested to wear their badge. Conference badges are required for entrance into the Congress Center.

Nous demandons aux participants de bien vouloir mettre leur badge. Le port du badge est obligatoire pour entrer dans le Centre de congrès.

SIMULTANEOUS TRANSLATION
TRADUCTION SIMULTANEE

English and French are the official languages of the conference. Simultaneous translation is provided for most of sessions.
Headphones are available, and an I.D. will be requested. **Please bring them back at the end of each day** for battery loading.

Les langues officielles du congrès sont l'anglais et le français. La traduction simultanée est disponible dans la plupart des salles.
Les casques seront disponibles, mais une pièce d'identité sera nécessaire. ***Merci de les ramener en fin de journée*** *pour la recharge des batteries.*

FREE COMMUNICATIONS - POSTERS
COMMUNICATIONS LIBRES - POSTERS

All selected abstracts are published in the Program and Book of Abstracts. Abstracts have been accepted either for a free communication with a poster display or for a poster display.
Free communications sessions will take place Friday at 16:00 or Saturday at 12:15. No translation.
Please look at the program for the details.
All posters will be on display during the three days of the conference. The authors will be present in front of their posters during the morning breaks or will indicate on their board on what day and at what time they will be present to discuss their work with the delegates.
An index of authors is provided at the end of this book.

Tous les résumés retenus sont publiés dans le Programme et Livre des Résumés. Les résumés ont été acceptés soit pour une communication orale avec présentation affichée soit pour une présentation affichée.
Les sessions de communications orales se dérouleront le vendredi à 16:00 ou le samedi à 12:15. Pas de traduction.
Pour plus de détails, merci de consulter le programme.
Tous les posters seront affichés pendant les trois jours du congrès. Les auteurs seront présents devant leurs posters aux pauses du matin ou indiqueront sur leur panneau poster les jours et heures où ils seront présents pour discuter avec les congressistes.
Une liste des auteurs se trouve à la fin de ce livre.

EXHIBITION
EXPOSITION

Take time to visit the exhibition staffed by representatives of major suppliers in the field of respiratory care. They will welcome your visit, questions or suggestions.

Prenez le temps de visiter l'exposition qui vous permettra de prendre contact avec les principaux fournisseurs dans le domaine des soins respiratoires. Les exposants seront heureux de vous accueillir sur leur stand pour répondre à vos questions et entendre vos suggestions.

LUNCHES
DEJEUNERS

No official lunches or coffee breaks are provided.
A bar is opened in the exhibition hall (beverages, coffee, sandwiches).
There are restaurants and stores close by.

Les déjeuners et pauses-café ne sont pas organisés par le congrès.
Un bar est ouvert dans le hall d'exposition (boissons, café, sandwiches).
Restaurants et commerces sont à votre disposition dans la Cité Internationale.

Download the app !
Téléchargez l'application !

Follow us !
Suivez-nous !

JIVD@jivd2018

Pre-congress courses

(detailed programs on the website)

Date and Time:
Thursday, March 15th from 9:30 am to 12:30 pm.

Registration fees:
60 € each course + congress fees, to be paid before the congress.

Language:
english only (no simultaneous translation).

Please note:
The pre-congress courses have limited number of seats and are only for congress participants.

Pre-congress 1

Home mechanical ventilation and chronic patients

J.P. Janssens (Geneva, CH) ; C. Rabec (Dijon, FR)

Pre-congress 2

Acute NIV for beginners

M. Chatwin (London, UK) ; M. Goncalves (Porto, PT) ; A. Hare (London, UK)

Pre-congress 3

Home ventilation in paediatrics

R. Cutrera (Roma, IT) ; C. Milesi (Montpellier, FR) ; M. Pons (Barcelona, SP)

Pre-congress 4

Organization of home mechanical ventilation: how to start a community program

A. Balana (Barcelona, SP) ; C. Embid (Barcelona, SP) ; J. Escarrabill (Barcelona, SP) ; J. Winck (Porto, PT)

Pré-congrès : cours pour débutants et cours de perfectionnement

(programmes détaillés à consulter sur le site)

Date et horaires :
Jeudi 15 mars, de 9h30 à 12h30.

Droits d'inscription :
60 € par cours + inscription au congrès, à régler avant le congrès.

Langue :
Anglais uniquement (pas de traduction simultanée).

Merci de noter que les places sont limitées et réservées aux inscrits du congrès.

Pré-congrès 1

Ventilation mécanique à domicile et Insuffisance respiratoire chronique

J.P. Janssens (Genève, CH) ; C. Rabec (Dijon, FR)

Pré-congrès 2

VNI en aigu pour débutants

M. Chatwin (Londres, UK) ; M. Goncalves (Porto, PT) ; A. Hare (Londres, UK)

Pré-congrès 3

Ventilation à domicile et pédiatrie

R. Cutrera (Rome, IT) ; C. Milesi (Montpellier, FR) ; M. Pons (Barcelone, SP)

Pré-congrès 4

Organisation de la ventilation mécanique à domicile : comment mettre en route un programme

A. Balaña (Barcelone, SP) ; C. Embid (Barcelone, SP) ; J. Escarrabill (Barcelone, SP) ; J. Winck (Porto, PT)

NOTES

THURSDAY MARCH 15

13h30 - 15h00

FORUM 3 LEVEL -2

Years in review

Chairpersons: P. Léger (Lyon, FR) ; J. Escarrabill (Barcelona, SP)

- The NIV paradox: from home to hospital *D. Robert (Lyon, FR)*
- Historical aspects of HMV *D. Rodenstein (Brussels, BE)*
- Literature review since last JIVD ERCA 2015 in adults *J.C. Winck (Porto, PT)*
- Paediatrics *A.K. Simonds (London, UK)*

FORUM 1 LEVEL -2

NIV vs invasive ventilation in acute COPD

Chairpersons: K. Grant (Lausanne, CH) ; J.C.M. Richard (Annecy, FR)

- When and why I prefer intubation *A. Ozsancak (Istambul, TU)*
- When and why I prefer NIV *M. Ferrer (Barcelona, SP)*
- Beyond NIV : is intubation the only alternative? (patients' perspectives) *L. Pisani (Bologna, IT)*

AUDITORIUM PASTEUR LEVEL +1

Diagnosis and management of OSAS children

Chairpersons: S. Khirani (Paris, FR) ; Q. De Halleux (Lausanne, CH)

- Discussion of the ERS 2016 guidelines *A. Boudewyns (Edegem, BE)*
- Therapeutic options for OSAS in adolescents *F. Abel (London, UK)*
- Is there a place for high flow nasal cannula in OSAS? *A. Amaddeo (Paris, FR)*

SALON PASTEUR +1

Airway clearance techniques in chronic care

M. Chatwin (London, UK) ; M. Nygren-Bonnier (Stockholm, SE)

RHÔNE 3 LEVEL +1

The ventilator dependant patient (the patient ventilated around the clock): technical aspects

M. Georges (Dijon, FR) ; J. Gonzalez-Bermejo (Paris, FR) ; M. Toussaint (Vlezenbeek, BE)

ST CLAIR 3 LEVEL +2

Pulmonary rehabilitation and NIV

Chairpersons: J.C. Borel (Grenoble, FR) ; P.J. Wijkstra (Groningen, NL)

- NIV during physical training *E. Derom (Gand, BE)*
- Nocturnal NIV in addition to pulmonary rehabilitation *M. Duiverman (Groningen, NL)*
- Rehabilitation in 24hrs ventilator dependent patients *M.R. Goncalves (Porto, PT)*

RHÔNE 2 LEVEL +1

Home Oxygen therapy

A. Barral (Paris, FR) ; C. Hernandez (Barcelona, SP) ; J.F. Muir (Rouen, FR)

15h00 - 15h30 BREAK: VISIT THE POSTERS AND EXHIBITION

15h30 - 17h00

FORUM 3 LEVEL -2

Management of central apnea

Chairpersons: S. Javaheri (Mason, US) ; A.K. Simonds (London, UK)

- Physiopathology *J.L. Pépin (Grenoble, FR)*
- Clinical aspects and diagnosis of central apnea *G. Lorenzi Filho (São Paulo, BR)*
- When and how to treat central apnea *S. Javaheri (Mason, US)*

FORUM 1 LEVEL -2

Electrical stimulation in respiratory medicine

Chairpersons: C. Straus (Paris, FR) ; P.J. Strollo (Pittsburgh, US)

- Phrenic nerve stimulation in neuromuscular diseases *C. Morelot (Paris, FR)*
- Hypoglossal stimulation in OSA *D. Rodenstein (Brussels, BE)*
- Phrenic nerve stimulation in central hypoventilation *C. Straus (Paris, FR)*

AUDITORIUM PASTEUR LEVEL +1

Neuromuscular diseases in children

Chairpersons: B. Fauroux (Paris, FR) ; M. Pons (Barcelona, SP)

- When to start NIV in children with NM diseases *A. Amaddeo (Paris, FR)*
- How to ventilate children with NM diseases *B. Fauroux (Paris, FR)*
- Monitoring and long term follow up of children with NM diseases *U. Krivec (Ljubljana, SI)*

SALON PASTEUR +1

Home emergency with mechanical ventilation: keep calm and carry on

A. Balana (Barcelona, SP) ; J. Gonzalez-Bermejo (Paris, FR) ; M. Paneroni (Gussago, IT)

RHÔNE 3 LEVEL +1

Airway clearance techniques in acute care - Invasively ventilated patients, children and adults

Q. De Halleux (Lausanne, CH) ; M.R. Goncalves (Porto, PT)

ST CLAIR 3 LEVEL +2

Survivors after acute care

Chairpersons: M. Cour (Lyon, FR) ; J.P. Janssens (Geneva, CH)

- Effects of technical progress on intensive care outcomes *J.C.M. Richard (Annecy, FR)*
- Physical and psychological sequels *A. Wollner (Ramat Gan, IL)*
- Future after intensive care in neonatology *O. Claris (Lyon, FR)*

17h00 END OF THE SESSIONS/ SYMPOSIUMS

- Scientific Session
- Workshop / Highlights on...

Interactive session

17h15 - 18h45 (FORUM 1, level -2)
Symposium AGIR à dom

Promoting physical activity in patients with Obesity Hypoventilation Syndrome for targeting comorbidities

Chairmen: J.L. Pépin (Grenoble, FR) ; J.C. Borel (Grenoble, FR)

Efficacy and limits of NIV in patients with OHS: Understand NIV as one of the component of a comprehensive integrated management program *A. Piper (Sydney, AU)*

Faisability and efficacy of rehabilitation programs in addition to NIV *N. Hart (London, UK)*

Individualizing rehabilitation strategies to improve patients' outcomes? *I. Vivodtzev (Cambridge, US)*

17h15 - 18h45 (AUDITORIUM PASTEUR, level +1)
Symposium FISHER & PAYKEL Healthcare

Nasal Humidified High Flow: changing paradigms in chronic respiratory support

President: P. Navalesi (Catanzaro, IT)

Physiological effects of the Nasal High Flow for chronic patients *L. Pisani (Bologna, IT)*

Nasal High Flow in hypercapnia *J. Braünlich (Leipzig, DE)*

NHF for long term use in COPD patients: results of a RCT *U. Weinreich (Aalborg, DK)*

Compliance and implementation of NHF for long term use in COPD patients *L. Storgaard (Aalborg, DK)*

FRIDAY MARCH 16

08h30 - 10h00

FORUM 3 LEVEL -2

Physiopathology

Chairpersons: J.L. Pépin (Grenoble, FR) ; F. Lofaso (Garches, FR)

- Chronic respiratory failure and comorbidities — *J.L. Pépin (Grenoble, FR)*
- Detection of hypoventilation — *F. Lofaso (Garches, FR)*
- How does NIV work? - physiological considerations — *M. Polkey (London, UK)*

FORUM 1 LEVEL -2

How e-health is changing our practice, how big data can help us?

Chairpersons: M. Lujan (Barcelona, SP) ; D. Adler (Geneva, CH)

- What to do with so much information? — *N. Ambrosino (Pisa, IT)*
- Validity of the data in ventilated patient — *J.P. Janssens (Geneva, CH)*
- How to interpret the data : doctors' and patients' point of view — *A.K. Simonds (London, UK)*

AUDITORIUM PASTEUR LEV +1

CPAP/NIV in children

Chairpersons: F. Abel (London, UK) ; M. Pons (Barcelona, SP)

- CPAP for infants with upper airway obstruction — *A. Amaddeo (Paris, FR)*
- Rationale and benefits of CPAP/NIV in paediatric lung disease — *B. Fauroux (Paris, FR)*
- Technical challenges of CPAP in children — *S. Khirani (Paris, FR)*

SALON PASTEUR +1

Patients as partners

Chairpersons: J. Chaulet (Toulouse, FR) ; J. Escarrabill (Barcelona, SP)

- Patients and caregivers as partners — *R. Goldstein (Toronto, CA)*
- Patients' experience evaluation — *J. Escarrabill (Barcelona, SP)*
- Patients' testimonies — *J. Chaulet (Toulouse, FR)*

RHÔNE 3 LEVEL +1

Ethical aspects and social liabilities

Chairpersons: J.O. Benditt (Seattle, US) ; B. Midgren (Lund, SE)

- To propose or not to propose ventilation: respecting the patients' decision — *B. Midgren (Lund, SE)*
- Palliative care — *S. Pautex (Geneva, CH)*
- Bioethical perspectives — *O. Jonquet (Montpellier, FR)*

ST CLAIR 3 LEVEL +2

NIV adaptation in acute COPD

N. Terzi (Grenoble, FR) ; J. Simons (Lausanne, CH)

RHÔNE 2 LEVEL +1

Acute care and hospital at home: airway clearance techniques in newborn (0-2 yrs old)

P. Nouvellet (Lausanne, CH) ; P. Joud (Lyon, FR)

RHÔNE 1 LEVEL +1

10h00 - 10h30 BREAK: VISIT THE POSTERS AND EXHIBITION

10h30 - 12h00

FORUM 3 LEVEL -2

Obesity and hypoventilation in adults

Chairpersons: J.C. Borel (Grenoble, FR) ; J.P. Janssens (Geneva, CH)

- Obesity and comorbidities. Should we adjust the diagnostic criteria of OHS? — *A. Piper (Sidney, AU)*
- Efficacy of CPAP and Bilevel ventilation — *J.F. Masa (Caceres, SP)*
- Short and long term treatment targets. How to improve outcomes ? — *P. Murphy (London, UK)*

FORUM 1 LEVEL -2

ALS

Chairpersons: J. Gonzalez-Bermejo (Paris, FR) ; J.O. Benditt (Seattle, US)

- Is chronic ventilatory support really effective in patients with ALS? — *P.J. Wijkstra (Groningen, NL)*
- Multidisciplinary care programs in ALS — *A. Calvo (Torino, IT)*
- Ethical dilemmas and end of life — *J.O. Benditt (Seattle, US)*

AUDITORIUM PASTEUR LEV +1

NIV for difficult weaning

Chairpersons: M.W. Elliott (Leeds, UK) ; M. Norrenberg (Brussels, BE)

- Physiopathology of difficult weaning and post-extubation failure — *N. Terzi (Grenoble, FR)*
- Role of NIV to facilitate extubation — *P. Navalesi (Catanzaro, IT)*
- Role of NIV in the prevention and treatment of post-extubation failure — *M. Ferrer (Barcelona, SP)*

SALON PASTEUR +1

Home adaptation for ventilator dependent patient

P. Delalande (Angers, FR) ; M. Paneroni (Gussago, IT) ; G. Wasteels (Vlezenbeek, BE)

RHÔNE 3 LEVEL +1

Physical activity and COPD

Chairpersons: E. Derom (Gand, BE) ; M. Duiverman (Groningen, NL)

- Early rehabilitation after COPD exacerbation — *E. Gimeno Santos (Barcelona, SP)*
- How can we stimulate participation in physical activity in patients with COPD? — *H. Demeyer (Leuven, BE)*
- Long term outcomes of physical activities in COPD — *S.H. Singh (Leicester, UK)*

ST CLAIR 3 LEVEL +2

Tracheostomy in the 21st century

R. Diez Gross (Pittsburgh, US) ; H. Prigent (Garches, FR)

RHÔNE 2 LEVEL +1

The ventilator dependent patient: role of intermediate care centers

N. Ambrosino (Pisa, IT) ; M.T. Garcia Tejero (Lyon, FR)

RHÔNE 1 LEVEL +1

12h15 - 13h45 (AUDITORIUM PASTEUR, level+1) Symposium BREAS MEDICAL Ltd

Innovations in Mechanical In-Exsufflation: past, present and future

Co-Chairs: J. Bach (Newark, US) ; M. Chatwin (London, UK)

What we have learnt from bench tests of MI-E devices with regards to MI-E settings? *M. Chatwin (London, UK)*

Implications of high pressures? *P. Murphy (London, UK)*

When to use low pressures? *T. Andersen (Bergen, NO)*

Is there a role for MI-E in intubated patients? *M. Goncalves (Porto, PT)*

Innovation in Acute Care *R. Moses (North Shields, UK)*

12h15 - 13h45 (SALON PASTEUR, level +1) Symposium SENTEC

Evidence for transcutaneous CO2-monitoring in home mechanical ventilation

Evidence in COPD *F. Magnet (Köln, DE)*

Evidence in restrictive disorders/NMD *M. Duiverman (Groningen, NL)*

Evidence for transcutaneous CO2-monitoring in home mechanical ventilation for children *B. Fauroux (Paris, FR)*

12h15 - 13h45 (RHÔNE 2, level +1) Symposium ORKYN'

Télésurveillance en Ventilation Non Invasive: vers un nouveau modèle de prise en charge à domicile?

Expérimentations nationales de télémédecine: Actualités *P. Jourdain (Paris, FR)*

Expérimentations nationales de télésurveillance pour les Insuffisants Respiratoires Chroniques traités par VNI *C. Rabec (Dijon, FR)*

Le télé-suivi en ventilation, retour d'expérience *(in French)* *J.M. Arnal (Toulon, FR)*

■ Scientific Session
■ Workshop / Highlights on...

12h00 - 14h00 LUNCH / SYMPOSIUMS / VISIT THE POSTERS AND EXHIBITION

14h00 - 15h30

High O2 flow (HOF) Part 1: From physiology to evidence

Chairpersons: S. Jaber (Montpellier, FR) ; L. Pisani (Bologna, IT)

- Neonatology: how to ensure respiration without alveoli! *M. Roth-Kleiner (Lausanne, CH)*
- HOF: only a question of oxygen? *N.S. Hill (Boston, US)*
- Use in acute respiratory failure *J.D. Ricard (Colombes, FR)*

From guidelines to real life

Chairpersons: D. McKim (Ottawa, CA) ; J. Escarrabill (Barcelona, SP)

- Adherence with HMV guidelines. Can we lead a horse? *D. McKim (Ottawa, CA)*
- Indications in the real world *M.W. Elliott (Leeds, UK)*
- Financial issues *M. Trapero Bertran (Barcelona, SP)*

The ABC of NIV monitoring

Chairpersons: B. Midgren (Lund, SE) ; F. Lofaso (Garches, FR)

- Monitoring NIV during initiation and long term ventilation: why, when and where? *M. Lujan (Barcelona, SP)*
- How to monitor NIV Part 1 - basic tools *C. Rabec (Dijon, FR)*
- How to monitor NIV Part 2 - advanced tools *D. Adler (Geneva, CH)*

Ventilation outside the home

P. Delalande (Angers, FR) ; G. Wasteels (Vlezenbeek, BE)

Neuromuscular diseases: beyond breathing

Chairpersons: M. Toussaint (Vlezenbeek, BE) ; D. Orlikowski (Garches, FR)

- Understanding upper airway function *T. Andersen (Bergen, NO)*
- Evaluation and optimisation of cardiac function *A. Pantazis (London, UK)*
- Feeding and nutrition *J. Haan (Brussels, BE)*

Organization of home mechanical ventilation in different European countries

J.C. Borel (Grenoble, FR) ; N. Hart (London, UK) ; J.P. Janssens (Geneva, CH) ; F. Magnet (Köln, DE) ; P.J. Wijstra (Groningen, NL)

Ventilation in pediatrics: the tricks of the trade. Choice of interface for NIV

Q. De Halleux (Lausanne, CH) ; M. Pons (Barcelona, SP)

15h30 - 16h00 BREAK : VISIT THE POSTERS AND EXHIBITION

16h00 - 17h30

High O2 flow Part 2 : From evidence to the future

Chairpersons: N.S. Hill (Boston, US) ; M. Roth-Kleiner (Lausanne, CH)

- Use in chronic failure *L. Pisani (Bologna, IT)*
- Indications other than hypoxemic respiratory failure *S. Jaber (Montpellier, FR)*
- Use in paediatrics *O. Claris (Lyon, FR)*

Home ventilation technical aspects in adults

N. Hart (London, UK) ; J. Escarrabill (Barcelona, SP) ; J.C. Winck (Porto, PT)

Physiological impact of technical Insufflator/ Exsufflator and high frequency ventilatory mode

T. Andersen (Bergen, NO) ; Q. de Halleux (Lausanne, CH)

How patients use internet?

B. Hov (Oslo, NO) ; I. Grau (Barcelona, SP) ; J. Taytard (Paris, FR) ; B.M. Tiburzi (IVUN, St Louis, US)

Cystic fibrosis

Chairpersons: M. Nygren-Bonnier (Stockholm, SE) ; N. Stremler (Marseille, FR)

- Update in respiratory physiopathology *B. Fauroux (Paris, FR)*
- Airway clearance techniques *M. Nygren-Bonnier (Stockholm, SE)*
- Indications for NIV *A. Piper (Sidney, AU)*

Round table: Unmet needs of patients

Coordinators: J. Chaulet (Toulouse, FR) ; C. Devaux (AFM, Paris, FR) ; A.S. Gresle (Barcelona, SP) ; F. Lofaso (Garches, FR)

Sponsored by ADEP Assistance

When and how to begin and stop CPAP/NIV in children?

R. Rubinsztajn (Paris, FR) ; F. Stehling (Essen, DE)

FREE COMMUNICATIONS 10 - 27 bis

(5 minutes presentations)

Chairpersons: O. Contal (Geneva, CH) ; to be confirmed

Airway Clearance - COPD - NIV *Posters 10 - 27 bis*

17h30 END OF THE SESSIONS/ SYMPOSIUMS

12h15 - 13h45 (ST CLAIR 3, level +2) Workshop RESMED

What does the most recent research tell us about home NIV in post-acute stable hypercapnic COPD and the advantages of telemonitoring?
How does it translate into clinical practice?

Discuss these questions with three expert speakers then gain hands-on experience of ResMed's home NIV and telemonitoring solutions.

Speakers: N. Hart (UK) ; P.C. Neuzeret (DE) ; C. Carlin (UK)

17h45 - 19h15 (RHÔNE 3, level +1) Symposium BREAS

Improving the quality of home mechanical ventilation

Chair: B. Ergan (Izmir, TU) ; J. Gonzales-Bermejo (Paris, FR)

Classification and clinical impact of patient ventilator asynchrony *A. Carlucci (Pavia, IT)*

Pay attention to the screen: Solutions to detect patient ventilator asynchrony *J.M. Arnal (Toulon, FR)*

'Tighten your belts': Advanced solutions to diagnose patient ventilator asynchrony *M. Lujan (Barcelona, SP)*

Following up your patients at home: telemonitoring now and in the future *J. Gonzales-Bermejo (Paris, FR)*

17h45 - 19h15 (ST CLAIR 3, level +2) Symposium RESMED

Leak Ventilation in Life Support, Why, When and How?

Leak ventilation with a life support ventilator in adult patients *C. Gregoretti (IT)*

Leak ventilation with a life support ventilator in pediatric patient *T. Kirjavainen (FI)*

Leak Ventilation for Invasive Ventilation *G. Gobaille (FR)*

SATURDAY MARCH 17

	08h30 - 10h00		10h30 - 12h00
FORUM 3 LEVEL -2	**Implications of innovation** *Chairmen: J.P. Janssens (Genève, CH) ; J. Chaulet (Toulouse, FR)* • Manufacturers' perspectives: result of a survey *J.P. Janssens (Geneva, CH)* • Physicians' perspectives: are new modes good news? *C. Rabec (Dijon, FR)* • Patients' perspectives: applying human - centered design methods *L. Parameswaran (Barcelona, SP)*	10h00 - 10h30 BREAK: VISIT THE POSTERS AND EXHIBITION	**Future perspectives** *Chairmen: P. Levy (Grenoble, FR) ; D. Robert (Lyon, FR)* • Future perspectives of NIV in COPD *A. Cuvelier (Rouen, FR)* • Future perspectives of CPAP and NIV in obese patients *P. Levy (Grenoble, FR)* • Future perspectives of NIV in NM diseases *J.R. Bach (Newark, US)*
FORUM 1 LEVEL -2	**Risk management and competency training of caregivers for the initiation of NIV** *A. Hare (London, UK) ; B. Vrijsen (Leuven, BE)*		**Adapting to the worsening of the long term ventilated patient** *M.W. Elliott (Leeds, UK) ; A. Vianello (Padova, IT)*
AUDITORIUM PASTEUR LEVEL +1	**Evaluation of therapeutic education programs** *M. Jansa (Barcelona, SP) ; B. Saugeron (Marseille, FR)*		**Physiology of ventilation curves / learning from simulation - acute and chronic** *A. Hare (London, UK) ; L. Piquilloud (Lausanne, CH) ; D. Thevoz (Lausanne, CH)*
SALON PASTEUR LEVEL +1	**NIV adaptation in acute setting. Case studies** *P. Navalesi (Catanzaro, IT) ; J.Y. Olivier (Angers, FR) ; L. Piquilloud (Lausanne, CH) ; J. Simons (Lausanne, CH*		**Be competent for home ventilation** *M. Lujan (Barcelona, SP) ; V. Roges-Bredas (Amiens, FR)* *Sponsored by ADEP Assistance*
RHÔNE 3 LEVEL +1	**Pulmonary rehabilitation in non COPD patients** *Chairmen: M. Chatwin (London, UK) ; N. Ambrosino (Pisa, IT)* • Rehabilitation in patients with pulmonary hypertension *B. Degano (Besançon, FR)* • Rehabilitation in patients with severe obesity/OHS: modalities and outcomes *S. Mandal (London, UK)* • Neuromuscular electrical stimulation to improve exercice capacity in severely disabled patients *I. Vivodtzev (Cambridge, US)*		**Home ventilation technical aspects in children** *M. Chatwin (London, UK) ; C. Gregoretti (Palermo, IT) ; A. Torrent (Barcelona, SP)*
ST CLAIR 3 LEVEL +2	**Transition in care of ventilated patients (e.g. ICU to longterm care, paediatric care to adult service)** *O. Norregaard (Arhus, DK) ; A. Torrent (Barcelona, SP)*		**Exercise retraining under NIV: from theory to practice** *E. Derom (Gent, BE) ; F.E. Gravier (Le Havre, FR)*
RHÔNE 2 LEVEL +1	**Cystic fibrosis: NIV and rehabilitation pre/post transplantation** *S. Mariani (Milano, IT) ; N. Stremler (Marseille, FR)*		**Monitoring symptoms in COPD: being pro-active** *B. Baroche (Lyon, FR) ; N. Coullandaye (Lyon, FR) ; J. Escarrabill (Barcelone, SP) ; D. Le Roy (Lyon, FR)*

12h15 - 13h45 (AUDITORIUM PASTEUR, lev+1)
FREE COMMUNICATIONS 1 - 9

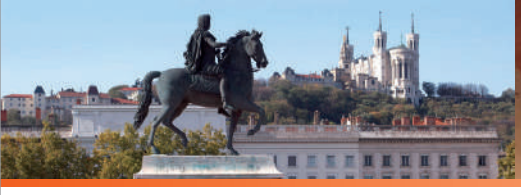
(10 minutes presentations)
Chairpersons: D. Adler (Geneva, CH) ; J.O. Benditt (Seattle, US)
Home Care - NIV - NMD
Posters 1 - 9

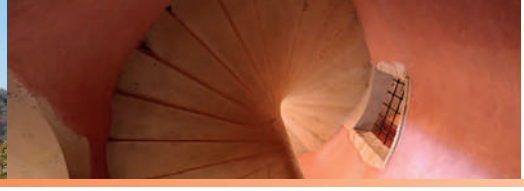
12h15 - 13h45 (RHÔNE 3, level +1)
Symposium PHILIPS

New noninvasive COPD screening of EFL with in home therapy
Chairperson: *Dr. David White, Medical Director of Philips Sleep & Respiratory Care*
Speakers: *Prof. Raffaele L. Dellaca, PhD, at the Politecnico di Milano University ; Dr. Peter Calverley, Professor of Respiratory Medicine at the University of Liverpool ; Mr Robert Romano, Pittsburgh, PA, USA*

12h15 - 13h45 (RHÔNE 2, level +1)
FREE COMMUNICATIONS 28 - 45

(5 minutes presentations)
Chairpersons: P. Banfi (Milano, IT) ; J. Cotting (Lausanne, CH)
NMD - Paediatrics
Posters 28 - 45





12h00 - 14h00 LUNCH / SYMPOSIUMS / VISIT THE POSTERS AND EXHIBITION

14h00 - 15h30

Hot Topics

Chairmen: B. Make (Denver, US) ; D. Robert (Lyon, FR)

- Oxygen therapy: 40 years, past and future — *B. Make (Denver, US)*
- Home NIV and home therapy vs home oxygen therapy alone to reduce hospital readmission after acute COPD exacerbations — *N. Hart (London, UK)*
- Effects of respiratory events on cerebral oxygenation in children and benefits of CPAP/NIV — *S. Khirani (Paris, FR)*

Monitoring of the quality of chronic ventilation (co-organized by the SOMNONIV group)

A. Carlucci (Gussago, IT) ; J. Gonzalez-Bermejo (Paris, FR) ; C. Rabec (Dijon, FR

Oxygen titration (in chronic and acute care)

E. L'Her (Brest, FR) ; J. Winck (Porto, PT)

Aging when you are a ventilator patient with neuromuscular disease

B. Denis (Rennes, FR) ; G. Laier Groeneveld (Oberhausen, DE) ; D. Orlikowshi (Garches, FR) ; V. Roges-Bredas (Amiens, FR)

Sponsored by ADEP Assistance

Early mobilization in ICU

N. Dousse (Geneva, CH) ; L. Poiroux (Angers, FR)

15h30 - 16h00 BREAK : VISIT THE POSTERS AND EXHIBITION

16h00 - 17h30

NIV in chronic COPD: is the available evidence enough?

Chairmen: F. Magnet (Köln, DE) ; D. Adler (Geneva, CH)

- When to initiate long term NIV — *J. Callegari (Köln, DE)*
- Is there an impact of different COPD subtypes and comorbidites on NIV outcomes? — *P.J. Wijkstra (Groningen, NL)*
- Overview and future perspectives — *P. Murphy (London, UK)*

Thoracoabdominal surgery: perioperative ventilation and rehabilitation

C. Bhatia (Geneva, CH) ; S. Jaber (Montpellier, FR)

Swallowing disorders in ventilator patients

R. Diez Gross (Pittsburgh, USA) ; H. Prigent (Garches, FR)

17h30 CLOSING OF CONFERENCE

■ Scientific Session

■ Workshop / Highlights on...

NOTES

JEUDI 15 MARS

13h30 - 15h00

FORUM 3 NIVEAU -2

Historique et revue de la littérature

Modérateurs : P. Léger (Lyon, FR) ; J. Escarrabill (Barcelone, SP)

- Le paradoxe VNI: du domicile à l'hôpital *D. Robert (Lyon, FR)*
- Historique de la ventilation mécanique à domicile *D. Rodenstein (Bruxelles, BE)*
- Revue de la littérature depuis le congrès JIVD ERCA 2015 chez l'adulte *J.C. Winck (Porto, PT)*
- Revue de la littérature en Pédiatrie *A.K. Simonds (Londres, UK)*

FORUM 1 NIVEAU -2

VNI vs ventilation invasive chez les patients BPCO en phase aigue

Modérateurs : K. Grant (Lausanne, CH) ; J.C.M. Richard (Annecy, FR)

- Quand et pourquoi je préfère l'intubation? *A. Ozsancak (Istambul, TU)*
- Quand et pourquoi je préfère la VNI? *M. Ferrer (Barcelone, SP)*
- Au-delà de la VNI : l'intubation est-elle la seule alternative? (point de vue des patients) *L. Pisani (Bologne, IT)*

AUDITORIUM PASTEUR NIVEAU +1

Diagnostic et prise en charge du SAOS chez l'enfant

Modérateurs : S. Khirani (Paris, FR) ; Q. De Halleux (Lausanne, CH)

- Discussion des recommandations de l'ERS 2016 *A. Boudewyns (Edegem, BE)*
- Les options thérapeutiques pour le SAOS chez l'adolescent *F. Abel (Londres, UK)*
- Le haut débit par canule nasale a-t-il sa place dans le SAOS? *A. Amaddeo (Paris, FR)*

SALON PASTEUR +1

Techniques de désencombrement en soins chroniques

M. Chatwin (Londres, UK) ; M. Nygren-Bonnier (Stockholm, SE)

RHÔNE 3 NIVEAU +1

Le patient ventilateur dépendant (ventilé 24h/24) : aspects techniques

M. Georges (Dijon, FR) ; J. Gonzalez-Bermejo (Paris, FR) ; M. Toussaint (Vlezenbeek, BE)

ST CLAIR 3 NIVEAU +2

Réhabilitation pulmonaire et VNI

Modérateurs: J.C. Borel (Grenoble, FR) ; P.J. Wijkstra (Groningen, NL)

- VNI pendant le réentrainement physique *E. Derom (Gand, BE)*
- VNI nocturne en complément de la réhabilitation pulmonaire *M. Duiverman (Groningen, NL)*
- Réhabilitation des patients ventilateurs dépendants 24h/24 *M.R. Goncalves (Porto, PT)*

RHÔNE 2 NIVEAU +1

Oxygénothérapie à domicile

A. Barral (Paris, FR) ; C. Hernandez (Barcelone, SP) ; J.F. Muir (Rouen, FR)

15h00 - 15h30 PAUSE : VISITE DES POSTERS ET DE L'EXPOSITION

15h30 - 17h00

FORUM 3 NIVEAU -2

Prise en charge des apnées centrales

Modérateurs : S. Javaheri (Mason, US) ; A.K. Simonds (Londres, UK)

- Physiopathologie *J.L. Pépin (Grenoble, FR)*
- Aspects cliniques et diagnostic des apnées centrales *G. Lorenzi Filho (São Paulo, BR)*
- Quand et comment traiter les apnées centrales? *S. Javaheri (Mason, US)*

FORUM 1 NIVEAU -2

Stimulation électrique et soins respiratoires

Modérateurs : C. Straus (Paris, FR) ; P.J. Strollo (Pittsburgh, US)

- Stimulation phrénique dans les maladies neuromusculaires *C. Morelot (Paris, FR)*
- Stimulation glosso-pharyngée dans le SAOS *D. Rodenstein (Bruxelles, BE)*
- Stimulation phrénique dans l'hypoventilation centrale *C. Straus (Paris, FR)*

AUDITORIUM PASTEUR NIVEAU +1

Maladies neuromusculaires chez l'enfant

Modérateurs : B. Fauroux (Paris, FR) ; M. Pons (Barcelone, SP)

- Quand débuter la VNI chez les enfants porteurs de maladies neuromusculaires *A. Amaddeo (Paris, FR)*
- Comment ventiler des enfants porteurs de maladies neuromusculaires *B. Fauroux (Paris, FR)*
- Monitorage et suivi à long terme des enfants porteurs de maladies neuromusculaires *U. Krivec (Ljubljana, SI)*

SALON PASTEUR +1

Urgences et ventilation mécanique à domicile : rester calme et continuer

A. Balana (Barcelone, SP) ; J. Gonzalez-Bermejo (Paris, FR) ; M. Paneroni (Gussago, IT)

RHÔNE 3 NIVEAU +1

Techniques de désencombrement en soins intensifs – patients adultes et enfants sous ventilation mécanique invasive

Q. De Halleux (Lausanne, CH) ; M.R. Goncalves (Porto, PT)

ST CLAIR 3 NIVEAU +2

Survivre après les soins intensifs

Modérateurs : M. Cour (Lyon, FR) ; J.P. Janssens (Genève, CH)

- Effets du progrès technique sur les résultats des soins intensifs *J.C.M. Richard (Annecy, FR)*
- Séquelles physiques et psychologiques *A. Wollner (Ramat Gan, IL)*
- Devenir après la réanimation en néonatologie *O. Claris (Lyon, FR)*

17h00 FIN DES SESSIONS / SYMPOSIUMS

■ Session scientifique
■ Atelier / Le point sur...
session interactive

17h15 - 18h45 (FORUM 1, niveau -2)
Symposium AGIR à dom

Promouvoir l'activité physique des patients SOH (Syndrome Obésité-Hypoventilation) pour prendre en charge les comorbidités

Modérateurs : J.L. Pépin (Grenoble, FR) ; J.C. Borel (Grenoble, FR)

Efficacité et limites de la VNI chez les patients atteints d'un SOH : considérer la VNI comme un des éléments d'une prise en charge intégrée *A. Piper (Sydney, AU)*

Faisabilité et efficacité de la réhabilitation en complément de la ventilation non invasive *N. Hart (Londres, UK)*

Individualiser les programmes de réhabilitation pour en améliorer les bénéfices *I. Vivodtzev (Cambridge, US)*

17h15 - 18h45 (AUDITORIUM PASTEUR, niveau +1)
Symposium FISHER & PAYKEL Healthcare

Nasal Humidified High Flow: changing paradigms in chronic respiratory support

President: P. Navalesi (Catanzaro, IT)

Physiological effects of the Nasal High Flow for chronic patients *L. Pisani (Bologna, IT)*

Nasal High Flow in hypercapnia *J. Braünlich (Leipzig, DE)*

NHF for long term use in COPD patients: results of a RCT *U. Weinreich (Aalborg, DK)*

Compliance and implementation of NHF for long term use in COPD patients *(en anglais)* *L. Storgaard (Aalborg, DK)*

VENDREDI 16 MARS

08h30 - 10h00

FORUM 3 NIVEAU -2

Physiopathologie

Modérateurs : J.L. Pépin (Grenoble, FR) ; F. Lofaso (Garches, FR)

- Insuffisance respiratoire chronique et comorbidités — *J.L. Pépin (Grenoble, FR)*
- Détection de l'hypoventilation — *F. Lofaso (Garches, FR)*
- Comment marche la VNI? - Aspects physiologiques — *M. Polkey (Londres, UK)*

FORUM 1 NIVEAU -2

Comment la e-santé change-t-elle notre pratique, comment les bases de données peuvent nous aider?

Modérateurs : M. Lujan (Barcelone, SP) ; D. Adler (Genève, CH)

- Que faire avec tant de données? — *N. Ambrosino (Pise, IT)*
- Validité des données des patients ventilés — *J.P. Janssens (Genève, CH)*
- Comment interpréter les données : le point de vue des médecins et des patients — *A.K. Simonds (Londres, UK)*

AUDITORIUM PASTEUR NIV +1

CPAP / VNI chez les enfants

Modérateurs : F. Abel (Londres, UK) ; M. Pons (Barcelone, SP)

- CPAP chez les nourrissons avec obstruction des voies aériennes supérieures — *A. Amaddeo (Paris, FR)*
- CPAP/VNI : sa justification et ses bénéfices dans les maladies pulmonaires de l'enfant — *B. Fauroux (Paris, FR)*
- Les défis techniques de la CPAP chez l'enfant — *S. Khirani (Paris, FR)*

SALON PASTEUR NIV +1

Patients partenaires

Modérateurs : J. Chaulet (Toulouse, FR) ; J. Escarrabill (Barcelone, SP)

- Patients et soignants en tant que partenaires — *R. Goldstein (Toronto, CA)*
- Evaluation de l'expérience des patients — *J. Escarrabill (Barcelone, SP)*
- Témoignages de patients — *J. Chaulet (Toulouse, FR)*

RHÔNE 3 NIVEAU +1

Aspects éthiques et responsabilités sociales

Modérateurs : J.O. Benditt (Seattle, US) ; B. Midgren (Lund, SE)

- Proposer ou ne pas proposer la ventilation - respecter la décision du patient — *B. Midgren (Lund, SE)*
- Soins palliatifs — *S. Pautex (Geneva, CH)*
- Perspectives bioéthiques — *O. Jonquet (Montpellier, FR)*

ST CLAIR 3 NIVEAU +2

Adaptation de la VNI chez les patients BPCO en insuffisance respiratoire aigue

N. Terzi (Grenoble, FR) ; J. Simons (Lausanne, CH)

RHÔNE 2 NIVEAU +2

Techniques de désencombrement du nourrisson (enfants de moins de 2 ans) en soins intensifs à domicile

P. Nouvellet (Lausanne, CH) ; P. Joud (Lyon, FR)

RHÔNE 1 NIVEAU +1

10h00 - 10h30 PAUSE : VISITE DES POSTERS ET DE L'EXPOSITION

10h30 - 12h00

FORUM 3 NIVEAU -2

Obésité et hypoventilation de l'adulte

Modérateurs : J.C. Borel (Grenoble, FR) ; J.P. Janssens (Genève, CH)

- Obésité et comorbidités. Les critères de diagnostic du SOH doivent-ils être ajustés? — *A. Piper (Sidney, AU)*
- Efficacité de la PPC et de la ventilation à deux niveaux de pression — *J.F. Masa (Caceres, SP)*
- Objectifs des traitements à court et à long terme. Comment améliorer les résultats? — *P. Murphy (Londres, UK)*

FORUM 1 NIVEAU -2

SLA

Modérateurs : J. Gonzalez-Bermejo (Paris, FR) ; J.O. Benditt (Seattle, US)

- L'aide ventilatoire chronique est-elle réellement efficace? — *P.J. Wijkstra (Groningen, NL)*
- Prise en charge multidisciplinaire de la SLA — *A. Calvo (Turin, IT)*
- Dilemmes éthiques et fin de vie — *J.O. Benditt (Seattle, US)*

AUDITORIUM PASTEUR NIV +1

VNI et sevrage difficile

Modérateurs : M.W. Elliott (Leeds, UK) ; M. Norrenberg (Bruxelles, BE)

- Physiopathologie du sevrage prolongé et décompensation post-extubation — *N. Terzi (Grenoble, FR)*
- Rôle de la VNI pour faciliter l'extubation — *P. Navalesi (Catanzaro, IT)*
- Rôle de la VNI dans la prévention et le traitement d'une décompensation post-extubation — *M. Ferrer (Barcelone, SP)*

SALON PASTEUR NIV +1

Adaptation du domicile pour le patient ventilateur dépendant

P. Delalande (Angers, FR) ; M. Paneroni (Gussago, IT) ; G. Wasteels (Vlezenbeek, BE)

RHÔNE 3 NIVEAU +1

Activité physique et BPCO

Modérateurs : E. Derom (Gand, BE) ; M. Duiverman (Groningen, NL)

- Réhabilitation précoce après une exacerbation — *E. Gimeno Santos (Barcelone, SP)*
- Comment inciter les patients à faire une activité physique? — *H. Demeyer (Louvain, BE)*
- Résultats à long terme du réentrainement des patients BPCO — *S.H. Singh (Leicester, UK)*

ST CLAIR 3 NIVEAU +2

La trachéotomie au 21e siècle

R. Diez Gross (Pittsburgh, US) ; H. Prigent (Garches, FR)

RHÔNE 2 NIVEAU +2

Le patient ventilateur dépendant : rôle des centres de soins intermédiaires

N. Ambrosino (Pise, IT) ; M.T. Garcia Tejero (Lyon, FR)

RHÔNE 1 NIVEAU +1

12h15 - 13h45 (AUDITORIUM PASTEUR, niv +1)
Symposium BREAS MEDICAL Ltd

Innovations in Mechanical In-Exsufflation: past, present and future *(en anglais)*

Co-Chairs: J. Bach (Newark, US) ; M. Chatwin (London, UK)

What we have learnt from bench tests of MI-E devices with regards to MI-E settings? *M. Chatwin (London, UK)*

Implications of high pressures? *P. Murphy (London, UK)*

When to use low pressures? *T. Andersen (Bergen, NO)*

Is there a role for MI-E in intubated patients? *M. Goncalves (Porto, PT)*

Innovation in Acute Care *R. Moses (North Shields, UK)*

12h15 - 13h45 (SALON PASTEUR, +1)
Symposium SENTEC

Evidence for transcutaneous CO2-monitoring in home mechanical ventilation

Evidence in COPD — *F. Magnet (Köln, DE)*

Evidence in restrictive disorders/NMD — *M. Duiverman (Groningen, NL)*

Evidence for transcutaneous CO2-monitoring in home mechanical ventilation for children — *B. Fauroux (Paris, FR)*

(en anglais)

12h15 - 13h45 (RHÔNE 2, niveau +1)
Symposium ORKYN'

Télésurveillance en Ventilation Non Invasive: vers un nouveau modèle de prise en charge à domicile?

Expérimentations nationales de télémédecine: Actualités — *P. Jourdain (Paris, FR)*

Expérimentations nationales de télésurveillance pour les Insuffisants Respiratoires Chroniques traités par VNI — *C. Rabec (Dijon, FR)*

Le télé-suivi en ventilation, retour d'expérience — *J.M. Arnal (Toulon, FR)*

■ Session scientifique
■ Atelier / Le point sur...

12h00 - 14h00 LUNCH / SYMPOSIUMS / VISITE DES POSTERS ET DE L'EXPOSITION

14h00 - 15h30

Oxygénothérapie à haut débit - 1ère partie : De la physiologie aux preuves d'efficacité

Modérateurs : S. Jaber (Montpellier, FR) ; L. Pisani (Bologne, IT)

- Néonatologie : comment assurer la respiration sans alvéole ! *M. Roth-Kleiner (Lausanne, CH)*
- Haut débit d'oxygène : seulement une question d'oxygène? *N.S. Hill (Boston, US)*
- Son utilisation dans l'insuffisance respiratoire aigue *J.D. Ricard (Colombes, FR)*

Des "Guidelines" à la vie réelle

Modérateurs : D. McKim (Ottawa, CA) ; J. Escarrabill (Barcelone, SP)

- Adhésion aux "Guidelines". Peut-on "*faire boire un cheval qui n'a pas soif?*" *D. McKim (Ottawa, CA)*
- Les indications dans la vraie vie *M.W. Elliott (Leeds, UK)*
- Les aspects financiers *M. Trapero Bertran (Barcelone, SP)*

Le b-a-ba du monitoring de la VNI

Modérateurs : B. Midgren (Lund, SE) ; F. Lofaso (Garches, FR)

- Monitoring de la VNI au démarrage et à long terme : pourquoi, quand, où et comment? *M. Lujan (Barcelone, SP)*
- Comment monitorer la VNI – 1ère partie : les outils de base *C. Rabec (Dijon, FR)*
- Comment monitorer la VNI – 2ème partie : les outils de pointe *D. Adler (Genève, CH)*

La ventilation à l'extérieur du domicile

P. Delalande (Angers, FR) ; G. Wasteels (Vlezenbeek, BE)

Maladies neuromusculaires : au-delà du respiratoire

Modérateurs : M. Toussaint (Vlezenbeek, BE) ; D. Orlikowski (Garches, FR)

- Comprendre la fonction des voies aériennes supérieures *T. Andersen (Bergen, NO)*
- Evaluation et optimisation de la fonction cardiaque *A. Pantazis (Londres, UK)*
- Alimentation et nutrition *J. Haan (Bruxelles, BE)*

Organisation de la ventilation mécanique à domicile dans différents pays européens

J.C. Borel (Grenoble, FR) ; N. Hart (Londres, UK) ; J.P. Janssens (Genève, CH) ; F. Magnet (Köln, DE) ; P.J. Wijstra (Groningen, NL)

Ventilation et pédiatrie : les astuces des spécialistes. Choix des interfaces pour la VNI

Q. De Halleux (Lausanne, CH) ; M. Pons (Barcelone, SP)

15h30 - 16h00 PAUSE : VISITE DES POSTERS ET DE L'EXPOSITION

16h00 - 17h30

Oxygénothérapie à haut débit - 2ème partie : Au futur

Modérateurs : N.S. Hill (Boston, US) ; M. Roth-Kleiner (Lausanne, CH)

- Utilisation chez l'insuffisant respiratoire chronique *L. Pisani (Bologne, IT)*
- Indications autres que l'insuffisance respiratoire hypoxémique *S. Jaber (Montpellier, FR)*
- Utilisation en pédiatrie *O. Claris (Lyon, FR)*

Aspects techniques de la ventilation à domicile chez les adultes

N. Hart (Londres, UK) ; J. Escarrabill (Barcelone, SP) ; J.C. Winck (Porto, PT)

Impact physiologique des appareils de désencombrement mécanique : Insufflateur-Exsufflateur et ventilation par percussion à haute fréquence

T. Andersen (Bergen, NO) ; Q. de Halleux (Lausanne, CH)

Comment les patients utilisent-ils internet?

B. Hov (Oslo, NO) ; I. Grau (Barcelone, SP) ; J. Taytard (Paris, FR) ; B.M. Tiburzi (IVUN, St Louis, US)

La mucoviscidose

Modérateurs : M. Nygren-Bonnier (Stockholm, SE) ; N. Stremler (Marseille, FR)

- Physiopathologie respiratoire : état des connaissances *B. Fauroux (Paris, FR)*
- Techniques de désencombrement *M. Nygren-Bonnier (Stockholm, SE)*
- Indications de VNI *A. Piper (Sidney, AU)*

Table ronde : Les besoins insatisfaits des patients

Coordinateurs : J. Chaulet (Toulouse, FR) ; C. Devaux (AFM, Paris, FR) ; A.S. Gresle (Barcelona, SP) ; F. Lofaso (Garches, FR)

Avec le soutien d'ADEP Assistance

Quand et comment débuter et arrêter la CPAP/VNI chez les enfants?

R. Rubinsztajn (Paris, FR) ; F. Stehling (Essen, DE)

FREE COMMUNICATIONS 10 - 27 bis *(en anglais)*

(5 minutes presentations)

Chairpersons: O. Contal (Geneva, CH) ; to be confirmed

Airway Clearance - COPD - NIV *Posters 10 - 27 bis*

17h30 FIN DES SESSIONS / SYMPOSIUMS

12h15 - 13h45 (ST CLAIR 3, niveau +2) Workshop RESMED

Que révèlent les dernières études sur la ventilation non invasive à domicile pour la BPCO post-aiguë hypercapnique stable et les avantages du télémonitorage? Quelles sont les implications pour la pratique clinique?

Venez discuter avec trois conférenciers experts et participer à des ateliers pratiques sur les solutions NIV et le télémonitorage à domicile de ResMed.

Orateurs: N. Hart (UK) ; P.C. Neuzeret (DE) ; C. Carlin (UK)

17h45 - 19h15 (RHÔNE 3, niveau +1) Symposium BREAS

Improving the quality of home mechanical ventilation *(en anglais)*

Chair: B. Ergan (Izmir, TU) ; J. Gonzales-Bermejo (Paris, FR)

Classification and clinical impact of patient ventilator asynchrony *A. Carlucci (Pavia, IT)*

Pay attention to the screen: Solutions to detect patient ventilator asynchrony *J.M. Arnal (Toulon, FR)*

'Tighten your belts': Advanced solutions to diagnose patient ventilator asynchrony *M. Lujan (Barcelona, SP)*

Following up your patients at home: telemonitoring now and in the future *J. Gonzales-Bermejo (Paris, FR)*

17h45 - 19h15 (ST CLAIR 3, niveau +2) Symposium RESMED

Ventilation à fuite en Support de vie, Pourquoi, Quand et Comment?

Ventilation à fuite chez le patient adulte ventilo dépendant *C. Gregoretti (IT)*

Ventilation à fuite chez l'enfant ventilo dépendant *T. Kirjavainen (FI)*

Ventilation à fuite en Ventilation invasive *G. Gobaille (FR)*

SAMEDI 17 MARS

	08h30 - 10h00	10h00 - 10h30 PAUSE : VISITE DES POSTERS ET DE L'EXPOSITION	10h30 - 12h00
FORUM 3 NIVEAU -2	**Implications de l'innovation** *Modérateurs : J.P. Janssens (Genève, CH) ; J. Chaulet (Toulouse, FR)* • La perspective des fabricants de matériel : résultat d'une enquête *J.P. Janssens (Genève, CH)* • La perspective des médecins : les nouveaux modes constituent- t- ils un progrès? *C. Rabec (Dijon, FR)* • La perspective des patients: appliquer des méthodes de design centrées sur l'humain *L. Parameswaran (Barcelone, SP)*		**Perspectives futures** *Modérateurs : P. Levy (Grenoble, FR) ; D. Robert (Lyon, FR)* • Perspectives futures de la VNI chez les patients BPCO *A. Cuvelier (Rouen, FR)* • Perspectives futures de la CPAP et de la VNI chez les patients obèses *P. Levy (Grenoble, FR)* • Perspectives futures de la VNI chez les patients porteurs de maladies neuromusculaires *J.R. Bach (Newark, US)*
FORUM 1 NIVEAU -2	**La formation des soignants dans l'initiation de la VNI et la gestion des risques** *A. Hare (Londres, UK) ; B. Vrijsen (Leuven, BE)*		**S'adapter à l'aggravation du malade ventilé à long terme** *M.W. Elliott (Leeds, UK) ; A. Vianello (Padoue, IT)*
AUDITORIUM PASTEUR NIVEAU +1	**Evaluation des programmes d'éducation thérapeutique** *M. Jansa (Barcelone, SP) ; B. Saugeron (Marseille, FR)*		**Etre compétent en ventilation à domicile** *M. Lujan (Barcelone, SP) ; V. Roges-Bredas (Amiens, FR)* *Avec le partenariat d'ADEP Assistance*
SALON PASTEUR +1	**Adaptation de la VNI en situation aigue. Cas cliniques** *P. Navalesi (Catanzaro, IT) ; J.Y. Olivier (Angers, FR) ; L. Piquilloud (Lausanne, CH) ; J. Simons (Lausanne, CH*		**Interprétation des graphiques fournis par les ventilateurs / apprendre par la simulation - aigu et chronique** *A. Hare (Londres, UK) ; L. Piquilloud (Lausanne, CH) ; D. Thevoz (Lausanne, CH)*
RHÔNE 3 NIVEAU +1	**Réhabilitation pulmonaire des patients non BPCO** *Modérateurs : M. Chatwin (Londres, UK) ; N. Ambrosino (Pise, IT)* • Réhabilitation des patients avec une hypertension artérielle pulmonaire *B. Degano (Besançon, FR)* • Réhabilitation des patients avec un syndrome obésité/ hypoventilation sévère : modalités et résultats *S. Mandal (Londres, UK)* • Neurostimulation électrique pour améliorer la capacité de patients gravement handicapés à réaliser des exercices *I. Vivodtzev (Cambridge, US)*		**Aspects techniques de la ventilation à domicile chez les enfants** *M. Chatwin (London, UK) ; C. Gregoretti (Palerme, IT) ; A. Torrent (Barcelone, SP)*
ST CLAIR 3 NIVEAU +2	**Périodes de transition pour les patient ventilés (par ex. : des soins intensifs aux soins continus puis aux soins de suite, de la pédiatrie à la médecine adulte)** *O. Norregaard (Arhus, DK) ; A. Torrent (Barcelone, SP)*		**Réentrainement à l'effort sous VNI : de la théorie à la pratique** *E. Derom (Gent, BE) ; F.E. Gravier (Le Havre, FR)*
RHÔNE 2 NIVEAU +1	**Mucoviscidose : VNI et rehabilitation pre/post transplantation** *S. Mariani (Milan, IT) ; N. Stremler (Marseille, FR)*		**Monitorer les symptômes chez le BPCO : être pro-actif** *B. Baroche (Lyon, FR) ; N. Coullandaye (Lyon, FR) ; J. Escarrabill (Barcelone, SP) ; D. Le Roy (Lyon, FR)*

12h15 - 13h45 (AUDITORIUM PASTEUR, lev+1)
FREE COMMUNICATIONS 1 - 9

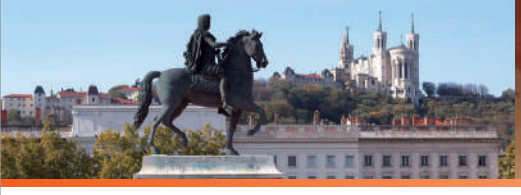
(10 minutes presentations)
Chairpersons: D. Adler (Geneva, CH) ; J.O. Benditt (Seattle, US)
Home Care - NIV - NMD
Posters 1 - 9
(en anglais)

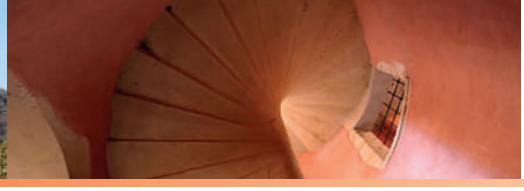
12h15 - 13h45 (RHÔNE 3, level +1)
Symposium PHILIPS

New noninvasive COPD screening of EFL with in home therapy *(en anglais)*
Chairperson: *Dr. David White, Medical Director of Philips Sleep & Respiratory Care*
Speakers: *Prof. Raffaele L. Dellaca, PhD, at the Politecnico di Milano University ; Dr. Peter Calverley, Professor of Respiratory Medicine at the University of Liverpool ; Mr Robert Romano, Pittsburgh, PA, USA*

12h15 - 13h45 (RHÔNE 2, level +1)
FREE COMMUNICATIONS 28 - 45

(5 minutes presentations)
Chairpersons: P. Banfi (Milano, IT) ; J. Cotting (Lausanne, CH)
NMD - Paediatrics
Posters 28 - 45
(en anglais)





12h00 - 14h00 LUNCH / SYMPOSIUMS / VISITE DES POSTERS ET DE L'EXPOSITION

14h00 - 15h30

Sujets d'actualité

Modérateurs : B. Make (Denver, US) ; D. Robert (Lyon, FR)

- **Oxygénothérapie : 40 ans, passé et futur** *B. Make (Denver, US)*
- **Réduire les réadmissions à l'hôpital des BPCO après exacerbations: VNI et thérapie à domicile vs oxygénothérapie à domicile seule** *N. Hart (Londres, UK)*
- **Effets des évènements respiratoires sur l'oxygénation cérébrale chez les enfants : avantages de la CPAP/VNI** *S. Khirani (Paris, FR)*

Monitorer la qualité de la ventilation chronique (co-organisé par le groupe SOMNOVNI)

A. Carlucci (Gussago, IT) ; J. Gonzalez-Bermejo (Paris, FR) ; C. Rabec (Dijon, FR

Titration de l'oxygène (soins aigus et chroniques)

E. L'Her (Brest, FR) ; J. Winck (Porto, PT)

Vieillir sous ventilation avec une maladie neuromusculaire

B. Denis (Rennes, FR) ; G. Laier Groeneveld (Oberhausen, DE) ; D. Orlikowshi (Garches, FR) ; V. Roges-Bredas (Amiens, FR)

Avec le partenariat d'ADEP Assistance

Mobilisation précoce en soins intensifs

N. Dousse (Genève, CH) ; L. Poiroux (Angers, FR)

15h30 - 16h00 PAUSE : VISITE DES POSTERS ET DE L'EXPOSITION

16h00 - 17h30

VNI au long cours des patients BPCO : avons nous assez de preuves?

Modérateurs : F. Magnet (Köln, DE) ; D. Adler (Genève, CH)

- **Quand débuter la VNI de longue durée?** *J. Callegari (Köln, DE)*
- **Les différents sous-types de BPCO et les comorbidités, ont-ils un impact sur les résultats de la VNI?** *P.J. Wijkstra (Groningen, NL)*
- **Vue d'ensemble et perspectives futures** *P. Murphy (Londres, UK)*

Chirurgie thoraco-abdominale : ventilation et réhabilitation peri-opératoire

C. Bhatia (Genève, CH) ; S. Jaber (Montpellier, FR)

Troubles de déglutition chez les malades ventilés

R. Diez Gross (Pittsburgh, USA) ; H. Prigent (Garches, FR)

17h30 CLOTURE DU CONGRÈS

■ Session scientifique

■ Atelier / Le point sur...

JIVD

ERCA

ABSTRACTS BOOK

FREE COMMUNICATIONS

Testimony

Saturday, March 17th - session ***Be competent for home ventilation*** - 10h30 to 12h - Salon Pasteur

Saturday, March 17th - session ***Aging when you are a ventilator patient with NMD*** - 14h to 15h30 - Salon Pasteur

COMPÉTENT EN VENTILATION : CHEMIN DE VIE ET DE MÉSAVENTURES

Être et se sentir compétent en ventilation par Viviane Roges-Bredas[1].

[1] Comité ADEP Picardie des Insuffisants Respiratoires
MAAM, 12 Rue Frédéric PETIT 80000 Amiens
Tél 03 22 33 08 16
comite.adep.picardie@wanadoo.fr
http://adep.asso.fr
(Antenne Picardie d'ADEP, Siège PARIS. Tél: 01 45 45 40 30 - contact.siege@adep.asso.fr)

Ma compétence en ventilation s'est construite au fil de ma vie, à mesure que je grandissais. Plus je me suis sentie autonome, plus j'ai été confrontée à des "mésaventures" qui ont enrichi cette compétence.

Tout au long de ces expériences de vie, les médecins, le prestataire ADEP Assistance et mon entourage m'ont aidé à :

• maîtriser les technologies au fur et à mesure de leur évolution (aspect théorique)

• trouver les solutions face à des obstacles techniques ou psychologiques (aspect pratique)

A maintenant plus de 50 ans, je sais que ma compétence en ventilation est le fruit d'un apprentissage permanent ayant pour but d'être autonome pour faire face aux multiples projets que j'ai voulu mener. Il faut se sentir libre et assez fort pour aller vers l'inconnu.

En tant que Présidente de l'association des patients picards depuis plus de 10 ans, je m'efforce certes de partager ce savoir, mais surtout à transmettre ces notions de confiance et d'assurance nécessaires à l'apprentissage et la validation d'acquis en ventilation.

BEING SKILLED IN VENTILATION : A LIFE AND PITFALLS EXPERIENCES

Feeling and Being skilled in ventilation by Viviane Roges-Bredas.

I got skilled in ventilation as I was growing up.

During my life, the more I decided to do things on my own, the more I had to face pitfalls that made me stronger and learnt me how to better manage my disease and my ventilation.

Throughout these life experiences, doctors, home healthcare providers and my family, have helped me to :

• manage all the new and evolving technologies (theoretical aspect)

• find solutions to deal with psychological and technical difficulties (practical aspect)

Now I'm 50, I'm sure that my desire to be autonomous and live like anyone through various projects (university, marriage, pregnancy, work, etc.) has brought me all the knowledge I needed in ventilation to achieve my goals.

As President of a patient association in Picardie during these last 10 years, I'm eager to convey my knowledge but the most important thing to me is that my fellows understand that being self-confident is the key for being and feeling skilled in ventilation.

You have to feel free and be strong enough to dive into the unknown !

Poster réalisé en collaboration avec ADEP Assistance / APAIR Assistance

Saturday, March 17th / 12h15 – 13h45 / Auditorium Pasteur, Level +1 (10 minutes presentations)

Airway Clearance - Home Care - Paediatrics - NIV - NMD

Free communication 1 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur **Poster 1**

EFFICACY OF MECHANICAL INSUFFLATION-EXHALATION THERAPY IN PATIENTS WITH NEUROMUSCULAR DISEASE

Mayoralas-Alises S.[1]; Castaño A.[2]; Pizarro N.[2]; Caneiras C.[3]; Díaz-Lobato S[4]

[1] Hospital Moncloa. Respiratory Department, Madrid. Healthcare Department, Praxair, Spain.
[2] Healthcare Department, Praxair, Madrid, Spain
[3] Healthcare Department, Praxair, Portugal
[4] Hospital Ramóm y Cajal. Respiratory Department, Spain.

Introduction: Mechanical Insufflation-Exhalation (MI-E) is a therapy that has proven to be an effective treatment in patients with Neuromuscular Disease (NMD) with deterioration of the mechanism of cough.
Actually, cough is considered not effective when Peak Cough Flow (PCF) is <160L/min (<270 L/min during a respiratory infection). Although the indications are clear, a lot of patients do not adhere to the therapy due to lack of efficacy or poor tolerance.
The objective of the present study is to verify the efficacy and tolerance of therapy in NMD patients according to PFT.

Methods: One year observational analysis of 23 NMD patients with indication of an MI-E, referred to the nursing office for adaptation to the therapy.
A tolerance/efficacy test was performed to each patient with a cough assist device. All patients were submitted to a treatment of MI-E with the Cough Assist with pressures set at 30/40 cm H2O for insufflation and -40/-30 cm H2O for exsufflation. An insufflation/exsufflation time ratio of 3:2 seconds and a pause of 3 seconds between each cycle were used. Eight cycles were applied in the session.
To define that the treatment was effective and well tolerated, t3 item was required: good coordination of the patient with the MI-E therapy, generation of an effective post-treatment cough maneuver (subjective assessment of the magnitude of the expiratory phase as well as the sound of the glottis opening or PCF measurement) and absence of collapse of upper airway during the expulsive phase of cough. Patients were monitored by oximetry.

Results: We included 24 NMD patients (15 men, 9 women) with a median age of 52 years (3-80 years). 19 patients were under mechanical ventilation treatment (2 by tracheotomy).
The diagnoses were: 19 ELA (12 with bulbar involvement), 2 Gravis Myasthenia, 1 Duchenne Muscular Dystrophy (DMD), 1 Cystinosis Myopathy and Limb-girdle muscular dystrophy (LGMD).
The MI-E therapy was effective and well tolerated in 45,9% of the patients (n = 11) with the following diagnoses: non-bulbar ELA (7), Myasthenia Gravis (1), Cystinosis Myopathy (1), LGMD (1) and DMD (1). The MI-E therapy was ineffective in 13 of them (54,1% of the sample), of whom 12 had bulbar ELA and 1 Myasthenia Gravis.

Conclusions: In more than 50% of our patients included, the MI-E therapy was ineffective or bad tolerated.
The indication of MI-E therapy in neuromuscular patients according to lung function parameters does not ensure its effectiveness.
To ensure the use and maximum clinical benefit it is necessary to perform a tolerance / efficacy test in these patients.

Free communication 2 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur **Poster 2**

HOME MECHANICAL VENTILATION IN CHILE: TEN YEARS OF EXPERIENCE

R. Paiva Reinero[1], R. Vera Uribe[2,3], R. Torres-Castro[2,3], R. Valenzuela[1], P. Pontoni[1]

[1] Unidad de Respiratorio Ministerio de Salud Chile - Santiago (Chile)
[2] Programa Nacional de Ventilación Domiciliaria, Unidad de Respiratorio Ministerio de Salud Chile
[3] Departamento de Kinesiología, Universidad de Chile - Santiago (Chile)

Introduction: In Chile, 11 years ago, home mechanical ventilation (HMV) was started in patients under 20 years of age. This program provides technologies and professional assistance to children needing ventilatory support. Our objective was to describe and characterize the patients admitted to the HMV program in Chile.

Methods: A retrospective study was designed. Patients admitted to the HMV program with invasive (IMV) and non-invasive ventilation (NIV) during the period 2006-2016 were included. We describe mean age of entry, the cause of ventilation, the length of stay, type of ventilatory support, discharge, complications, and mortality of all patients.

Results: Currently, 1011 patients have been admitted to the HMV program. The causes that determine the need for ventilation are a neuromuscular pathology 53%, lung disease 22%, and neurological disease 19%. Thirty percent are ventilated with IMV by tracheostomy. 14.6% patients died and 23.3% patients were discharged, due to improvement of their clinical condition. The mean age of admission was around 10 years of age, and the mean time in the program was 6 years.

Discussion: The events that occurred at home have been resolved with a strategy designed for it and training for parents and caregivers. 26% of patients have maintained the need for mechanical ventilation at home in adulthood. Implementation across the country has been a major achievement. It has been a strategy of high quality and safety. The home becomes an extension of the network of care.

Free communication 3 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur **Poster 3**

OUTPATIENT INITIATION OF HOME MECHANICAL VENTILATION IN PEDIATRIC PATIENTS

Freitas A.C. (1), Tinoco A. (2), Sousa R. (1), Ramos A. (1), Morais L. (1)

1 - Pediatric Pulmonology, Centro Materno-Infantil do Norte (Porto, Portugal)
2 - Linde Healthcare REMEO Home (Portugal)

Introduction: Home mechanical ventilation had a rapid expansion in pediatric patients. The need of a hospital stay for its adaptation has resources implica-

tions and leads to delays in ventilation beginning and costs for the hospital and patient's families. Outpatient ventilation initiation is starting to be described in adults. To the authors' knowledge, this is the first pediatric report about this practice.

Methods: Retrospective description of Outpatient Initiation Protocol for the pediatric patients followed at the Integrated Domiciliary Ventilation Outpatient Clinic (IDVC) at Centro Materno-Infantil do Norte.

Results: Outpatient Initiation Protocol starts with a hospital outpatient clinic session for interface adaptation, initial parameters adjustment during a 2-3 hour nap and caregiver education. A pediatric pneumologist and specialized nurse and physiotherapist hold this session. There is a 24/7 phone availability and caregivers have all IDVC members' contact information. A first phone call is done at 24-48h to evaluate home ventilation difficulties. A home visit is scheduled within a week and an outpatient clinic appointment at one month. There is a constant integration of technical and monitoring data between domiciliary and hospital teams, allowing individualized follow-up. Later, IDVC professionals hold community education sessions for patients on ventilation and respiratory care in schools or day-care facilities. Since October 2012, 43 pediatric patients started long-term ventilation at outpatient clinic, with ages between 2 months and 17 years (median 8,1 years). Most (51%) had neuromuscular diseases or cerebral palsy. Ventilation initiation was elective in all cases and corresponded to 96% of all elective ventilation beginnings (2 patients required hospital admission). The majority (90,7%) started non-invasive ventilation through orofacial or nasal interface. Four patients initiated invasive mechanical ventilation through previously existing tracheostomy. Five children (11,6%) did not adapt to home non-invasive ventilation - these patients were not admitted for ventilation adaptation. All other patients either maintained ventilation until death (3), were transferred to adult clinic (5) had a medical indication for suspension (1) or still maintained home ventilation with regular IDVC follow-up.

Conclusion: Outpatient initiation of home mechanical ventilation can be done in complex pediatric patients with good results. It is a feasible option in patients with stable chronic ventilatory insufficiency requiring either non-invasive or invasive ventilation. From authors' perspective, a structured integrated outpatient clinic with 24/7 domiciliary support is required for a positive outcome.

Free communication 4 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur **Poster 4**

SIMULATION TRAINING: AN EFFICIENT AND SAFE METHOD IN EDUCATING CAREGIVERS OF LONG TERM INVASIVE MECHANICAL VENTILATED PATIENTS

Anne Louise Kleiven (RN) Sigurd Aarrestad (MD).

Oslo University Hospital

Background: Long-term invasive mechanical ventilation (LTMV) is one of the most advanced therapies offered to patients outside hospitals. The National Guidelines for LTMV patients in Norway places the responsibility for the treatment and the training of the caregivers within the hospitals and the specialized health care service.
Simulation education is a learning method for improving self-efficacy and critical thinking skills. To our knowledge, few hospitals in Norway offer simulation training in a realistic environment in their systematic training programs of caregivers to LTMV-patients.

Objective: The aim of this project was to implement simulation training in the structured systematic training program to caregivers of LTMV-patients and to investigate how the participants evaluated the method in terms of usefulness and confidence in dealing with an acute situation.

Method: Two separate groups of caregivers were offered simulation training in April 2016 and in April 2017. Totally 12 caregivers participated. The training was organized by a pulmonologist and three respiratory nurses. All but one nurse were certified simulations facilitators by Oslo University Hospital. The participants were divided into three groups, who in turn participated in the scenario, observed the scenario or trained on specific skills with a respiratory nurse. During the training they received a general lecture about simulation training and crisis resource management (CRM) and a briefing about the surroundings and the simulation trainer. The simulation training included a 15 minute long acute scenario that demanded the participants to contact a prehospital team and use an ambu-bag, a cough assist, a suction aid and to change the patient's cannula. After the scenario the group underwent a debrief session, exploring how they dealt with the situation, what they handled well and possible what they could have solved differently. Principals of CRM, such as effective communication and call for help early, were embedded in both the scenario and in the following debrief session.

Results: Eleven of the caregiver`s evaluated the simulation training as very useful, while two evaluated the training as useful. All of the caregivers reported that the training had increased their ability to react confident and use necessary skills in dealing with a similar, difficult and acute situation in the patient`s home.

Conclusion: Simulation training is a safe and efficient method to embed in the systematic training program of caregivers to LTMV-patients.

Free communication 5 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur **Poster 5**

EVALUATION OF IVAPS AUTOEPAP IN RESPIRATORY FAILURE PATIENTS

Lisa Wolfe, MD, Gerard Criner, MD, Pamela DeYoung, BS, Robert Owens, MD, Krishna Sundar, MD, Sheila Tsai, MD, John Coleman III, MD, Rahul Sharma, MD, Jeremy Orr, MD, Adam Benjafield, PhD, Maureen Crocker, BS, Leslee Willes, MS, Atul Malhotra, MD

Introduction: Patients with Neuromuscular Disease (NMD) are increasingly managed with non-invasive ventilation (NIV). There may be an advantage to an automatic adjustable EPAP (AutoEPAP) for managing the changing therapeutic requirements in these patients.

Objective: To evaluate the work of breathing following the use of the AutoEPAP algorithm in comparison to manual EPAP on the Astral ventilator.

Methods: This is a prospective, randomized, cross-over trial carried out at 6 sites in the United States. Randomized participants are representative of adult patients with respiratory failure, history of upper airway obstruction, and established on NIV therapy. Randomized participants complete two overnight polysomnography studies, one each using Astral with iVAPS manual EPAP and the other with Astral with iVAPS AutoEPAP.

Results: A total of 42 patients were randomized, 17 of which had a primary respiratory diagnosis of NMD. Baseline characteristics for the NMD population are: 76.5% male, mean age of 46 ± 18.4 years, mean BMI of 52.2 ± 25.5, a mean time of 4.3 ± 5 years of NIPPV treatment at baseline and 64.7% were classified as dependent on their ventilator. Primary endpoint of ODI4% is 4.79 ± 7.71 on AutoEPAP night and 8.18 ± 16.50 on manual EPAP night; the mean paired difference (AutoEPAP – Manual EPAP) is -3.38 ± 11.48. There are no statistically significant differences between nights of iVAPS and iVAPS AutoEPAP for the endpoints of AHI, pCO2 or SpO2. Mean target alveolar volume (Va) is 5.32 ± 1.32 and 5.31 ± 1.35, tidal volume (Vt, L) is 0.45 and 0.42, respiratory rate (RR) is 16.06 and 17.41, and RR/Vt is 35.78 and 41.53 for AutoEPAP and Manual EPAP nights, respectively. No serious adverse events were reported.

Conclusions: This trial was designed to assess the functionality of an AutoEPAP algorithm for treating upper airway obstruction in patients with respiratory failure. The primary result of this study in the NMD population shows that AutoEPAP is non-inferior to manual EPAP. Secondary endpoint analyses for the NMD population suggest that the AutoEPAP algorithm can be effectively used to treat NMD diseases that are progressive in nature and have constantly changing targets. The results of this study provides valuable information regarding the titration of NIV in these patients.

	iVAPS AutoEPAP (N=17)	iVAPS manual EPAP (N=17)	AutoEPAP-manual EPAP (N=17)
Results	**Mean [N]**	**Mean [N]**	**Mean**
Tidal Volume (L)	0.4 [16]	0.42 [17]	0.03
RR	16.06 [16]	17.41 [17]	-1.35
AHI	5.29 [16]	5.82 [17]	-0.53
RR/Vt	35.78 [16]	41.53 [17]	-5.74
SpO2 (%)	94.00 [13]	95.20 [15]	-1.20
pCO2 (%)	43.71 [13]	41.73 [15]	1.98

Free communication 6 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur — Poster 6

OBESITY HYPOVENTILATION SYNDROME TREATED WITH NON-INVASIVE VENTILATION: CAN WE SWITCH TO CPAP?

M. P. Arellano-Maric[1], C. Hamm[2], S. B. Schwarz[2], J. Callegari[2], M. Duiverman[3], C. Schmoor[4], J. H. Storre[2], M. Spielmanns[5], W. Galetke[6], W. Windisch[7]

[1] Pontificia Universidad Católica de Chile - Santiago (Chile), [2] Cologne Merheim Hospital, Kliniken der Stadt Köln, Witten/Herdecke University - Cologne (Germany), [3] University Medical Center Groningen - Groningen (Netherlands), [4] University Hospital Freiburg - Freiburg (Germany), [5] St. Remigius Krankenhaus - Opladen (Germany), [6] Krankenhaus der Augustinerinnen - Cologne (Germany), [7] Asklepios Klinik Gauting - Munich (Germany)

Obesity hypoventilation syndrome (OHS) is one of the most frequent indications for long-term non-invasive ventilation (NIV) worldwide. Nevertheless, CPAP therapy has proven to be a suitable therapy for a significant percentage of these patients. The device election has relevant implications, taking into consideration the lower cost of a CPAP and its easiness of use. It is hypothesized that stable OHS patients receiving NIV therapy for ≥3 months can be switched to CPAP therapy, irrespective of the reasons that supported the NIV initiation.

Methods: An open label multicentric interventional trial was performed. OHS patients under successful NIV therapy for ≥3 months underwent an APAP night. If the parameters were acceptable they were switched to CPAP for 4-6 weeks. Blood gases, polysomnography, transcutaneous CO_2 ($PtcCO_2$) monitoring, lung function testing and questionnaires (heatlh-related quality of life, sleepiness, patient's preference) were obtained.

Results: forty-two stable OHS patients with home NIV experience for 34 (IQR 13.7-57.4) months were recruited. Severe obstructive sleep apnea was present in all of them, COPD GOLD I/II was present in 52%. Importantly, 38% of them were started on NIV because of initial CPAP failure and 31% because of acute hypercapnic respiratory failure. Regarding the primary outcome, 30/42 patients (71%, 95% CI 55-84%) maintained daytime $PaCO_2$ levels ≤45mmHg after the home CPAP period. The mean $PtcCO_2$ level rose slightly under CPAP but remained within a clinically acceptable range (NIV 42.2 ±5 versus CPAP 46.3 ±5 mmHg). There was no impairment in quality of life, polysomnographic parameters or lung function. Interestingly, 24 (57%) of patients preferred CPAP therapy despite the high pressure levels (mean 13,8±1,8 mbar).

Conclusions: It is feasible to switch stable OHS patients from NIV to CPAP therapy. CPAP was the prefered ventilatory mode for these patients. These data are a practical strategy to diminish costs to the health care system.

Free communication 7 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur — Poster 7

THE EFFECT OF TREATING OBSTRUCTIVE SLEEP APNOEA AFTER ACUTE QUADRIPLEGIA WITH POSITIVE AIRWAY PRESSURE ON NEUROCOGNITIVE PERFORMANCE AND SLEEPINESS (COSAQ)

DJ Berlowitz for the COSAQ Collaborative.

Department of Physiotherapy. University of Melbourne, Institute for Breathing and Sleep & Department of Respiratory and Sleep Medicine. Austin Health. Melbourne. Australia

Importance: Highly prevalent and severe obstructive sleep apnoea caused by acute cervical spinal cord injury (quadriplegia) is associated with neurocognitive dysfunction, sleepiness and is likely to impair rehabilitation.

Objective: To determine whether three months of auto-titrating continuous positive airway pressure (CPAP) would improve neuropsychological function, sleepiness, quality of life, anxiety and depression more than usual care in people with both acute quadriplegia and obstructive sleep apnoea.

Design: Multinational, randomized controlled trial conducted from July 2009 until October 2015. Outcome measures were made by assessors blinded to treatment allocation.

Setting: Eleven spinal cord injury centres across Australia, New Zealand, Canada and England.

Participants: Consecutive sample screened from 1,810 people who sustained a new, traumatic quadriplegia. 332 met the inclusion criteria and underwent full, portable polysomnography. 273 had an apnoea hypopnoea index greater than 10. 160 tolerated at least four hours of CPAP during a three-day run-in and were randomized.

Intervention: Three months of auto-titrating CPAP compared with usual care

Main outcomes: The primary outcome was neurocognitive performance, specifically attention and information processing, as measured by the Paced Auditory Serial Addition Task. Daytime sleepiness, as measured by the Karolinska Sleepiness Scale was considered a priori as the most important secondary outcome.

Results: 149 participants (134 men, age 46+34, 81+57 days post-injury) completed the trial. Overall CPAP use averaged 2.9 (SD=2.3) hours per night with 15 (21%) of those randomised to CPAP classified as fully "adherent" (at least four hours nightly use on five days per week). The intention-to-treat analyses revealed no significant differences in attention and information processing, (Paced Auditory Serial Addition Task), with a mean difference in improvement of 2.28 (95%CI -7.09-11.6. p=0.63). Controlling for pre-morbid intelligence, age and OSA severity (group effect estimate of -1.15, -10–7.7) did not alter this finding. Sleepiness (Karolinska Sleepiness Scale) was significantly improved by CPAP on intention-to-treat analysis (mean difference of 1.26, 0.32-2.2. p<0.01).

Discussion: Despite treatment with nasal CPAP being particularly challenging in this group, CPAP significantly improved sleepiness after acute quadriplegia but did not improve neurocognition beyond that seen with post-injury spontaneous recovery.

Trial registration: Australian New Zealand Clinical Trial Registry ACTRN1260500079965

Free communication 8 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur **Poster 8**

PEAK COUGH FLOW AS PREDICTIVE FACTORS TO COUGH AIDS TECHNICAL IN DM1 PATIENTS

Ghilas Boussaïd, PT, PhD [1,2] ; Hélène Prigent, MD, PhD [1,3] ; Annane Djillali, MD, PhD [1,4] ; David Orlikowski, MD, PhD [1,4,5] ; Frédéric Lofaso, MD, PhD [1,2,3]

[1] *Université de Versailles Saint Quentin en Yvelines, INSERM U1179, France*
[2] *Association Française contre les Myopathies - Téléthon, 91000 Evry, France*
[3] *Service d'Explorations Fonctionnelles Respiratoires, AP-HP, Hôpital Raymond Poincaré, 92380 Garches, France*
[4] *Pôle de ventilation à domicile, AP-HP, Hôpital Raymond Poincaré, 92380 Garches, France*
[5] *CIC 1429, INSERM, AP-HP, Hôpital Raymond Poincaré, 92380 Garches, France*

Background: Many patients with DM1 require respiratory care at home with non-invasive ventilation and cough aids technical. However, no specific recommendations are available, in contrast to other neuromuscular diseases.

Methods: The respiratory function parameters associated with peak cough flow PCF values were identified using multivariate linear regression analysis. Cox proportional-hazards regression was used to estimate hazard ratios (HRs) for starting non-invasive ventilation (NIV).

Results: In the 283 included patients, maximal inspiratory pressure (MIP) correlated significantly with inspiratory capacity (IC; R^2=0.35; p<0.0001). PCF impairment was associated with lower values of MIP (p=0.005), maximal expiratory pressure (p=0.02), expiratory reserve volume (p=0.0003) and IC (p<0.0001). Predictive factors who associated with NIV initiation were hypercapnia, and younger age at baseline (HR, 1.03; CI [1.01-1.06], p<0.006) and with lower peak cough flow (p<0.001) which were independent to NIV indication.

Conclusion: Our data suggest that MIP impairment seems to be the earliest sign of respiratory muscle weakness. As the respiratory failure progresses, cough impairment develops. Therefore, closer monitoring of PCF may optimise the management of the respiratory complications of the disease in DM1 patients.

Keys words: non-invasive ventilation, peak cough flow, Myotonic Dystrophy type 1, prospective study.

Free communication 9 - Saturday, March 17th from 12h15 to 13h45 - Auditorium Pasteur **Poster 9**

EVALUATION OF THREE DIFFERENT INTERFACE CONFIGURATIONS IN THE ASSSESSMENT OF PEAK COUGH FLOW

Michalis Agrafiotis, Aekaterini Kousta, Evangelia Serasli, Elena Paschoni, Christos Karachristos, Diamantis Chloros

Respiratory Neuromuscular Outpatient Clinic, Department of Pulmonary Medicine, "G.Papanikolaou" General Hospital, Thessaloniki, Greece.

Introduction: Peak cough flow (PCF) measurement is important for the evaluation of patients with neuromuscular diseases (NMDs). However, the effect of different interfaces in the reliability of measurement has not been adequately studied.

Subjects & Methods: We used a mechanical peak flow meter (Mini-Wright) to compare 3 different interface configurations: 1-mouthpiece and nose clip; 2-mouthpiece without nose clip; 3-anesthetic mask attached to mouthpiece. Thirty-three normal subjects (28.2±11.8 years, 16 females) and 11 patients with various NMDs (45.2±21.7 years, 2 females) were recruited into the study. Each subject was instructed to take a deep breath and cough as forcibly as he/she could into the interface. The 3 configurations were tested in random order and enough time was provided for familiarization with the maneuvers and rest. For each configuration, we used the best of 3-4 attempts with a difference<5% and/or <50/L/min. Repeated measures ANOVA with post hoc Bonferroni correction was employed to compare the different configurations.

Results: There was no significant difference between configuration-1 and configuration-2 (472.0±130.4 L/min vs. 472.3±133.1 L/min, P=NS) but configuration-3 yielded significant lower PCF values (430.0±119.7 L/min, P<0.0003).

Conclusions: 1) The use of nose clip is not required in PCF assessments unless there is velopharyngeal insufficiency. 2) The anesthetic mask yields lower PCF values as compared to mouthpiece. 3)The type of interface should be stated when reporting PCF measurements.

Friday, March 16th / 16h00 – 17h30 / Rhône 1, Level +1 (5 minutes presentations)

Airway Clearance - COPD - NIV

Free communication 10 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 10**

A PILOT STUDY TO EVALUATE THE USE OF A NOVEL AIRWAY CLEARANCE AND LUNG EXPANSION TREATMENT IN MOTOR NEURON DISEASE (MND) PATIENTS IN THE HOME SETTING

Lisa M Wolfe, MD; John M Coleman III, MD; Michelle Prickett, MD; Rahul Sharma, MD and Jenny L Hixon, BS

Division of Pulmonary and Critical Care Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois USA

RATIONALE: Airway clearance therapy is a key component of care for patients with motor neuron disease (MND). Low lung volume and inability to cough effectively result in pulmonary complications. Airway clearance, hyperinflation, and cough assistance therapy are used to maintain lung volume and avoid respiratory infection. A recent study by Lechtzin et al (2016). suggests this therapy helps avoid hospitalization and may decrease medical costs in patient with neuromuscular disease.
The MN4000 is a home device that provides continuous high frequency oscillation (CHFO) and continuous positive expiratory pressure (CPEP) along with aerosol therapy to provide airway clearance and hyperinflation. The purpose of this study is to provide preliminary data on feasibility, effectiveness and patient satisfaction with therapy in the home.

METHODS: The study is a non-randomized open label pilot study. All enrolled subjects received treatment with the MN4000. Therapy was delivered using Albuterol, normal saline or 3 % hypertonic saline. No other aerosolized medications were used. Treatment settings were adjusted to patient comfort and tolerance. Subjects were seen at baseline, after 30 days and after 90 days of therapy. Adherence was self-reported using an on-line tool. We evaluated satisfaction, adherence to therapy and compared lung function results and results on the ALS-FRS R.

RESULTS: 5 stable MND subjects were enrolled. Mean subject reported adherence to prescribed therapy was 95.4 %. After 90 days of therapy. 4 of 5 subjects reported the therapy more effective than previous therapy for keeping their lungs clear and chose to continue using the therapy after the study. Mean ALS-FRS R scores were 33.6 + 6.84 at baseline and 32.0 + 5.29 at 30-days and 32.2 + 5.07 at 90 days. Pulmonary function results are listed in Table 1.

Table 1: Pulmonary Function Measures

	Baseline		30 days		90 days	
	Actual	% Predicted	Actual	% Predicted	Actual	% Predicted
FEV_1	1.7 ± (0.54)	58.6 ± (19.49)	1.6 ± (0.71)	57.8 ± (28.42)	1.7 ± (0.73)	59.4 ± (27.67)
SCV	2.1 ± (0.50)	55.2 ± (13.59)	2.2 ± (0.66)	58.2 ± (21.10)	2.1 ± (0.89)	54.6 ± (27.09)
MIP	-41.0 ± (21.24)		-35.6 ± (19.65)		-34.8 ± (15.32)	
Peak Cough Flow	344.0 ± (105.74)		320.0 ± (152.81)		280.0 ± (144.91)	
SpO_2	97.4 ± (0.89)		96.8 ± (1.3)		95.8 ± (1.64)	

CONCLUSIONS: Our preliminary data suggest MN4000 therapy is easy to use, patients are willing to adherence to prescribed therapy and therapy may help patients to keep their lungs clear. In this short-term study, our data suggest consistent CHFO and CPEP therapy may have a role in the treatment of patients with MND.

CLINICAL IMPLICATIONS: Devices that are easy for patients with MND to use may improve adherence to pulmonary therapies and may help to avoid pulmonary complications.

1 Lechtzin N, Wolfe LF, Frick KD. The Impact of High-Frequency Chest Wall Oscillation on Healthcare Use in Patients with Neuromuscular Diseases. Ann Am Thorac Soc. 2016 Jun;13(6):904-9.

Free communication 11 - Friday, March 16th from 16h to 17h30 - Rhône 1 Poster 11

USE OF FLOW GENERATING EQUIPMENT TO INCREASE THE PEAK FLOW OF COUGH, COMPARED WITH AIR STAKING, COUGH ASSIST AND SPONTANEOUS TOS IN CHILDREN WITH NEUROMUSCULAR DISEASES USERS OF NON-INVASIVE NIGHT-BREAKING SUPPORT IN THE METROPOLITAN REGION, DURING 2017

R. Vera Uribe[1,2], R. Torres-Castro[1,2], G. Villarroel[2], L. Vasconcello[1,2], M. Barros Poblete[2], J. Rosales[1,2], R. Valenzuela[3], P. Pontoni[3], R. Paiva Reinero[3]

[1] Programa Nacional de Ventilación Domiciliaria, Unidad de Respiratorio, Ministerio de Salud (Chile)
[2] Departamento de Kinesiología, Facultad de Medicina, Universidad de Chile (Chile)
[3] Unidad de Respiratorio, Ministerio de Salud Chile (Chile)

Introduction: In neuromuscular patients, the progressive weakness of the respiratory musculature generates alterations in the mechanism of cough, which is the main cause of morbidity and mortality in these population. To improve the cough an increase in the lung volumes of air is required to optimize the peak flow of cough (PCF). The vital capacity (VC) and the maximum insufflation capacity (CIM) are the most important factors to increase the PCF and consequently, have a more effective cough. This is why, is important to optimize the lung volume. There are manual and instrumental techniques that increase the VC achieving the increase of the PCF. Among them we have the «Air Stacking «(AS), the Glossopharyngeal Breathing (GFB), the use of «Cough Assist»(CA) and flow generators by non invasive ventilation (NIV). The objective of this investigation is to compare the changes in the PCF after an assisted cough maneuver by performing a maximum insufflation with the use of a NIV at different IPAP level, AS technique, CA and GFB.

Methods: A cross-sectional study was performed in 30 patients waiting for a change of at least 100 l/min, considering an alpha risk of 0.05, a power of 99% and a loss of 10%, applied to patients who are beneficiaries of the home noninvasive ventilation(HMV).

Results: Until now we have evaluated 19 patients of which 63% are male (n=12), all of whom had a good level of collaboration to perform the evaluations. Their average age is 17 ± 2.3 years.
A 52.6% of the patients had a diagnosis of Duchenne muscular dystrophy, a 15.7% diagnosis of spinal muscular atrophy, a 10,5% of Ulrich muscular dystrophy and 21% corresponded to other NMD. All patients were users of HMV.
When comparing basal PCF with the different techniques we observed significant increases in PCF with all the maneuvers except GFB (p=0.34) and with the CA (p=0.24). Likewise, we observed no differences between increment of PCF with AS or NIV with high IPAP (p>0,005). Similarly, with all therapeutic strategies we observed a significant increase in VC compared to baseline (p<0.005) except for the GFB (p=0.82). There were no differences between the increases in VC produced by AS, NIV with high IPAP (p >0,005).

Conclusion: So far, it would seem that it is equivalent to increase the PCF and the CV with AS or with NIV with high IPAP.

Free communication 12 - Friday, March 16th from 16h to 17h30 - Rhône 1 Poster 12

RAPID RESOLUTION OF A COMPLETE LUNG ATELECTASIS USING INTRAPULMONARY PERCUSSION VENTILATION: A CASE REPORT

Donizetti V, Grandi M, Landoni CV, Sesana M, Vicentini L, Viganò R.

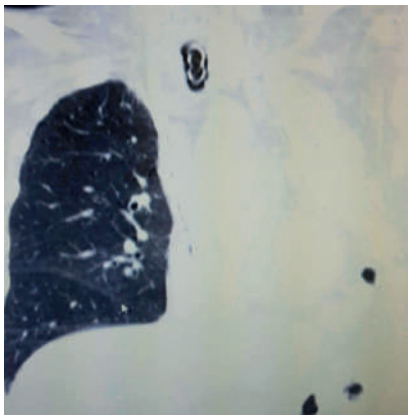
Centro Riabilitativo Villa Beretta, Ospedale Valduce – 22100 Como, Italy

Introduction: Intrapulmonary Percussion Ventilation (IPV) is a technique proposed in the early 1980s by FM Bird to promote airway clearance, to recruit pulmonary areas and to improve gas exchange.
IPV devices deliver a continuous pulsatile flow rate, superimposed on the patient's breathing pattern; the percussions are subtidal volumes of gas delivered through an open breathing circuit (Phasitron®) ; the adjustable parameters are pressure, I/E ratio and frequency.

Case Report: We received from a general ICU a 24/7 ventilator dependent tracheostomized patient, age 74, affected by ALS (with progressive motion impairment, impossibility to maintain the supine position, dysphagia and recent onset of severe respiratory failure). The chest X-Ray demonstrated an elevated left hemidiaphragm. Oxygen supplementation was necessary to maintain a pulse oxymetry of 95% despite effective invasive mechanical ventilation. To manage a condition of massive hypersecretion we started IPV ("IPV2-C" ®, Percussionaire) twice a day to treat the peripheral pulmonary areas, followed by mechanical in-exsufflation ("E70®", Philips Respironics) to clear out secretions from the trachea and the main bronchi.
After three days we registered an abrupt fall in O2 saturation, with dyspnea and a silent left lung at auscultation. A CT scan revealed a complete left lung atelectasis.

We decided to intensify IPV, adopting a setting able to ventilate the patient but also to mobilize the secretions from the distal airways toward the trachea (settings: pressure 20-25 cmH2O, I/E ratio 1/1-1.5/1, frequency 200-300/min). The treatment was well tolerated and performed in right lateral decubitus to promote ventilation of the affected lung.
After four consecutive hours of such a treatment, the patient was still comfortable and declared to feel better; we performed a thoracic ultrasonography (US) that suggested a better aerated left lung, with consolidation limited to its lower part. A second CT scan was performed confirming an almost complete resolution of the atelectasis.

Conclusion: In expert hands, IPV is an excellent tool for promoting lung recruitment in neuromuscular patients. In our opinion its low diffusion is due to the lack of expertise, at least in our country. In 2002 we had the great opportunity to be trained by dr P. Soudon and dr M. Toussaint in Brussels: their profound knowledge of IPV allowed us to acquire a good experience too. This case report demonstrates the possibility of treating atelectasis rapidly, effectively and without distress for the patient, using IPV. Incidentally we appreciated the usefulness of thoracic ultrasonography in revealing pulmonary modifications without irradiation; in this case US was crucial in determining the timing for a second CT scan control.



Free communication 13 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 13**

PREVALENCE OF CHRONIC HYPERCAPNIC COPD - PRELIMINARY DATA FROM THE HOMEVENT REGISTRY

M. Dreher[1] ; P. C. Neuzeret[2] ; W. Windisch[3] ; D. Busam[2] ; G. Hoheisel[4] ; A. Gröschel[5] ; H. Woehrle[6] ; K. Ortner[7] ; A. Graml[3] ; T. Köhnlein[8]

1 - Uniklinik RWTH - Aachen (Germany)
2 - ResMed - Munich (Germany)
3 - Merheim Hospital - Cologne (Germany)
4 - Studienzentrum - Leipzig, (Germany)
5 - MVZ AAZ - Aachen (Germany)
6 - Lungenzentrum - Ulm (Germany)
7 - The Clinical Research Institute - Munich (Germany)
8 - Klinikum St. Georg - Leipzig (Germany)

Introduction: Non-invasive ventilation (NIV) significantly improves survival and quality of life in COPD patients with chronic hypercapnic respiratory failure. However, the proportion of patients with chronic hypercapnia is unknown.

Aim: The HOmeVent registry aims to determine the prevalence of chronic hypercapnic COPD patients in an outpatient setting.

Methods: A multicentre, prospective, observational, non-interventional medical device registry was developed for COPD patients in GOLD stage 3 or 4. Participants were identified and enrolled in an outpatient setting during routine visits for COPD. The registry was approved by all local ethic committees and patients provided written informed consent.

Results: 8 outpatient clinics were enrolled. To date, 231 COPD patients have been included (63.4% male; mean age 67.2±9.0 years; mean body mass index 26.2±5.9; 58% and 42% in GOLD stage 3 and 4, respectively). PaCO2 was ≥45 mmHg in 65 patients (28.1%); of these, 23 (10%) had PaCO2 ≥50 mmHg. In the group with PaCO2 ≥45 mmHg (n=65), 26 were in GOLD stage 3 and 39 were in GOLD stage 4; for the 23 patients with PaCO2 ≥50 mmHg, 9 and 14 were in GOLD stage 3 and 4, respectively.

Conclusion: A significant proportion of COPD patients in GOLD stage 3 and 4 exhibit chronic hypercapnia and might therefore be candidates for NIV treatment.

Free communication 14 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 14**

REVIEW OF PATIENT CHARACTERISTICS AND THEIR ASSOCIATION WITH SURVIVAL IN PATIENTS WITH COPD ON HOME NON-INVASIVE VENTILATION FOR HYPERCAPNIC RESPIRATORY FAILURE: 5 YEAR RETROSPECTIVE STUDY

J Bleksley, NR Ward, R Pritchard, J Davidson, PD Hughes, J Palmer, B Kathiresan

Plymouth Hospitals NHS Trust, Plymouth, UK

Introduction: Home non-invasive ventilation (NIV) can improve outcomes in some patients with chronic obstructive pulmonary disease (COPD) and chronic hypercapnic respiratory failure. It is unclear how to identify who will benefit most from home NIV. We have assessed patient characteristics and ventilator settings in individuals with COPD referred for home NIV, and their association with survival.

Methods: Retrospective case note analysis of patients with COPD referred for home NIV between April 2011 and January 2017. We compared patient characteristics and ventilator settings in those surviving ≥12 months, to those who died earlier.

Results: 150 patients were referred for home NIV. 41 did not tolerate NIV and discontinued treatment prior to audit data collection. Of the 109 who used NIV, 50 were alive at July 2017.
Full data was available for 109 (73%) patients. Median survival in those using NIV (n=92) was 16.8 months (IQR 7.75-38.03). In patients who discontinued NIV in the first month (n=17), survival was 11.97 months (IQR 3-3-38.30; p = 0.26).

Characteristics and NIV settings in the 92 patients who used NIV:

	Survived <12 months (n =33)	Survived ≥12 months (n = 59)	P Value
Age (years)	72.44 (62.80-78.61)	69.09 (65.04-76.64)	0.71
Number (%) Male	15 (45%)	27 (46%)	0.97
Body Mass Index (kg/m2)	19.52 (17.97-26.93)	25.19 (21 44-33.5)	0.03
Number (%) starting after acute admission	26 (79%)	41 (69%)	0.34
Forced Expiratory Volume in 1 second (L)	0.7 (0.45-0.94)	0.8 (0.59-0.95)	0.33
Baseline pCO2 (kPa)	9.4 (8.35-11.5)	9 (7.8-10.4)	0.21
Inspiratory Positive airway Pressure (cm H20)	22 (18.75-25.5)	25 (20-28)	0.17
Expiratory Positive airway Pressure (cm H2O)	5 (5-5)	5 (5-6)	0.04
Number (%) using NIV ≥4 hours per night	23 (67%)	52 (88%)	0.03

Discussion: 109 (73%) patients with COPD and hypercapnic respiratory failure used NIV after set up. Our data demonstrates lower body mass index and use NIV for >4 hours each night was significantly associated with surviving <12 months after starting NIV. Patients who survived >12 months showed a non-significant trend to be younger, with better lung function and using NIV at higher pressures. A higher proportion of those surviving <12 months commenced NIV after acute admissions suggesting those with stable disease survive longer. Patients using NIV also showed a trend to longer survival, compared to those who did not tolerate NIV.
These observations highlight the need for careful patient selection when considering which patients may benefit from home NIV, an awareness of the features that may contribute to survival, and subsequent attention to ventilator settings and compliance during treatment.

Free communication 15 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 15**

EFFECTIVENESS OF A RESPIRATORY AND MOTOR REHABILITATION PROGRAM AFTER ACUTE EXACERBATION IN SEVERE COPD PATIENTS

S. Aguado Ibáñez[1], MA. Galarza Jiménez[2], L. Ansaloni[2], E. Wozniak[2], J. Maisonobe[2], J. González Bermejo[2]

[1] *Puerta del Hierro Hospital, Madrid, Spain*
[2] *Pitié-Salpêtrière Hospital, Paris, France*

Introduction: Patients with COPD usually diminish physical activity for the presence of dyspnea with the consistent loss of muscular mass. The respiratory physical therapy is a coadjutant treatment that improves quality of life. One of the tests validated to evaluate its effectiveness is the six-minute walk test (6MWT).
Furthermore, the use of not invasive ventilation (NIV) in addition to rehabilitation can diminished respiratory work; improve pulmonary oxygenation and dyspnea.

Target: evaluate the improvement in 6MWT in patients with severe COPD admitted after an acute exacerbation (AE) in a unit of respiratory and motor rehabilitation; and to evaluate the differences between patients with and without NIV.

Material and methods: Retrospective, descriptive study. 71 patients analyzed in 2017 in the Pitié-Salpêtrière Hospital.
The variables gathered were age, sex, index of corporal mass (IMC), mMRC, % FEV1, needs of VNI, traveled meters on 6MWT (26 meters considered a significant improvement), dyspnea (Borg), initial and final oxygen saturation (SO2) and number of days between both tests.

Results: Of 71 patients, 47 (66%) were men. Middle age 70±9 years and middle IMC 24.
16 patients (22,5%) presented other concomitant pulmonary illnesses (bronquiectasis, asthma, pulmonary hypertension).
Most of patients had severe obstruction (FEV1 38,31 +/-13,41%) with a grade of dyspnea mMRC 3,15.

38 patients (53.5%) needed NIV.
We found significant differences in group with NIV, presenting major mMRC, minor FEV1 and major level of dyspnea on final 6MWT (Table 1)

Variable	All (71)	NIV N=38	No NIV n=33	Significance between NIV and no NIV
Age	70±9	70±4	70±5	p= 0,99
Sex Man	46 (66%)	28 (74%)	19 (58%)	p= 0,21
IMC	24±6	25±7	23±4	p= 0,16
mMRC	3,1	3,4±0,8	2,8±0,9	**p= 0,04**
FEV1%	38.3%	34.5%	42.6%	**p=0,01**
Final Borg (entry)	5,7±2	6,8±2	4,5±2	**p<0,001**
GOLD IV	33	24	9	**p= 0,04**

Regarding the results in 6MWT (table 2), 63 of 71 patients (88,7%) improved their performances, and 73% (53 patients) gained >26 meters.
The number of days between both tests was 40±12.
We found in patients with NIV a greater increase of number of meters and dyspnea, being the dyspnea statistically significant.

Variable	All	NIV N=38	No NIV n=33	Significance Between VNI and no VNI
Metres (final/entry)	210±128 / 294±108	190±134 / 279±111	233±119 / 312±102	p= 0,60
Difference of metres	84	89	79	p= 0,60
SpO2% post 6MWT (final/entry)	85±19% /88±5%	88,5% / 88.3%	88,9% / 89.5%	p=0,25
Final Borg 6MWT (final/entry)	5.7 / 4.5	6,8 / 4.8	4,5 / 4.2	**p=0,03**

Conclusions: A hospitalization program of respiratory and motor rehabilitation after AE induces a significant improvement in 6MWT and dyspnea in patients with severe COPD.
Patients who needed NIV presented a major increase in the distance covered in 6MWT and a major improvement in dyspnea, in spite of having worse functional capacity and major dyspnea

Free communication 16 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 16**

THE USE OF THE CYCLICAL SIGH FUNCTION IN LONG TERM NON-INVASIVE VENTILATION (NIV) AS AN ADJUNCT TO CONTROL HYPERCAPNIA IN A PATIENT WITH SEVERE CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Mr Liam Campbell, Specialist Physiotherapist & Mrs Alison Armstrong, Nurse Consultant.

Regional Assisted Ventilation Service.
Newcastle Upon Tyne Hospitals NHS Foundation Trust.

Rationale: A common cause of hypercapnic respiratory failure in patients with severe COPD is nocturnal hypoventilation. Dreher et al. (Thorax 2010; **65:303**-308) found high intensity NIV (HI-NIV) to be superior at controlling hypoventilation in this population group. Ventilation is only considered to be effective in stable COPD if a specified decrease in pCO2 is demonstrated. Mauri et al (Crit Care Med 2015; 43:1823-1831) found that sigh decreases regional lung strain and intratidal ventilation heterogeneity. The need to ensure safe yet effective ventilation is necessary to reduce hospitalisation associated with severe non-infective exacerbations.

Background: A single case study has previously shown an improvement in pCO2 control associated with the introduction of cyclical sigh ventilation. The purpose of this case series was to evaluate cyclical sigh ventilation as a treatment adjunct to control hypercapnia across a wider varied COPD population group.

Objective: To ascertain if the use of the cyclical sigh breath can improve pCO2 control further than high intensity ventilation alone.

Methods: Retrospective data on 23 patients already established on HI-NIV (Nippy 3+) and subsequently commenced with sigh ventilation between 2015 -2017 was collated. Pre- & post- commencement arterial blood gases as well as ventilation settings, sigh IPAP and sigh frequency were analysed. Patients who had sigh ventilation initiated within 3 months of initial treatment commencement, had incomplete data or had any changes in ventilation settings other than introduction of a sigh, were excluded. 12 patients were therefore included.

Results: Introduction of sigh breaths facilitated an improvement in CO2 clearance (average 1.15 kPa) and an improvement in oxygenation (average 0.92 kPa) with no difference in ventilation discomfort or decrease in ventilator use reported.

Conclusion: This retrospective case series suggests the use of the cyclical sigh function decreased the structural heterogeneity across lung regions thus reduced pCO2 levels further than HI-NIV alone. It could be considered in cases where ventilation need and patient discomfort are problematic. Further study on size of sigh above baseline pressure, length (in seconds) of sigh and frequency of sigh breath is required.

Free communication 17 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 17**

NON-INVASIVE HOME MECHANICAL VENTILATION: 10-YEAR MORTALITY DATA

Mike Mackie[1], Gurpreet Beghal[2], Michelle Ramsay[1,2], Eui-Sik Suh[1,2], Georgios Kaltsakas[1,2], Hina Pattani[1], Phil Marino[1,2], Patrick Murphy[1,2], Nicholas Hart[1,2], Joerg Steier[1,2]

[1] *Lane Fox Respiratory Unit, Guy's & St Thomas' NHS Foundation Trust, London, UK.*
[2] *Faculty of Life Sciences and Medicine, King's College London, UK.*

Introduction: Non-invasive home mechanical ventilation (HMV) is used to treat chronic hypercapnic respiratory failure (HRF). We present the 10-year mortality data based on the underlying condition for the Lane-Fox Respiratory Unit (LFRU), one of the largest tertiary referral centres for HMV in the UK. The LFRU currently manages 1,866 patients on HMV in the community.

Patients & Methods: All-cause mortality data were collected from the LFRU over a decade. Patients were grouped into those with neuromuscular disease/ chest wall disease (NMD/CWD), obstructive airway disease (OAD), obesity related respiratory failure (ORRF), and others. Parameters recorded included age, gender, diagnosis, ventilation, HMV compliance, treatment period and cause of death. Data are presented standard deviation (SD), the 50% survival time is presented as median (interquartile range, IQR).

Results: In total, 894 deaths were recorded over the 10-year period, mortalities are grouped according to diagnosis (table 1). Patients with NMD/CWD had the shortest survival time (1.3 (0.3-5.1) years, p<0.01), whilst patients with ORRF had the best (2.4 (1.1-5.6) years, p<0.01). Patients with OAD and other had survival times between those with NMD/CWD and ORRF (1.6 (0.6-3.4) and 1.6 (0.6-4.8) years, respectively; figure 1). A subgroup (n=29) within the NMD/CWD group were patients with Duchene's muscular dystrophy (age of 25.1 (5.3) years), their survival time was 4.9 (2.4-6.5) years. Out of the total cohort there was non-compliance in 21.8% (n=87 NMD/CWD, n=60 OAD, n=38 ORRF and n=9 Other)

Diagnostic Group	Age (years)	Male/ Female	Compliance (hours)	Last ABG recorded Prior to Death		
				pH	PaO2 (kPa)	PaCO2 (kPa)
NMD/CWD (n=393)	62.1 (17.8)	234/159	9.3 (6.5)	7.40 (0.05)	9.4 (1.9)	6.8 (1.4)
OAD (n=239)	69.1 (9.8)	122/117	6.6 (4.9)	7.37 (0.07)	8.4 (1.8)	7.8 (1.9)
ORRF (n=230)	66.2 (12.5)	124/106	5.6 (3.7)	7.39 (0.05)	8.7 (2.1)	6.7 (1.4)
Other (n=32)	63.2 (17.3)	17/15	7.3 (4.1)	7.38 (0.07)	9.3 (2.3)	7.3 (2.0)

Table 1: Characteristics of the different diagnostic groups. Other = post-surgical, Prader-Willi syndrome, acute lung injury, cystic fibrosis.

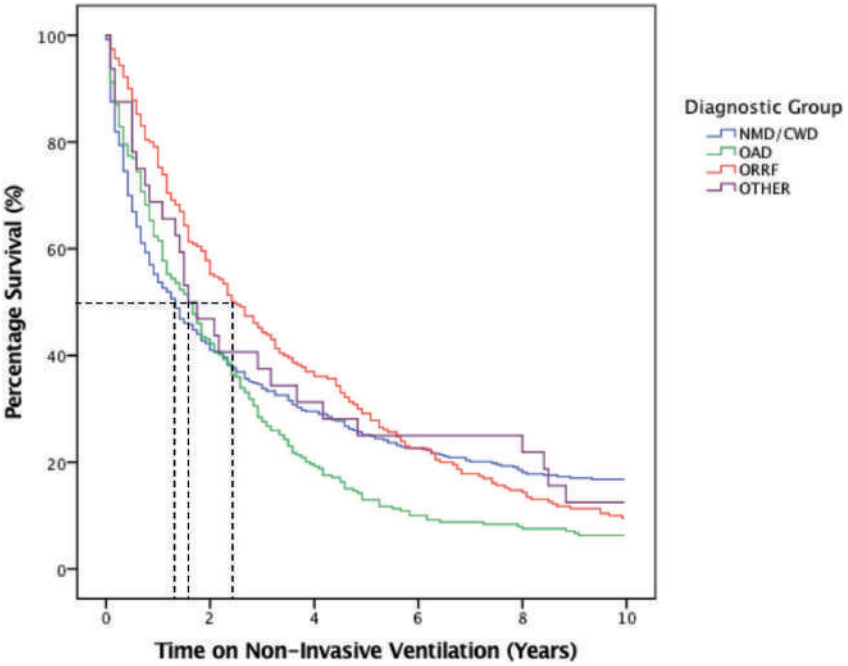


Figure 1: Mortality following initiation of non-invasive home mechanical ventilation

Conclusion: Long-term mortality in patients treated with HMV for hypercapnic respiratory failure differs significantly between diagnostic groups. Patients with NMD/CWD had the shortest survival, while patients with ORRF do better, this is despite patients with NMD/CWD having the best compliance. These results stress the severity of hypercapnic respiratory failure as an indicator of long-term outcome.

Free communication 18 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 18**

PHYSIOLOGICAL EFFECTS OF THREE DIFFERENT VENTILATORY MODES IN PATIENTS WITH OBESITY HYPOVENTILATION SYNDROME UNDER NOCTURNAL NONINVASIVE VENTILATION: A PILOT RANDOMIZED STUDY

Francisco Viana Machado[1], Tiago Pinto[1,3], Pedro Amorim[1], Miguel R. Gonçalves[1,2,3], Filipa Pires[1], Anabela Marinho[1], Marta Drummond[1,2,3]

1 – Lung Function and Ventilatory Unit, Pulmonology Department, Centro Hospitalar São João, Porto, Portugal
2 – Faculty of Medicine University of Porto, Portugal
3 – Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Portugal

Background: Noninvasive ventilation (NIV) is an established treatment for obesity hypoventilation syndrome (OHS), however studies on the efficacy of different ventilatory strategies, including recent hybrid modes remains lacking.

Objective: Randomized observational study aimed to analyse the physiologic effects of three different NIV ventilatory modes in patients with OHS.

Methods: Eight OHS outpatients patients (0 females), with median(IQR) age of 64(44-74), BMI of 39(36-43), FEV1/FVC% of 72(69-85), AHI of 24(15-42), mean SpO2 of 85(78-89), % SpO2 under 90% of 95(48-99) and PaCO2 of 50(47-56) were included. Patients were admitted during 3 nights to sleep with an oro-nasal interface under 3 different modes (Bi-level S/T, AVAPS-AE and volume cycled) in a random order. Ventilator settings were titrated gradually for the patient comfort with IPAP of 24(20-30), EPAP of 11(8-15), Respiratory Rate of 15 (14-16). The titration of the tidal volume (volume mode) and target volume (AVAPS-AE) were set to 10ml/kg of ideal body weight.
During the 3 nights, sleep polygraphy (level III) values, transcutaneous CO2 (TcCO2), ventilator software data, actigraphy and patient comfort were registered.

Results: All patients tolerated the different ventilatory modes (except 1 – Volume mode). Regarding the physiologic effects, no significant differences in the were found between the different modes, however better comfort was observed in the AVAPS-AE mode.

	AHI	Mean SpO2	Mean TcCO2	Sleep Efficiency
S/T	6(1-18)	93(91-95)	48(37-53)	90(85-93)
AVAPS-AE	7(3-17)	92(91-95)	37(31-46)	75(68-83)
Volume	4(2-10)	93(91-94)	46(39-50)	89(35-93)

Conclusions: Although a reduced number of OHS patients were included, this study did not show differences in treatment effect between these 3 ventilatory modes. Hybrid modes may improve comfort and therefore patient's tolerance to nocturnal NIV.

Free communication 19 - Friday, March 16th from 16h to 17h30 - Rhône 1 Poster 19

SHORT-TERM EFFECTS, LONG-TERM COMPLIANCE AND ADMISSIONS IN PATIENTS WITH OBESITY HYPOVENTILATION SYNDROME UNDER NONINVASIVE MECHANICAL VENTILATION

Francisco Viana Machado[1], Tiago Pinto[1,3], Vanessa Santos[1], Marta Drummond[1,2,3], Miguel R. Gonçalves[1,2,3]

1 – Lung Function and Ventilatory Unit, Pulmonology Department, Centro Hospitalar São João, Porto, Portugal
2 – Faculty of Medicine University of Porto, Portugal
3 – Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Portugal

Background: Noninvasive ventilation (NIV) is an established treatment for patients with obesity hypoventilations syndrome (OHS), however short-term physiologic effects, compliance data and admissions remains lacking.

Objective: To describe and analyze the short-term physiologic effects of a NIV ambulatory adaptation, a compliance follow-up and admissions, in stable patients with OHS.

Methods: One hundred and twenty nine patients (91 females), with median(25-75) age of 68(59-77), BMI of 40(36-44), AHI of 35(19-64) witch 54%>30, and PaCO2 of 50(47-53)were submitted to NIV ambulatory adaptation. Ventilator settings were titrated gradually for the patient comfort with IPAP of 21 (18-24), EPAP of 9(8-11), Respiratory Rate (RR) of 14(14-15) and in 120 patients (93%) with a oro-nasal interface. Pulse oximetry (SpO2), transcutaneous CO2 (TcCO2), RR, Tidal Volume (Vt) were registered before and after the NIV trial. A 6 months compliance follow-up was performed.

Results: All patients had a significant improvement in RR [22(20-24) vs 15(15-17) bpm, p<0,001], SpO2 [91(88-94) vs 96(94-97)%, p<0,001], TcCO2 [50(46-55) vs 43(37-46)mmHg, p<0,001]. Regarding the NIV compliance the average daily use (hours/day) was 6:45(5:23-8:07) and the % of days with NIV use above 4 hours was 96(73-100)%. Despite the 6 months follow-up, patients remain under NIV for 23(12-34)months. Concerning the respiratory admissions during the study, 66% had 0, 18% had 1 and 11% had 2.

Conclusions: This study confirms that NIV ambulatory adaptation improves short-term physiologic parameters, the long-term compliance and low rate of respiratory admissions in OHS patients.

Free communication 20 - Friday, March 16th from 16h to 17h30 - Rhône 1 Poster 20

AN OVERVIEW OF HOME NONINVASIVE VENTILATION (NIV) PRACTICES IN SPAIN AND PORTUGAL

SD Lobato[1] ; A Antón[2] ; M Gonçalves[3] ; MJ Guimarães[4] ; ML Alonso-Álvarez[5] ; S Correia[6]

[1] *Hospital Universitario Ramón y Cajal, Madrid, Spain*
[2] *Hospital Santa Creu I Sant Pau, Barcelona, Spain*
[3] *Hospital São João, Porto, Portugal*
[4] *Hospitalar do Alto Ave, Guimarães,Portugal*
[5] *Hospital Universitario de Burgos, Burgos, Spain*
[6] *ResMed, Iberia*

Aim: There are no previous studies focused on comparing clinical practice on NIV in two different countries. This cross-sectional survey was designed to determine and compare current clinical practice for diagnosing, prescribing and treating patients with NIV in Spain & Portugal. This survey will allow us to better address the educational needs regarding NIV through an educational program; the Iberian Respiratory Care Program.

Methods: In Sep-Dec 2016, a questionnaire was sent via e-mail to 94 healthcare professionals from Spain & Portugal identified as regularly performing NIV-related activities in their practice. The questionnaire included 40 items relating to responder demographics, NIV care structure, ventilated patient profile, work habits for home NIV, and potential future practice improvements.

Results: 66 questionnaires (70%) were returned (Spain, 36; Portugal, 30). The majority of respondents were physicians (95% in Spain, 63% in Portugal). Obstructive lung disease was the most common indication for acute NIV (33% in Spain, 42% in Portugal), followed by obesity hypoventilation syndrome (29% and 27%) and neuromuscular diseases (24% and 17%). Overall, 83% of hospitals had a specific NIV clinic (100% in Spain, 63% in Portugal). NIV was most often initiated in the acute phase/during hospitalisation (89% overall, 97% Spain, 80% Portugal), followed by in the stable phase during hospitalisation (62%, 61% and 63%, respectively). Initiation of NIV in the stable phase during a daytime ventilation lab visit was more common in Portugal vs Spain (57% vs 22%). Pulmonologists most often managed home NIV (86% in Spain, 77% in Portugal), but home care providers (HCPs) played a greater role in Portugal vs Spain (47% vs 39%). Pulmonologists and HCPs monitored most NIV at home in Portugal (77%) whereas home NIV was most often manage by pulmonologists at the hospital level in Spain (67%). There was wide variation in NIV titration methods. NIV settings were usually adjusted via consultation with a physician or therapist in Spain (75%), and via the HCP in Portugal (67%).Respondents highlighted the identification of new patient groups to benefit from NIV and patient phenotyping to optimize treatment and provided personalised therapy as future NIV strategies.

Conclusions: An important difference in care of patients with NIV was observed in two similar countries. Better understanding of clinical practices can facilitate targeted education and training to ensure optimal management of patients using NIV.

Free communication 21 - Friday, March 16th from 16h to 17h30 - Rhône 1 Poster 21

DOES PATIENT COMPLIANCE WITH NON-INVASIVE VENTILATION (NIV) DEPEND UPON LOCATION OF TREATMENT INITIATION?

Mrs Alison Armstrong, Nurse Consultant, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust. Dr Ben Messer, Consultant in Intensive Care Medicine and Home Ventilation, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust.

Rationale: There are implications related to location of NIV initiation. These include cost and use of resource, but location may also influence the rate of NIV compliance.

Background: There is significant variation between long-term ventilation (LTV) services in terms of the organisation of care delivery. One variation is the location in which patients are initiated on NIV. The locations may be as an inpatient requiring an elective admission for overnight NIV initiation and training, outpatient initiation when the patient attends the hospital for NIV initiation and training or initiation of NIV and training in the home environment. The choice of location of NIV initiation is dependent upon the location of the patient and their clinical status at the time of referral, as well as their wishes and those of their care team. Existing evidence suggests that there is no difference in patient compliance with NIV if treatment is initiated as an inpatient or outpatient, but there is no comparison to include those in whom NIV is initiated in the home environment.

Objective: To demonstrate whether patient compliance with NIV is influenced by location of treatment initiation.

Method: Retrospective data over a two year period from one regional assisted ventilation service were collected and analysed. The data were collected in a variety of ways, including device interrogation and during clinical assessment. Compliance was defined as greater than 4 hours of use in a 24 hour period.

Data were analysed between NIV initiation groups using Fisher's exact test.

Results:

Set up location	Total set up (246)	12 month compliance	12 month mortality
Home	39	67%	23%
Inpatient	93	70%	27%
Outpatient	114	70%	19%

There was no significance difference in compliance or 12 month mortality between groups.

Conclusions: In patients still alive at 12 months following initiation of NIV, there is no difference in patient compliance associated with location of initiation of NIV. There are also no differences in mortality associated with location of initiation of NIV. The location of initiation of NIV should continue to be bespoke based on the patient's wishes, location and clinical status at the time of referral.

Free communication 22 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 22**

THE GENEVA LAKE STUDY UPDATE: A DESCRIPTIVE AND CROSS-SECTIONAL MULTICENTER STUDY REGARDING THE CURRENT TRENDS OF LONG-TERM HOME NON-INVASIVE VENTILATION: ASV POPULATION

C. Cantero[1], P. Pasquina[2], F. Vienne[5], D. Adler[2], A.B. Younossian[3], M. Prella[4], P. Gasche[2], J.-P. Janssens[2]

[1] *Department of General Internal Medicine, Geneva University Hospitals, Geneva, Switzerland*
[2] *Department of Pulmonology, Geneva University Hospitals, Geneva, Switzerland*
[3] *Department of Pulmonology, La Tour Hospital, Meyrin, Switzerland*
[4] *Department of Pulmonology, Lausanne University Hospital, Vaud, Switzerland*
[5] *Vaudoise Pulmonary League, Lausanne, Vaud, Switzerland*

Rationale: One of the main recent developments in our area in home non-invasive mechanical ventilation (HMV) is the appearance a large population treated by adaptive servo-ventilation (ASV).

Methods: Descriptive, cross-sectional and multicenter study regarding patients undergoing long term (> 3 months) ASV in the Cantons of Geneva or Vaud and followed by public and private hospitals, private practitioners and/or home care providers. This study aims to describe the epidemiology of the current trends in use of long-term ASV. Data collection from medical records by two investigators (double control).

Results: (median, IQR, number and/or percent)
181 patients identified, 154 (85%) male, 27 (15%) female, aged 71 years (59-77). Median BMI 29.3 kg/m^2 (26.7-33.5), 23 (12.7%) BMI <25kg/m^2, 9 (4.9%) BMI >40kg/m^2.
Principle indications for ASV were: sleep-related breathing disorder (SRBD) : 167 (92.3%), and obstructive lung disorder (OLD) : 10 (5.5%). The SRBD group included: emerging complex sleep apnea (ECSA) syndrome: 104 (62.3%); central sleep apnea (CSA) syndrome: 62 (37.1%), and obstructive sleep apnea (OSA) syndrome: 1 (0.6%). Origin of CSA was: idiopathic: 15 (24.2%); cardiac: 15 (24.2%); neurologic: 14 (22.6%); drug-related 9 (14.5%) or cardiac and neurologic: 2 (3.2%); missing data: 7 (11.3%). Among the CSA patients: 34 (54.8%) had an echocardiography within prior 12 months; median LVEF was 60% (55-65), 6 (9.7%) had LVEF <45%. 119 (65.7%) were put on ASV after failure of nCPAP.
Initiation of non-invasive ventilation (NIV): after acute episode of respiratory failure: 5 (2.7%); or electively: 164 (90.6%). NIV was started: in hospital ward: 89 (49.2%), or on an outpatient basis: 73 (40.3%). NIV was prescribed by a hospital center: 118 (65.2%) or by a pulmonologist in private practice: 63 (34.8%). Medical follow-up was provided by a pulmonologist in private practice: 82 (45.3%), a hospital center: 76 (42%), or both: 23 (12.7%). Interfaces: facial masks (139, 76.8%).
Data from ventilator software: compliance 6.3/h (5.4-8.2), leaks (95th percentile) 11.7L/min (2.5-25.6), AHI 1.1/h (0.3-3.1).

Variables Patients (n=181), n (%)	OLD 10 (5.5)	ECSA 104 (57.5)	CSA 62 (34.2)	OSA 1 (0.6)	Other* 4 (2.2)	All 181 (100)
Male, n (%)	6 (60)	90 (86.5)	54 (87)	1 (100)	3 (75)	
Female, n (%)	4 (40)	14 (13.5)	8 (13)	0 (0)	1 (25)	
BMI (kg/m2), median	27	29.7	28.3	36.4	31.1	
Former and/or active smokers, n (%)	8 (80)	28 (26.9)	24 (38.7)	- (-)	- (-)	
Obesity, n (%)	3 (30)	47 (45.2)	22 (35.4)	1 (100)	3 (75)	33 (18.2)
Chronic heart failure, n (%)	2 (20)	18 (17.3)	13 (20.9)	0 (0)	0 (0)	36 (19.9)
Cerebrovascular disease, n (%)	2 (20)	15 (14.4)	17 (27.4)	1 (100)	1 (25)	66 (36.4)
Substitutive treatment for opiate addiction, n (%)	1 (10)	1 (0.9)	6 (9.6)	0 (0)	0 (0)	
Failure of nCPAP, n (%)	3 (30)	87 (83.6)	27 (43.5)	1 (100)	1 (25)	
Adaptive servo-ventilation setting:						
- ASV, n (%)	5 (50)	64 (61.5)	49 (79)	0 (0)	3 (75)	
o EPAP (cmH20), median	6	6	6	- (-)	8	
o AI min. (cmH20), median	3	3	3	- (-)	3	
o AI max. (cmH20), median	10	10	10	- (-)	10	
- ASV-auto, n (%)	4 (40)	38 (36.5)	13 (21)	1 (100)	0 (0)	
o EPAP min. (cmH20), median	6	7	5	4	- (-)	
o EPAP max. (cmH20), median	12	13.5	10	10	- (-)	
o AI min. (cmH20), median	1.5	0	3	6	- (-)	
o AI max. (cmH20), median	15	10	12	14	- (-)	

*4 missing diagnosis ; OLD (obstructive lung disease), ECSA (emerging complex sleep apnea syndrome), CSA (central sleep apnea syndrome), OSA (obstructive sleep apnea syndrome) ; Ψ under ASV at a stable state and not more than 12 months prior to inclusion

Conclusion: Patients under ASV are a heterogeneous mostly male comorbid aged population, with mainly ECSA and CSA. Most ASV are initiated electively, in a hospital ward, by a hospital center although pulmonologists in private practice play a substantial role. Among CSA patients, 10% had a LVEF<45%, and 55%, no echocardiography within 12 months.

The authors have no financial or commercial relationships or interests to disclose. There were no funding sources for this abstract/article.

Free communication 23 - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 23**

THE GENEVA LAKE STUDY UPDATE: A DESCRIPTIVE AND CROSS-SECTIONAL MULTICENTRIC STUDY OF LONG-TERM HOME NON-INVASIVE VENTILATION: VENTILATORS, DATA VENTILATOR SOFTWARE AND MONITORING

P. Pasquina[2], C. Cantero[1], F. Vienne[5], D. Adler[2], A.B. Younossian[3], M. Prella[4], P. Gasche[2], J.-P. Janssens[2]

[1] *Department of General Internal Medicine, Geneva University Hospitals, Geneva, Switzerland*
[2] *Department of Pulmonology, Geneva University Hospitals, Geneva, Switzerland*
[3] *Department of Pulmonology, La Tour Hospital, Meyrin, Switzerland*
[4] *Department of Pulmonology, Lausanne University Hospital, Vaud, Switzerland*
[5] *Pulmonary League of Canton of Vaud, Lausanne, Vaud, Switzerland*

Rationale: Detailed technical aspects of home non-invasive mechanical ventilation (HMV) are seldom reported comprehensively. This information allows to monitor and reflect on present practices, and provides useful information for prescription.

Methods: Descriptive, cross-sectional and multicentric study of patients of all age undergoing long term (> 3 months) HMV in the Cantons of Geneva or Vaud (1'271'957 inhabitants) and followed by public and private hospitals, private practitioners and/or home care providers (patients with tracheostomies excluded). This study aims to describe technical data regarding ventilators, settings, items provided by ventilator software, and monitoring. Diagnoses were collected from medical records. This report is part of an ongoing larger study.

Results: (median, IQR, number and/or percent)
Median duration of HMV: 40 months (16-69). Ventilators were: bi-level positive pressure ventilators: 315 (63%); adaptive servo-ventilators: 181 (36.2%); or volumetric ventilators: 4 (0.8%); 38 (7.6%) had automatic modes ; 197 (39.4%) were put on HMV after failure of nCPAP.
Additional equipment: humidifier : 346 (69.2%) ; oxygen added to HMV : 144 (28.8%). Interfaces: facial masks: 373 (74.6%), nasal prongs: 30 (6%), nasal masks: 94 (18.8%).
Monitoring of patients was performed in a stable state and not more than 12 months prior to inclusion by: arterial blood gas (ABG): 292 (58.4%) and/or oxycapnometry: 104 (20.8%). Daytime ABG without non invasive ventilation (NIV): pH 7.41, $PaCO_2$ 42.7mmHg, HCO_3 26.3mmol/L, PaO_2 room air (n=233, 79.8%) 69mmHg, SaO_2 room air (n=233, 79.8%) 93.9%. Daytime $PaCO_2$ was >50mmHg in 66 (22.6%) of subjects.
Data from ventilator software: compliance 6.9/h, leaks (95th percentile) of 14L/min, AHI of 1.7/h.

Variables Patients, n (%)	SRBD 198 (40.4)	OLD 129 (26.3)	OHS 81 (16.5)	NMD 44 (9)	RD 37 (7.6)	Other* 11 (2.2)	Missing data 500 (100)
Ventilators:							
- Barometric ventilation, n (%)	31 (15.7)	119 (92.2)	81 (100)	42 (95.5)	35 (94.6)	7 (63.6)	0 (0)
- Adaptive servo-ventilation, n (%)	167 (84.3)	10 (7.8)	0 (0)	0 (0)	0 (0)	4 (36.4)	0 (0)
- Volumetric ventilation, n (%)	0 (0)	0 (0)	0 (0)	2 (4.5)	2 (5.4)	0 (0)	0 (0)
Barometric ventilator setting (n=315):							
- EPAP (cmH20), median	13 (8-13.7)	6 (5-8)	10 (8-12)	5 (4-8)	6 (4-7)	9	0 (0)
- IPAP (cmH20), median	17 (15.2-18.7)	18.2 (16-21)	20 (18-22)	15.5 (14-18)	17.5 (16-20)	21	3 (0.9)
- Back-up respiratory rate (n/min)Ψ, median	15 (14-18)	16 (13-18)	16 (14-18)	14 (14-16)	15.5 (14-17)	15	2 (0.6)
Automatic modes (n=38):							
- IVAPS, n	0	9	4	1	1	0	0 (0)
- AVAPS-AE, n	0	4	5	1	0	0	0 (0)
- AVAPS, n	2	1	5	0	0	0	0 (0)
- V-auto, n	5	0	0	0	0	0	0 (0)
Monitoring by ABG:							
- Yes, n (%)	59 (29.8)	104 (80.6)	61 (75.3)	36 (81.8)	32 (86.5)	0 (0)	0 (0)
- Non, n (%)	139 (70.2)	25 (19.4)	20 (24.7)	8 (18.2)	5 (13.5)	100 (100)	0 (0)
Daytime ABG without NIV (n=292):							
- pH, median	7.42	7.4	7.42	7.4	7.4	- (-)	0 (0)
- $PaCO_2$ (mmHg), median	37.8	47.2	42.3	42.2	45	- (-)	0 (0)
- HCO_3 (mmol/l), median	24.7	28.6	26.2	25.9	27.7	- (-)	2 (0.7)
In room air, n (%)	58 (98.3)	64 (61.5)	50 (81.9)	36 (100)	25 (78.1)	- (-)	0 (0)
- PaO_2 (mmHg), median	75.7	60.8	67.5	73.8	68.2	- (-)	1 (0.4)
- SaO_2 (%), median	96	92	93.5	95	93.4	- (-)	21 (9)
Monitoring by oxycapnometry:							
- Yes, n (%)	20 (10.1)	48 (37.2)	21 (25.9)	5 (11.4)	10 (27)	0 (0)	0 (0)
- Non, n (%)	178 (89.9)	81 (62.8)	60 (74.1)	39 (88.6)	27 (73)	100 (00)	0 (0)
Oxycapnometry under NIV (n=104):							
- %total time SaO2<88% (%), median	0	1	1.85	10.74	0	- (-)	35 (33.6)
- Median $PtcCO_2$ (mmHg), median	42	45.8	45.6	43.5	44.9	- (-)	7 (6.7)
- ODI>3% (events/h), median	3	7	11.5	9.07	12	- (-)	5 (4.8)
In room air, n (%)	20 (100)	16 (33.3)	13 (61.9)	5 (100)	6 (60)	- (-)	0 (0)
- Median SpO_2 (%), median	96	94	93	92	95	- (-)	7 (11.6)

*10 missing diagnosis and 1 palliative NIV ; SRBD (sleep related breathing disorder), OLD (obstructive lung disease), OHS (obesity hypoventilation syndrome), NMD (neuromuscular disease), RD (restrictive disease) ; Ψ S mode : 3, iBR (intelligent Back-up Rate) : 1

Conclusion: HMV is a long-term treatment with an average use of 50 months (Median: 40). Volumetric ventilation has virtually disappeared in our area, despite a 9% of the population with neuromuscular disease. Conversely, ASV is widely used and represents one third of positive pressure devices used for HMV. Few patients are on automatic modes. The majority of patients use a facial mask. Compliance is excellent with a low level of leakage. Intermediate pressures are used with an adequate control of $PaCO_2$, especially in the OLD group.

The authors have no fincancial or commercial relationships or interests to disclose. There were no funding sources for this abstract/article.

THE GENEVA LAKE STUDY UPDATE: A DESCRIPTIVE AND CROSS-SECTIONAL MULTICENTRIC STUDY OF LONG-TERM HOME NON-INVASIVE VENTILATION: POPULATION AND FOLLOW-UP

C. Cantero[1], P. Pasquina[2], F. Vienne[3], D. Adler[2], A.B. Younossian[4], M. Prella[5], P. Gasche[2], J.-P. Janssens[2]

[1] *Department of General Internal Medicine, Geneva University Hospitals, Geneva, Switzerland*
[2] *Department of Pulmonology, Geneva University Hospitals, Geneva, Switzerland*
[3] *Pulmonary League of Canton of Vaud, Lausanne, Vaud, Switzerland*
[4] *Department of Pulmonology, La Tour Hospital, Meyrin, Switzerland*
[5] *Department of Pulmonology, Lausanne University Hospital, Vaud, Switzerland*

Rationale: Detailed analyses of present practices regarding home non-invasive mechanical ventilation (HMV) (population, mode of initiation and follow-up, technical aspects) are seldom reported although important for specialists and home care providers involved in HMV.

Methods: This study is a descriptive, cross-sectional, multicentric study of patients of all age undergoing long term (> 3 months) HMV in the Cantons of Geneva or Vaud (1'271'957 inhabitants) and followed by public and private hospitals, private practitioners, and/or home care providers. This abstract focuses on diagnoses, modalities of initiation and follow-up, and provides preliminary results of an ongoing larger study.

Results: (median, IQR, number and/or percent)
Of 534 patients identified, 500 (93.6%) are included in analysis; 34 (6.4%) were excluded: 10 (29.4%) ventilated by tracheotomy, and 24 (70.6%) refusals; 332 (66.4%) male, 168 (33.6%) female, age: 71 years (59-77); median BMI: 32.4 kg/m^2 (25.7-62.5) BMI <25kg/m^2: 106 (22%); BMI>40kg/m^2: 76 (15.7%); former smokers: 172 (34.4%); active smokers: 65 (13%); never smokers: 130 (26%).
Indications, major comorbidities, modalities of initiation and follow-up are provided in Table 1.
For all: Comorbidities: hypertension : 350 (70%); obesity : 255 (51%); chronic heart failure : 105 (21%) ; cerebrovascular disease : 55 (11%); depression and/or anxiety disorder : 204 (40.8%) ; substitutive treatment for opiate addiction : 24 (4.8%).
Initiation of non-invasive ventilation (NIV): 141 (28.2%) after acute episode of respiratory failure, 337 (67.4%) electively. NIV started in hospital ward (348, 69.6%) or on an outpatient basis (121, 24.2%). NIV either prescribed by a hospital center (418, 83.6%) or by a pulmonologist in private practice (82, 16.4%). Medical follow-up assured by a pulmonologist in private practice (189, 37.8%), a hospital center (249, 49.8%), or both (62, 12.4%). 405 (81%) had seen a pulmonologist within the past year prior to inclusion. 332 (66.4%) had regular home visits by specialized health caregivers.

Conclusion: Sleep-related breathing disorders (a heterogenous group treated mostly by ASV), obesity-hypoventilation syndrome and obstructive lung disorders are the major indications for HMV in our area. More than 50% of all patients treated are obese. Comorbidities are frequent. Data also shows an important involvement of private practitioners in the initiation and follow-up of these patients. Most treatments are initiated electively, especially in the SRBD and NMD groups: only 141 (28.2%) of cases were started in an emergency setting.

The authors have no financial or commercial relationships or interests to disclose. There were no funding sources for this abstract/article.

Variables Patients, n (%)	SRBD 198 (40.4)	OLD 129 (26.3)	OHS 81 (16.5)	NMD 44 (9)	RD 37 (7.6)	Other* 11 (2.2)	Missing data 500 (100%)
BMI (kg/m2), median	30.5	29.9	44	26.2	24.7	32.6	18 (3.8%)
Former and/or active smokers, n (%)	65 (32.8)	98 (76)	40 (49.4)	19 (43.2)	13 (35.1)	2 (18.2)	133 (26.6%)
Hypertension, n (%)	136 (68.7)	95 (73.6)	67 (82.7)	21 (47.7)	26 (70.3)	5 (45.5)	7 (1.4%)
Obesity, n (%)	85 (42.9)	59 (45.7)	81 (100)	12 (27.3)	12 (32.4)	6 (54.5)	7 (1.4%)
Chronic heart failure, n (%)	34 (17.2)	29 (22.5)	26 (32.1)	9 (20.5)	7 (18.9)	0 (0)	7 (1.4%)
Cerebrovascular disease, n (%)	35 (17.7)	11 (8.5)	6 (7.4)	1 (2.3)	1 (2.7)	1 (9.1)	7 (1.4%)
Depression and/or anxiety disorder, n (%)	71 (35.9)	64 (49.6)	39 (48.1)	14 (31.8)	11 (29.7)	0 (0)	7 (1.4%)
Substitutive treatment for opiate addiction, n (%)	16 (8.1)	8 (6.2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0%)
Initiation of NIV:							
- Emergency, n (%)	8 (4)	76 (58.9)	38 (46.9)	4 (9.1)	15 (40.5)	- (-)	22 (4.4%)
- Electively, n (%)	183 (92.4)	49 (38)	42 (21.2)	40 (90.9)	22 (59.5)	1 (9.1)	
Setting of initiation of NIV:							
- Outpatient, n (%)	85 (42.9)	6 (4.6)	15 (18.5)	11 (25)	4 (10.8)	- (-)	31 (6.2%)
- Inpatient, n (%)	99 (50)	119 (92.2)	63 (77.8)	33 (75)	33 (89.2)	1 (9.1)	
NIV prescribed by:							
- Hospital center, n (%)	129 (65.2)	126 (97.7)	73 (90.1)	42 (95.5)	37 (100)	11 (100)	0 (0%)
- Pulmonologist in private practice, n (%)	69 (34.8)	3 (2.3)	8 (9.9)	2 (4.5)	0 (0)	0 (0)	
Medical follow-up by:							
- Hospital center, n (%)	92 (46.5)	54 (41.9)	45 (55.6)	29 (65.9)	22 (59.5)	7 (63.6)	0 (0%)
- Pulmonologist in private practice, n (%)	86 (43.4)	46 (35.7)	30 (37)	12 (27.3)	11 (29.7)	4 (36.4)	
- Both, n (%)	20 (10.1)	29 (22.4)	6 (7.4)	3 (6.8)	4 (10.8)	0 (0)	
Medical follow-up within the past year prior to inclusion:							
- Yes, n (%)	160 (80.8)	115 (89.1)	64 (79)	37 (84.1)	28 (75.7)	1 (9.1)	20 (4%)
- No, n (%)	31 (15.6)	10 (7.7)	16 (19.7)	7 (15.9)	7 (18.9)	4 (36.4)	
Regular home visits by specialized health caregivers:							
- Yes, n (%)	99 (50)	107 (82.9)	60 (74.1)	30 (68.2)	28 (75.7)	8 (72.7)	1 (0.2%)
- No, n (%)	99 (50)	22 (17.1)	21 (25.9)	13 (29.5)	9 (24.3)	3 (27.3)	

*10 missing diagnosis and 1 palliative NIV ; SRBD (sleep related breathing disorder), OLD (obstructive lung disease), OHS (obesity hypoventilation syndrome), NMD (neuromuscular disease), RD (restrictive disease)

Free communication 25 - Friday, March 16th from 16h to 17h30 - Rhône 1 Poster 25

FACTORS ASSOCIATED WITH CHANGE IN HEALTH-RELATED QUALITY OF LIFE AMONG INDIVIDUALS TREATED WITH LONG-TERM MECHANICAL VENTILATION, A SIX-YEAR FOLLOW-UP STUDY

Heidi Markussen, RN, Intensive care nurse, PhD candidate [1,2,4] ; Sverre Lehmann, Associate Professor, Physician Section Chief [1,3]; Roy M. Nilsen, PhD, biostatistician, Associate Professor [3] ; Gerd K. Natvig, RN, Professor [2]

1. The Norwegian National Advisory Unit on Longterm Mechanical Ventilation, Department of Thoracic Medicine, Haukeland University Hospital, Bergen, Norway.
2. Department of Global Public Health and Primary Care, University in Bergen.
3. Department of Clinical Science, University in Bergen.
4. Department of Health and Social Sciences, Western Norway University of Applied Sciences,Campus Bergen.

Aims: To examine changes and explanatory variables for changes in health-related quality of life in patients treated with long-term mechanical ventilation over a six-year period.

Background: Long-term mechanical ventilation is a treatment for individuals with chronic hypercapnic respiratory failure, primarily caused by neuromuscular diseases, obesity hypoventilation syndrome, chronic obstructive pulmonary and restrictive thoracic diseases.
One of the main goals with long-term mechanical ventilation is to improve health related quality of life. Studies on long-term outcome on health-related quality of life and factors influencing it are lacking.

Design: Prospective cohort study.

Methods: Data were collected from the Norwegian National registry of long-term mechanical ventilation and patient reported questionnaire in 2008 and 2014. Health-related quality of life was measured by the Severe Respiratory Insufficiency (SRI) questionnaire, containing 49 items and seven subdomains. Linear mixed effects models were used to measure and identify factors for changes in health related quality of life.

Results: After six years, 60 patients were still participating, out of 127 at baseline. Health-related quality of life improved significantly in the total score and in four subdomains of the questionnaire. Satisfaction with training in long-term mechanical ventilation was an explanatory variable for improvement in the SRI domain of 'psychologic well-being' and follow-up from health care professionals was an explanatory variable for improvement in the domain of 'anxiety'. Side effects of the treatment like facial soreness were associated with the total score of the SRI questionnaire. High age and high forced vital capacity were related to lower 'physical function' and improved 'social functioning', respectively.

Conclusion: Long-term mechanical ventilation over six years improved health-related quality of life in most patients. Patient training, follow-up and reduction of side effects contribute to achieve the main goal of the treatment - improved health related quality of life.

Free communication 26 - Friday, March 16th from 16h to 17h30 - Rhône 1 Poster 26

PATIENT REQUESTED WITHDRAWAL OF MECHANICAL VENTILATION IN MOTOR NEURONE DISEASE (MND) / AMYOTROPHIC LATERAL SCLEROSIS (ALS)

Dr Ben Messer, Consultant in Anaesthesia and Intensive Care Medicine, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust. Mrs Alison Armstrong, Nurse Consultant, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust. Dr Tim Williams, Consultant Neurologist, Newcastle upon Tyne Hospitals NHS Foundation Trust. Dr Tom Doris, Post-CCT fellow HMV, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust.

Rationale: To provide a case series of 6 patients with MND who requested withdrawal of mechanical ventilation (MV).

Background: Ensuring patients' autonomy and respecting their wishes is a fundamental clinical responsibility. However, withdrawal of MV at the request of patients with MND, who are ventilator-dependent, poses personal, ethical and moral challenges to healthcare professionals. There are also concerns about legal repercussions and the emotive response to withdrawing a therapy without which, death is certain. The Association of Palliative Medicine (APM) has recently published guidelines on withdrawal of MV in MND for clinicians.

Method: We present six patients with MND who requested withdrawal of MV and whose requests were facilitated in a timely and safe manner, often under challenging circumstances, in accordance with best medical practice and the APM MND practice guideline.

Results: We have supported withdrawal of MV for 6 patients with MND. Patients varied significantly in terms of: level of ventilator dependence; ventilator interface; and level of sedation required to prevent distress during reduction and discontinuation of MV (see table). We were able to facilitate their request, in a community setting, in a timely manner and without any symptoms or physiological signs of distress. There are various aspects of practice which went well but also lessons which are important to take into future practice and which might be pertinent in this challenging area for all health care professionals involved.

Conclusions: We discuss the challenges of withdrawal of MV in this scenario and hope our experience will be useful to other Home Ventilation, MND and palliative care teams and inform practice. No two patients were the same in terms of level of consciousness, ventilatory requirements or acute illness and therefore our management was necessarily bespoke. Preparation and communication between team members and with the family is critical to building trust at this most challenging of times.

Free communication 27 - Friday, March 16th from 16h to 17h30 - Rhône 1 Poster 27

TRACHEOSTOMIES: ARE THE UNWEANABLE REALLY WEANABLE? A SINGLE CASE STUDY DEMONSTRATING THE DECANULATION POTENTIAL OF A LONG TERM TRACHEOSTOMY PATIENT

Moses R [1] ; Vyas A [1] ; Blakemore J [1] ; Al-Nufornoy [1] ; Slinger C [1] ; Alexander N [2]

[1] Lancashire and South Cumbria Long Term Ventilation Service (LSCLTVS), Preston, UK
[2] Brighton and Sussex University Hospitals, Brighton, UK

Introduction: There has been a steady rise in the use of percutaneous tracheostomies in the intensive care unit (ICU) since they were first introduced over 30 years ago. Many patients are discharged from ICU with tracheostomies, most with little specialist follow up meaning huge financial implications and poor patient outcome.

Aim: As part of a pilot scheme across the region the Lancashire and South Cumbria long term ventilation service (LSCLTVS) accepted patients with permanent tracheostomies and high cost care placements to see if there was any potential to wean. This single case study details the pathway for one patient.

Method: A 54-year-old male who had suffered an intracerebral hematoma 3 years previously required craniotomy and tracheostomy due to high secretion load and inability to protect his airway. He had suffered with copious secretions, recurrent infections and poor swallow, meaning weaning had been unsuccessful.

He was referred to the LSCLTVS to assess potential for weaning. Initial nasendoscopy revealed large volumes of pooled saliva based secretions, adduction of the vocal cords, some degree of laryngospasm, redness to the endobronchial tree and no significant swallow.
Combined Physio and Speech and Language Therapy commenced for upper airway desensitisation alongside artificial airflow voicing using 10L oxygen delivered via subglottic tracheostomy port. Rescue breathing was used to re-educate the upper airway and later cuff deflation and finger occlusion for voice elicitation. Further therapy using a passy muir speaking valve (PMV) and rescue breathing allowed voice production and airway clearance.

Results: Once continuous cuff deflation was tolerated along with PMV for up to 12 hours daily we performed a cap trial for 45-minutes to assess readiness for decannulation, which he tolerated exceptionally well with vocalisation, no upper airway dysfunction, minimal suctions and ability to cough and clear into his mouth. This demonstrated he was ready for inpatient assessment and decannulation.

Conclusion: Following a 5 day inpatient stay for repeat nasendoscopy and assessment the patient was successfully decannulated after 2 months of therapy, having previously had a tracheostomy for nearly 3 years. 3 months later he was able to eat and drink after swallow rehabilitation. The cost saving for decannulation alone is over £92,000 per annum. This case is an example of the importance of continual re-evaluation of long-term tracheostomy patients and the importance of laryngeal weaning to maximise patient outcome and quality of life.

Please see abstract 27 bis page 34

Saturday, March 17th / 12h15 – 13h45 / Rhône 2, Level +1 (5 minutes presentations)

NMD - Paediatrics

Free communication 28 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 28**

I'M READY TO DIE NOW.
A 12 MONTH REVIEW OF VENTILATION WITHDRAWAL FOR MND PATIENTS WITHIN A REGIONAL UK VENTILATION SERVICE

Moses R [1] ; Callagher P [2] ; Vyas A [1] ; Andrews J [3] ; Wood S [1]

[1] *Lancashire and South Cumbria Long Term Ventilation Service (LSCLTVS), Preston, UK*
[2] *MND Care Centre, Lancashire and South Cumbria, Preston UK*
[3] *Palliative Care Team, Lancashire Teaching Hospitals, Preston, UK*

Introduction: Non-invasive ventilation (NIV) has become a widely used intervention to treat nocturnal hypoventilation and breathlessness for patients with respiratory muscle weakness secondary to motor neurone disease (MND). Despite the survival benefit, many patients with MND opt not to trial NIV for the fear of dependency.

Aim: There has been an increase in the number of patients requesting planned NIV withdrawal across the UK. Therefore a 12 month audit was carried out within our regional ventilation service.

Method: Over a 12 month period there was an average of 142 patients living with MND across Lancashire and South Cumbria. With a combined population of 1.2m this gives a prevalence of 9 per 100,000 (national 5-7 per 100,000). At any point there was on average 43 patients with MND across the region receiving NIV. At the point of discussion around timing for NIV all patients document preferred priorities of care with the MND Nurse Specialists. The teams encourage all patients at the point of consent to trial NIV they can withdraw consent at any given time.
The majority of patients who become 24 hour dependant on NIV will die whilst receiving mask ventilation. For some patients they will decide they do not wish to continue with NIV any longer but need palliation of breathlessness and that involves the combined skill and input of the ventilation team, palliative care team and MND teams. All patients have an individual care plan but in our region we use subcutaneous syringe drivers containing midazolam and morphine alongside additional boluses as needed in the active withdrawal phase.

Results: Approximately 18% (n=8) of all patients with MND requested withdrawal of ventilation after becoming dependant (24 hours a day) in a 12 month period. All patients were receiving mask ventilation in a pressure control mode.

Patient	M/F	Age	Length of time NIV	Place of withdrawal	Time between withdrawal of NIV to death
1	F	70	3 weeks	Ward	5 hours
2	M	76	10 months	ICU	30 minutes
3	M	68	19 months	Home	20 minutes
4	M	72	4 weeks	Home	3 hours
5	M	72	21 months	Home	15 minutes
6	M	61	13 months	Care Home	10 minutes
7	M	59	10 days	Ward	40 minutes
8	M	55	6 months	Home	4 hours

Conclusion: It is important patients are aware they can withdraw consent to NIV at any time and the combined approach of palliative care, ventilation and specialist MND teams can prepare patients for a dignified and peaceful end of life.

Free communication 29 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 29**

TUESDAY- AS GOOD A DAY AS ANY TO DIE.
A SINGLE CASE STUDY DEMONSTRATING THE IMPORTANCE OF PATIENT LED WITHDRAWAL OF VENTILATION IN AN MND PATIENT

Wood S [1] Addison-Jones R [2] Hesketh R [2] Vyas A [1] Moses R [1]

[1] *Lancashire and South Cumbria Long Term Ventilation Service (LSCLTVS), Preston, UK*
[2] *MND Care Centre, Lancashire and South Cumbria, Preston UK*

Introduction: Motor Neurone Disease (MND) is a neurodegenerative disorder which causes progressive weakness of muscles. Approximately 7 in 10 people diagnosed with MND will die within 3-5 years from onset of symptoms. Not all people diagnosed with MND require ventilation, or will opt for this as part of their symptom management

Aim: This single case study demonstrates one man's journey towards end of life on non-invasive ventilation (NIV).

Method: Mr G was diagnosed with MND in July 2014 at age 55. He lived with his wife and son. He had just suffered the bereavement of his daughter. He was a driving instructor and liked swimming, cycling and playing instruments. Mr G began to suffer with respiratory symptoms in September 2014 and was referred to the respiratory team. It was in February 2015 he was commenced on NIV after his last 2 students had passed their driving test.

In November 2015, Mr G was noticeably anxious and therefore was prescribed oromorph which helped relieve this. His PPC was discussed and was decided that home was the best place to die.

In March 2016, Mr G decided against gastrostomy and was referred to palliative care. During this time he was only managing 2 hours off the ventilator. June 2016 came and Mr G was struggling with how much his QOL had deteriorated and felt as that he was now ready to die.

Mr G then decided to pick a day. It was a Tuesday. On this Tuesday he decided it would be the day he would pass away as he would no longer wear his ventilator.

This was arranged with Palliative care team, Hospice team, the Ventilation team and MND team. Documents had been completed the previous week including capacity assessments and advanced directives. Hospice nurse cover had also been organised for 48 hours post NIV removal.

Mr G confirmed to the medical team that he still wished for the ventilator to be removed. Midazolam and morphine were administered subcutaneously then the ventilator pressures were reduced and finally stopped. Mr G was relaxed and he was left with his family until he passed away an hour later.

Conclusion: It is imperative that disease progression and ventilator dependence are discussed prior to commencing ventilation. Along with this, discussions about withdrawal should occur. From the example above, it shows that it is important to palliate symptoms of breathlessness and have an appropriate care plan in place to ensure dignity during end of life care.

Free communication 30 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 30**

ETHICAL CHALLENGES WHEN AN ALS PATIENT BECOMES LOCKED-IN

Michael Murn, MD and Philip Choi, MD

Duke University, Durham, NC USA

Background: Locked-in syndrome refers to a clinical state where a patient remains alert with full control of cognitive facilities, while developing complete paralysis of extremities and oral structures. While the most common cause of locked-in syndrome is ischemic infarction of the ventral pons, other etiologies exist including Amyotrophic Lateral Sclerosis. Only a fraction of ALS patients decide to undergo tracheostomy, so locked-in syndrome is thankfully rare. Our case highlights ethical challenges regarding ALS patients who are locked-in, as well as the importance of ongoing conversations regarding end-of-life care.

Case: Ms. N is a 59 year old woman, diagnosed with ALS in 2015 electing to undergo tracheostomy a year after diagnosis. As her disease progressed, she maintained that she wanted to be supported on a home ventilator. Unfortunately, she chose not to return to the ALS clinic and was lost to follow up. Her husband contacted the clinic when she was no longer able to communicate, even with eye movements. They had never fully discussed what her wishes would be if she became locked-in, and he struggled with the ethical dilemma of ventilator withdrawal in this setting.

Discussion: Patient autonomy is a foundational concept in medical ethics. Given that the clinical course of ALS may be rapidly progressing, it is imperative that physicians foster continued goals of care and reengagement to preserve autonomy. However, Ms. N's physicians lacked the opportunity to engage in these discussions prior to her becoming locked-in. Therefore, substituted judgement through her durable power of attorney became vital, despite Ms. N's preserved consciousness.

Advanced directives and proxy directives provide means through which end of life wishes may be determined. Unfortunately, research shows that despite their importance most patients of developed nations never participate in advanced care planning. Even when established, they are often limited by lack of anticipatory specificity. Several ALS focused advanced care plans have been drafted but even they are stymied by low implementation rates and by the necessary technical experience required for a sufficiently granular conversation. Undoubtedly, despite their limitations improving rates of advanced directive adoption would help prevent cases such as Ms. N's.

Ms. N lacked a formal advanced directive and conversations did not explicitly determine a clear plan of action in the event of being locked-in. It is unclear whether she had sufficient insight into her likely disease progression. As such, her early statement requesting continued and aggressive care may no longer have been applicable. Ultimately, her husband acting as her surrogate decision-maker determined that this would not be consistent with her wishes and chose to withdraw the ventilator under hospice care.

Free communication 31 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 31**

LONG TERM EXPERIENCE WITH DIAPHRAGM PACING FOR TRAUMATIC SPINAL CORD INJURY: EARLY IMPLANTATION POST INJURY ALLOWS GREATER FREEDOM FROM INVASIVE TRACHEOSTOMY MECHANICAL VENTILATION

R Onders MD, M Elmo ACNP, C Kaplan, R Schilz DO PhD

University Hospitals Cleveland Medical Center

Purpose: Cervical spine injury (SCI) can result in catastrophic respiratory failure requiring invasive mechanical ventilation (MV) which is a leading cause of mortality and cost. Diaphragm Pacing (DP) was developed to replace/decrease mechanical ventilation. This is the largest long term analysis to be reported of a subgroup of traumatic SCI.

Methods: A retrospective review of prospective IRB approved protocols. All patients underwent laparoscopic diaphragm mapping and implantation of electrodes. DP electrodes were characterized and diaphragm strengthening with mechanical ventilator weaning was initiated immediately post op.

Results: March 2000 through June 2017 there have been a total of 486 DP implants at this single site. Within this group, 155 had spinal cord damage and 92 of those patients had SCI secondary to trauma. The manner of injury: MVA 44, Sports 22, Falls 12, GSW 7, Crush 3, Forceps Delivery 2, Assault 1, and electrocution 1. The age at time of injury ranged from birth to 74 years old with the average of 27.3 years and median age of 23 years. Time on mechanical ventilation prior to DP was an average of 47.5 months (6 days to 25 years with median of 1.58 years). Patients' highest level of injury: 27 C1, 36 C2, 14 C3, 7 C4, 5 C5 and 3 C6. Twelve patients had internal permanent cardiac pacemakers. There was no device to device interactions between DP and cardiac

pacemakers. A total of 83% of patients achieved 4 consecutive hours of pacing with fifty-six patients (60.8%) being full time and an additional 13% using DP >12 hours. DP decreased the need and risk of cuffed tracheostomy with 60% of patients going to cuffless tracheostomy and 7 decannulations. One patient with early DP implant avoided tracheostomy. Five patients were not successful in weaning off MV. Five patients had full recovery of automatic breathing with subsequent DP removal. Two pediatric patients have had growth spurts of 10 inches or greater without need of electrode replacement. There have been 23 deaths with no primary respiratory origin. Subgroup analysis showed that earlier DP implantation leads to greater 24 hour use of DP and no need for any MV. This group also had the greater proportionate recovery of breathing.

Conclusions: DP can successfully decrease need for mechanical ventilation for a significant number of SCI patients. There is a correlation of early implantation to greater weaning success, recovery of independent breathing and has the potential to obviate need for tracheostomy. Liberation from MV can substantially improve SCI rehabilitation. To minimize MV days and complications, DP should be considered early after injury even in those who may re-gain independent breathing.

Free communication 32 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 32**

REVIEWING STUDIES OF DIAPHRAGM PACING RESULTS TO IDENTIFY THE CORRECT PHENOTYPE OF ALS/MND PATIENTS FOR WHICH DIAPHRAGM PACING COULD HELP IN VENTILATION AND IN WHICH PATIENTS DIAPHRAGM PACING SHOULD NOT BE UTILIZED: THE DEVIL IS IN THE DETAILS

Raymond Onders MD, Lisa Wolfe MD, Bashar Katirji MD, MaryJo Elmo ACNP, Cindy Kaplan MSN, Robert Schilz DO Phd

University Hospitals Cleveland Medical Center, Cleveland, OH and Northwestern University, Chicago

Background: Clinical trials in ALS/MND are difficult because of differing presentations, genotypes and phenotypes. This is more critical when only one muscle is addressed. Diaphragm Pacing (DP) was designed for select patients who have intact lower motor units (LMN) with loss of control of upper motor neurons (UMN). Since the initial FDA trial in the USA, two trials reported poor outcomes. This report outlines the evaluation and management of DP in ALS/MND.

Objective: To analyze reports of DP in regard to phenotypes to identify appropriate patients.

Methods: All major reports and available databases were reviewed.

Results: The subgroup FDA study that lead to approval in the US involved late stage ALS patients where all had neurophysiologic testing to confirm intact LMN. Utilizing the same inclusion criteria, the US FDA PAS trial of 60 additional patients duplicating the results including a 10% non-implantation rate at surgery. The UK DiPALS trial showed a decrease survival but did not use the same inclusion as the US nor was there any failure to implant. The French RespiStim trial also had decreased survival compared to the US. Their population was implanted early in the disease before differentiation of UMN/LMN involvement of the diaphragm presents. Undisclosed was 9 of the patients were included in the harmful trans-spinal hyperstimulation trial. Previous reports in animals showed that early implantation and hyperstimulation could adversely affect at risk LMNs and RespiStim confirmed these findings. Further reports have highlighted the role of DP to overcome the loss of respiratory drive when there is a loss of UMN control (brainstem, pre-botzinger complex, lateral medulla) and intact LMNs which can be evident in bulbar patients. This report identifies that many times the success of DP can only be identified at surgery.

Conclusion: These reports help to identify the select phenotype of ALS patients for which DP is beneficial. Patients should be later in their disease to not put at risk phrenic LMNs that may be destined to die. Patients need intact motor units to stimulate. If patients are unable to contract their intact diaphragm motor units but DP can, it will improve ventilation while preventing paradoxical movement leading to diaphragm elevation. Not every therapy is for all ALS patients but for a specific phenotype, DP can improve ventilation.

Free communication 33 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 33**

DIAPHRAGMATIC WEAKNESS WITHOUT EVIDENCE OF NEUROMUSCULAR CONDITIONS: CLINICAL PRESENTATION, TREATMENT AND PROGNOSIS

N. Guthrie, A Khanna, J Colt, E Dewsbury, M Sovani.

Respiratory Medicine, Nottingham University Hospitals, Nottingham, United Kingdom.

Introduction and Methods: There is limited information available for prognosis of diaphragmatic palsy in non-neuromuscular patients. We undertook a retrospective case review of 19 patients (11 men) requiring nocturnal Noninvasive Ventilation (NIV) at Nottingham University Hospitals. The patients had a median age of 64 (range 38 to 86).

Results: Presentation can be divided into 3 groups: Post-surgery or Intensive Care Unit (ICU) (6 patients, 3 of these were diagnosed following prolonged ICU admissions and failure to wean from ventilator, 2 post cardiac surgery and 1 post H1N1 influenza), acute admissions to the Medical High Dependency Unit (HDU) with hypercapnic respiratory failure (6 patients) and via Outpatients Clinic (4 patients). All patients were reviewed by neurology to rule out neuromuscular disorders.

The patients presenting via ICU had no preceding symptoms whereas the patients presenting via acute admission and clinic all had symptoms, largely exertional dyspnoea, with a variable time frame from 2 weeks to many years. At diagnosis only 2 out of the 19 were able to lie flat. 82% had paradoxical diaphragmatic movements.

Mean upright Vital Capacity (VC) was 1.81 L (52.4% predicted). A fall in supine VC compared to upright VC was seen in all patients, with a mean drop of 41.3% recorded (range 20-65). Both the mouth Inspiratory Pressure (MIP) and Sniff nasal Inspiratory Pressure (SNIP) values obtained were significantly reduced, with a mean MIP of 29 cmH_2O (range 16-41) and mean SNIP 26 cmH_2O (range 19-42). Chest radiograph appearance revealed evidence of unilateral raised hemi-diaphragm in 8 patients, evidence of bilateral in 8 (small lung fields) and normal in 2 patients. The mean upright VC was 1.97 L for unilateral and 1.75 L for bilateral. A percentage drop in VC supine was 38.6% for unilateral and 44% for bilateral.

All patients were treated with overnight NIV. Duration of nocturnal ventilation ranged from few days to 10 years. Of the 19 patients, 15 remain on NIV. 4 patients have improved enough to stop NIV; the improvement was noted within a few months (post cardiac surgery) to over 6 years (patient post H1N1). In the patients able to come off nocturnal NIV, the drop in supine VC improved to less than 25%. The patients still on nocturnal NIV report an improvement in symptoms and morbidity evidenced by declining CO_2 and reduced hospital admissions.

Conclusions:

1. Chest radiographs are unreliable to diagnose clinically significant diaphragmatic palsy.
2. 21% of our patients came off NIV, and all show good clinical improvement with no mortality.
3. Inability to lie flat was highly predictive of >25% drop in supine VC and need for NIV.

SURVIVAL IN AMIOTROPHIC LATERAL SCLEROSIS MANAGED WITH NONIVASIVE VENTILATORY SUPPORT IN BRAZIL: THE 15 YEAR EXPERIENCE OF THE VENT-LAR GROUP

Vidigal-Lopes M, Trindade G, Bernardes S, Isensee R, Amatto B and Guedes R

Minas Gerais Hospital Foundation – FHEMIG, Julia Kubitschek Hospital, Belo Horizonte, Minas Gerais, Brazil

Introduction: Although it is known that noninvasive ventilatory support (NVS) can prolong life in amyotrophic lateral sclerosis/motor neuron disease (ALS/MND, in Brazil there is no experience published that provide long term information about this method of care.

Methods: We conducted a retrospective study from august 2002 to april 2017 on data provided by a Center for Noninvasive Support (CNVS) in Minas Gerais, a state of Brasil. We analysed patients with Neuromuscular Disease (ND) and subanalysed specifically patients with a neurological diagnosis of Amiotrophic Lateral Sclerosis /Motor Neuron Disease (ALS/MND) by the El Escorial criteria for the last 15 years.
The main objective was survival comparing patients managed invasively versus noninvasively for respiratory support. Demographic data was collected as well as, time of novinvasive ventilation, early gastrostomy, access to cough assistance, need of intubation, need of tracheostomy, survival on novinvasive respiratory support, survival on tracheostomy (TQT).

Results:

Diagnosis	TOTAL	TQT	Noninvasive	%TQT
ALS (sporadic)	152	37	115	**24%**
Duchenne MD	53	6	47	**11%**
Miotonic MDt	6	2	4	
ALS 8 (familiar)	12	2	10	
Pos Polio Syndrom	7	1	6	
Other Miopaties	5	1	4	
SMA II	9	1	8	
Nemalinic Miopaty	1	1	0	
Devic´s disease	1	1	2	
Non Identified NMD	1	1	0	
Total of Ventilated patients	**247**	**53**	**198**	**21%**
Total of non ALS (uncomon ND)	**94**	**16**	**95**	**17%**

SEX (for the TQT ALS patients)	
Feminino	18
Masculino	35
Total Geral	**53**

Used VNI prior to the TQT	
Não	26
Sim	27
Total Geral	**53**

Status of patients on TQT ventilation at the end of the study (april 2017)	
Dead	32
Alive	21
Total	**53**

Subanalisys of patients on TQT ventilation managed by the Center of nonivasive ventilatory support (CNVS – Brasil)		
Diagnosis	**ALS**	**39 TQT pcts**
19 patients from the countryside	**Mean Distance from CNVS**	**234 Km**
Deaths from 0 a 3 months of TQT	**05**	**12,8%**
Deaths from 3 a 12 months of TQT	**14**	**35,9%**
Deaths from more than 12 months	**16**	**41,0%**
Excluded (lack of data)	**04**	**0,1%**
Total	**39**	

Mean Survival on Home Mechanical Ventilation	VNI + TQT
Total time of HMV (VNI + TQT)	**37 meses**
% TQT / Tempo Total VM Domiciliar	**37,84%**
% VNI / Tempo Total VM Domiciliar	**62,16%**
Mean Survival on TQT only (without NIV first place)	**25 meses**

NIV = 62% of time	TQT = 38% of time

Mean Survival for patients that used NIV prior to TQT ventilation = 37 months being NIV the main enabling survival factor 62% vs TQT 38% of the time

TQT only

Mean Survival for patients that were Trached as a first option = 25 months

>	Sample	Tracheostomized Patients	**39 pt**
>	N of Pacientes that used VNI prior to TQT		**23 pt**
>	N of patients who went straight to TQT		**16 pt**
>	**Survival of patients VNI => TQT**		**37 m**
	> **Time of NIV use**		**23 m**
	> **Time of TQT use**		**14 m**
>	**Survival of the TQT only patients**		**25 m**
>	**Extra Survival of the VNI plus TQT versus TQT only**		**12 m**

All patients had an Ambu bag for manually assisted cough prescribed as their vital capacity achieved 2000ml or less, had a BIPAP machine prescribed for sintoms of alveolar hypoventilation and migrate to a volume cycled ventilator (PLV, LTV or Trilogy more recently) as they started 16hs out of 24hs ventilation or get a tracheostomy tube (TQT), had rapid access to mechanical in-exsuflation as needed for inefficient cough. All patients underwent percutanesous endoscopic gastrostomy as they start to loose weight, lost more than 10% of their own weitght from before or had severe dysphagia. All patients were treated by a versatil and specialized team in a Public Health Referency Center for Noninvasive Respiratory Support at the capital of Minas Gerais State, Belo Horizonte in the southwest region of Brazil. This team worked together and is formed by respiratory physiotherapists, pneumologists, psycologist, speech and language therapist, nutricionist, social assistant get in close contact with partners Services that provided neurological diagnosis.

The mean survival of the ALS/MND that had residual bulbar function and use NIV prior to TQT was:

- **37 months, being 23 ± 38 months of which of NIV (from 10 days – the last patient adapted to NIV to 12,4 years – the one who survived the most) and being 14 ± 21 months of which on TQT ventilation (from 18 dias to 7,5 year)**

The mean survival of patients that were TQT first place was:

- **25 months (varing from 5 meses a 5,5 anos)**

Conclusions: We might conclude that the survival of patients with ALS/MND is not defined by the Tracheostomy itself. Survival is influenced by the bulbar funtion as well as from the stage of the disease. If the patient really need a trachestomy tube this is associated to a worse mean survival rate. Patients who presented nonbulbar and had bulbar function that enable NIVsince the firt beginning and used tracheostomy ventilation as an option had a greater mean survival rate than those who needed early tracheostomy, being NIV the major contributor to survival.

Free communication 35 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 35**

DIAPHRAGM PACING IN COMPLEX PEDIATRIC RESPIRATORY CARE CAN HAVE A SIGNIFICANT ROLE IN TREATING RESPIRATORY FAILURE FROM SPINAL CORD INJURY TO MULTIPLE OTHER DISEASES INCLUDING SPINAL MUSCLE ATROPHY, POMPE'S, CONGENITAL CENTRAL HYPOVENTILATION AND SELECT ACUTE FLACCID MYELITIS PATIENTS

R Onders MD, M Elmo ACNP, C Kaplan

University Hospitals Cleveland Medical Center

Background: Chronic invasive mechanical ventilation (MV) in children increases medical complexity of care and adds to familial depression, anxiety and health care dollars. Diaphragm Pacing (DP) uses laparoscopically placed electrodes into the diaphragm muscle to deliver electrical stimulation to phrenic nerve motor points. This is the largest report of DP in the pediatric population.

Methods: Prospective, nonrandomized, interventional experience under IRB approval. Pediatric patients underwent laparoscopic implantation of four intra-muscular electrodes. Patients were discharged home where conditioning ensued to wean from the ventilator.

Results: From 2009 to 2017, 23 patients between 2 years to 17.5 years (average 9) had surgical evaluations of their diaphragms with 20 patients being implanted. Three patients had completely denervated diaphragms and were not implanted. Other previous abdominal operations include 18 gastrostomy tubes, 3 VP shunts and one baclofen pump. There were no peri-operative complications. Time spent on MV prior to DP was 9 days to 92 months (33 months average). There were 80 cumulative pacing years (up to 8 years). No long term infections have been reported and no patient has required electrode removal or surgical revision. Three subsequently had scoliosis surgery. 50% achieved full time pacing with no mechanical ventilation. 4 pace during daytime over 12 hours a day and 5 pace 4-6 hours a day and still weaning. Two patients eventually were not pacing (1-brittle bone disease; 1 chronic skin reaction). Two patient had full recovery of volitional breathing and had the electrodes removed. Parents report an ability to perform more "normal" activities such as taking the child who uses the pacer to the beach. In addition, they report significant greater ease in caring for the pacer compared to the ventilator. Social functions such as church and school are simpler without the noise of the ventilator and the excess tubing from the ventilator.

Conclusion: DP is easily implanted in children, has no deleterious effects and can decrease or replace MV. DP is the preferred breathing method by patients and their families, even when compared to non-invasive ventilation. Similar to adults, early implantation decreases wean time and identification of denervated diaphragms can save untoward effects from physiologically impossible ventilator weaning. For pediatric populations with intact phrenic motor neurons DP can be an option in a wide group of patients.

Free communication 36 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 36**

A NOVEL SCORING SYSTEM FOR THE RESPIRATORY HEALTH OF CHILDREN WITH SPINAL MUSCULAR ATROPHY TYPE 1

Robinsons V, Edel L, Rendle G, Grime C, Abel F, Chan E

Great Ormond Street Hospital, London UK

Background: Spinal muscular atrophy (SMA) results from a mutation in the survival motor neuron 1 (SMN1) gene responsible for the 90% of the SMN protein production. SMA I typically presents before 6 month of age with progressive muscle weakness, bulbar dysfunction and respiratory failure. *Nusinersun*, an antisense oligonucleotide that boosts SMN2 gene production of SMN from 10% to an amount comparable with SMN1 gene, is the first treatment available for SMA I. It has been shown to improve survival and gross motor function compared to placebo. Little is known about its effect on respiratory

status. While receiving *Nusinersun*, gross motor skills are monitored using standardised scoring systems; however, there is no relevant respiratory scoring tool for this patient group in the literature.

Aims: (1) to develop a composite scoring system to assess the respiratory status of SMA I patients ; (2) to describe the baseline status of these children prior to receiving *Nusinersun* using the scores.

Methods: Our patients with SMA I were regularly assessed by the respiratory multidisciplinary team following diagnosis. We developed The Great Ormond Street SMA I Respiratory (GSR) score to evaluate their respiratory status, generating scores 1 -19, with lower values representing better respiratory status (chart 1).
The key discriminators of respiratory health are the reliance in chest clearance techniques and the need for non-invasive ventilation (NIV). Indications for starting NIV include: recurrent /acute infective exacerbation, documented hypoventilation/ respiratory failure, symptoms/signs of sleep disordered breathing, baseline increased work of breathing/dyspnoea, poor weight gain despite optimised feeding.

Chart 1. The Great Ormond Street SMA type 1 Respiratory (GSR) scoring system

	Categories	Scores
Type of SMA I	A	3
	B	2
	C	1
Physiotherapy	Expiratory vibrations (MIE) dependant	3
	Expiratory vibrations (MIE) as required	2
	Other physiotherapy	1
	None	0
Nebulised therapy	Sodium chloride (0.9%, 3% or 7%)	1
	None	0
Age of MIE initiation	3-6 months	4
	7-12 months	3
	13-24 months	2
	25 months and older	1
	None	0
Age at NIV initiation	3-6 months	4
	7-12 months	3
	13-24 months	2
	25 months and older	1
	None	0
Reason for NIV initiation	Acute	1
	Elective	0
Use of NIV	> 16 hours per day	3
	Nocturnal only	2
	None	0

Results: Seventeen SMA I children (8 males, 9 females) are under our care and all undergoing treatment with *Nusinersun*. The median age of diagnosis is 6 months (IQR 3-10 months) at which point the median GSR score was 2 (IQR 1-2)/19. Treatment with *Nusinersun* was initiated a median of 90 days (IQR 38.5-180 days) following diagnosis at which point the GSR score increased to a median of 10 (IQR 3- 13)/19. By this point, ten children were receiving NIV. Median age of initiating NIV was 8 (IQR 4.7- 12.2) months. Discussion: The GSR score offers a composite objective assessment tool to reflect the respiratory status of children with SMA 1. The score at diagnosis reflected the SMA I subtype only. At the initiation of *Nusinersun*, in increased GSR scores reflected the introduction of airway clearance techniques and in 10 cases, non-invasive ventilation. The next step will be to use this tool to track the respiratory status of children while they are receiving *Nusinersun* with these scores as a baseline.

Free communication 37 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 **Poster 37**

LONG-TERM VENTILATION PATHWAY: SEAMLESS TRANSITION FROM HOSPITAL TO HOME

Polyviou, J. MN, NP-P[1], Chiang, J. MD, MA[1,2], Syed, F. RRT[1], Rajwani, F. MScPT[1], Clark, C. RN, MHSc[1], Da Silva, Z. RRT[1], Amin, R. MD, Msc[1,3]

[1]*The Hospital for Sick Children, Toronto, Canada*
[2]*Holland Bloorview Kids Rehabilitation Hospital, Toronto, Canada*
[3]*University of Toronto, Toronto, Canada*

Background: Medical and technological advances have resulted in a growing cohort of medically complex children using invasive long-term ventilation (LTV) via tracheostomy at home. The process from LTV initiation in hospital to transition to home is complex with many stakeholders and transition points. Based on feedback from patients, families and healthcare providers, it was recognized that the transition process was unsatisfactory with identified opportunities for improvement. Without a standardized discharge pathway, there were several barriers to discharge resulting in prolonged length of stay and considerable healthcare expenditure.

Objectives: Our study aim was to develop a LTV discharge pathway at our tertiary, pediatric institution, The Hospital for Sick Children (SickKids) that restructures and standardizes discharge preparation and processes internally, while facilitating timely transition to Holland Bloorview Kids Rehabilitation Hospital (HBKRH) for teaching, training and discharge planning. Our goal was to optimize transition efficiency, maximize family engagement, optimize patient safety and ensure community capacity building.

Methods: Pathway development was informed by 1) patient debriefs conducted with healthcare providers at SickKids and HBKRH regarding patients that had previously been discharged home, 2) our teams experience in the field and 3) the results of similar quality improvement initiatives in Colorado, USA and London, England. Using process mapping, the LTV discharge pathway was designed over one year with input from multiple departments/ divisions across our institution as well as HBKRH. A patient and family friendly version of the pathway was also created and inspired by our institution's tenants of family centered care.

Outcomes: The LTV discharge pathway has provided a patient and family centered framework for inter-professional operationalization of responsibilities. It has helped to bridge system gaps by connecting the healthcare system across the entire care trajectory from initiation of LTV decision making to transition to HBKRH and discharge home.

Conclusions: To our knowledge, this innovative paediatric pathway is the first of its kind in Canada for children using LTV that sets forth standardized discharge pathway criteria and expectations with graduating levels of caregiver responsibilities. In addition, it is believed to be the first pathway internationally that includes a pediatric rehabilitation hospital as a critical transition point, thereby facilitating the rehabilitation or habilitation needs of these patients and families en route to home.

Free communication 38 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 Poster 38

HEALTH TECH JUNIOR COURSE: DEVELOPING A COMPETENCY-BASED EDUCATION PROGRAM FOR COMMUNITY CAREGIVERS OF CHILDREN REQUIRING MEDICAL TECHNOLOGY

Faiza Syed BHSc, RRT [1], Stephanie Chu RN, BScN, MN [1,2], Joanna Polyviou MN, NP [1,2], Karen Breen-Reid RN, MN [1,2], Sara McEwan [1], Christine Le HBSc, RRT [1], Jennifer Withers BKin, RRT [1], Christine Clark RN, MHSc [1,2], Kate Langrish RN, MN [1,2], Julia Orkin MD, MSc [1,2], Christina Sperling RRT, BKin, MScCH [1], Bonnie Fleming-Carroll RN (EC), BSc [1,2], MN, Reshma Amin MD, MSc [1,2]

[1] *Hospital for Sick Children, Toronto, Canada*
[2] *University of Toronto, Toronto, Canada*

Background: Competent caregivers are essential to care for the unique needs of children receiving long-term mechanical ventilation (LTV) at home, where even short delays in recognition and response to emergency situations can have deleterious or fatal consequences. Significant gaps in the knowledge, skills and judgement required to care for children using medical technologies have been documented among homecare nurses. To date, home care nurse training in Ontario, Canada lacks standardization and competencies are inconsistently assessed. In addition, there is a limited cohort of paediatric LTV trained home care nurses due to the high turnover in the home care sector. Therefore, a competency based education program for home care nurses caring for children using LTV at home was developed in October 2016 at our Canadian paediatric tertiary institution to address this identified care gap. Our study aim was to evaluate the competency based education program from the perspective of the home care nurse participants.

Methods: The competency based education program offers 2 modules for home care nurses of children using LTV. Module 1 focuses on tracheostomy care and Module 2 focuses on invasive and noninviasve ventilation. The course includes didactic teaching integrated with hands-on session and medium and high-fidelity simulation. Course participants completed an anonymous course evaluation at the end of each of the 1 day course modules of tracheostomy care and/or ventilation. Participants were asked if the course met nine specific content areas and 5 specific learning activities based on a 5 point Likert scale. The Likert Scale options included strongly disagree, disagree, neutral, agree and strongly agree. All participants were also asked if they would recommend the course to a colleague.

Results: To date, 120 community home care nurses have attended the tracheostomy and/or ventilation 1 day course modules between October 2016 and November 2017. Course evaluation results show that 114/120 (95%) of study participants either 'agreed' or 'strongly agreed' that the course met the learning outcomes in each of the 9 content areas and 5 specific learning activities. 100% of participants responded that learning activities were relevant and effective and would recommend this course to a colleague.

Conclusions: With the development and implementation of the competency based training course for home care nurses, community capacity is being built to care for children using LTV at home. Based on course evaluation results, home care nurses feel that their learning needs are being met. Next steps include a formal, prospective randomized controlled trial to evaluate the short and long-term acquisition of knowledge and skills from attending the competency based training course.

Free communication 39 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 Poster 39

IS THERE AN UPPER THRESHOLD OF EFFICACY OF INCREASED MI-E SETTINGS ON PEAK EXPIRATORY FLOW IN A PEDIATRIC LUNG MODEL?

Hov, Brit$_1$, Andersen, Tiina$_2$, Toussaint Michel$_3$, Fondenes, Ove$_2$, Hovland Vegard$_1$.

$_1$ *Department of Paediatric Medicine, Oslo University Hospital HF, Oslo, Norway.*
$_2$ *Norwegian National Advisory Unit on Long term Mechanical Ventilation, Haukeland University Hospital, Bergen, Norway.*
$_3$ *Centre for Neuromuscular Disorders and Home Mechanical, UZ Brussel-Inkendaal, Vlezenbeek, Belgium.*

Background: Mechanical insufflation- exsufflation (MI-E) is used to augment cough in young children with neuromuscular disorders (NMD), but evidence and guidelines in optimal settings in infants are lacking. Current use may seem derived from an adult approach, even if young children have faster respiratory rate, smaller lung volumes, and altered compliance and airway resistance compared to older children and adults.

Aim: Our main aim was to explore how different MI-E settings affect the maximal expiratory airflow (MEF) in a lung pediatric model simulating a 1 year old child with NMD. Secondly, we wanted to assess if there are upper limits of efficacy where higher MI-E pressures and longer times do not result in increased MEF.

Method: A wide range of settings was tested using a Cough Assist E70 on a high-fidelity simulator (ASL-5000) simulating a one year old child with NMD. Every simulation was run for 20 sec allowing at least five MI-E cycles for every setting. The mean value of the 5 highest flows was used for calculation. A step-wise protocol with independent, incremental changes of Insufflation time (Ti), Exsufflation time (Te), Insufflation pressure (Pi) and Exsufflation pressure (Pe) was made in the mentioned order. One unit change for the time settings was 0,5 sec and 5 cm and 10 cm H2O was used for the Pi and Pe, respectively.
The pause was set at 0,5 sec and medium insufflation flow was used in all simulations.

The range (min-max) of the settings tested were Ti 0,5-2,0 sec, Te 0,5-1,0 sec, Pi 15-50 cmH2O and Pe -20- -50 cmH2O.

Results: All settings with insufflation time above 0,5 sec had a threshold where increased (more positive Pi and negative Pe) pressures did not increase MEF. The effect of increased Ti on the MEF were more important with low pressures, but declined with Ti above 1,5 sec. Increasing the Te from 0,5 to 1,0 sec did not affect the MEF.

When Ti was > 1 sec, 80 % of the maximal measured MEF was achieved with a Pi as low as 20 cmH2O if the Pe was -30 cmH2O or more negative.

Conclusion: There are upper limits of efficacy of increased MI-E settings on peak expiratory flow in a pediatric lung model. Further clinical studies are required before implementing these findings in the titration of MI-E in children with NMDs.

Free communication 40 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 Poster 40

FIO2 OF VARIOUS HOME VENTILATORS IN CHILDREN

Yoichi Kondo (1), Keisuke Isobe (2)

(1) Aozora Clinic Sumida, physician
(2) National Center for Child Heath and Development Tokyo, medical engineer:

Introduction: FiO2 of home ventilators was reported in a bench study using a test lung (1). However, in children, air leaks are present around the tracheal tube and, as recently passive circuits using expiratory ports became popular, real FiO2 became lower than in the bench study.

Method 1: We measured FiO2 at bedside using a portable oxygen analyzer (Newport Handi®+) when we visited the patient at home. Oxygen was administered 3 L/min by a home oxygen concentrator. Ventilator setting was not changed.

Result 1:

	FiO2(%)±SD	PIP	PEEP	BW kg±SD
BiPAP A40	30±2.5 (N=8)	12.1	6.1	13.8±10.6
Trilogy(passive)	34±3 (N=55)	16.3	5.5	15.3±10.1
Legendair	39±2.2 (N=4)	17.2	4.4	17.6±12.9
Monnal T50	44±6.5 (N=4)	15.5	5.5	8.8±2.6
Origin Puppy X	56±9.4 (N=9)	18.2	4.9	16.4±7.9

Method 2: To exclude impact of minute ventilation and air leakage, we conducted a bench study using a test lung. Tidal volume is 200ml and RR is 20/min.

Result 2:

Oxygen flow	1L	2L	3L	5L	10L
Trilogy（passive）	24	27	30	38	57
Trilogy（active）	24	31	33	42	63
Legendair	24	27	30	38	64
Monnal T50	28	31	36	46	74
Origin Puppy X	31	43	56	77	97
Resmed Astral	35	45	63	83	96

Discussion: Cause of low FiO2 in Trilogy seems due to large constant flow through passive cuircuit. FiO2 is highest in Origin Puppy X and Resmed Astral. Both ventilators have unique oxygen usage system.

Conclusion: There is a large difference in FiO2 between various home ventilators. We recommend routine measurement of FiO2.

Reference: (1) L Baboil. Efficiency of ventilators for intermediate care to deliver adequate FI02. a bench study

Free communication 41 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 Poster 41

SURVIVAL IN ALS PATIENTS ON NON INVASIVE VENTILATION

Marinou K.[1], Sideri R.[1], De Maria B.[1, 2], Garavaglia A.[1], Mora G.[1].

[1] *Neurological Rehabilitation Unit, IRCCS ICS Maugeri Milano, Milan Italy.*
[2] *Department of Electronics Information and Bioengineering, Politecnico of Milan, Milan Italy.*

Background: Non-invasive ventilation (NIV) improves survival and quality of life in amyotrophic lateral sclerosis (ALS) patients. There are few data on factors influencing survival in ALS patients on NIV, particularly those with bulbar involvement.

Aim: We studied the factors related to survival in ALS patients treated with NIV.

Methods: We conducted a retrospective study including patients diagnosed with ALS, evaluated in a tertiary ALS clinic over a 10-year period. All patients were treated with NIV. Demographic data, site of symptom onset, ALSFRS-R, ALSFRS-R bulbar subscore, respiratory measurements at NIV initiation were analyzed. We determined survival from disease onset and initiation of NIV, factors predicting survival. Statistical analysis methods included Kaplan-Meier and linear regression analysis.

Results: A total of 405 patients (220 males) 308 with spinal onset, 97 with bulbar onset where included in the analysis. The average age was 62.18 ± 10.7 years at disease onset, 64.5 ±10.33 years at NIV initiation. All patients were treated with NIV according to current consensus practice guidelines. NIV was well tolerated among patients with all phenotypes and was used for at least 6 hours during sleep. Median survival from the disease onset was 45 months. Survival was significantly longer in patients with spinal onset than in bulbar onset (47.7 vs 36.5 months, $p < 0.001$). There was no difference in survival between males and females. There was a significant inverse correlation of survival with age ($r = -0.21$, $p = 1.01 \times 10^{-6}$) but not with ALSFRS-R and ALSFRS-R bulbar subscore. Median survival from NIV initiation was 16.2 months. There was a better survival in spinal onset patients, in comparison with bulbar onset (24.1 vs 14.5 months, $p < 0.05$). No correlation was found between survival, ALSFRS-R and ALSFRS-R bulbar subscore. Survival inversely correlated with age ($r = -0.193$, $p = 9.07 \times 10^{-5}$).

Conclusions: Our data confirm previous observations that older age and bulbar onset are negative prognostic factors for ALS patients treated with NIV. NIV is well tolerated regardless site of onset and should be offered to all ALS patients.

Free communication 42 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 Poster 42

UK BASED TRACHEOSTOMY VENTILATION IN MOTOR NEURONE DISEASE: A MULTI-CENTRE REVIEW

Palmer, J. (1), Armstrong, A. (2), Kathiresan, B. (1), Latham, M. (3), Moses, R. (4),

1. Plymouth Hospitals NHS Trust, UK.
2. Newcastle upon Tyne Hospitals NHS Foundation Trust, UK.
3. St James's University Hospital, Leeds, UK.
4. Royal Preston Hospital, Preston, UK.

Background: Little data exists regarding use of tracheostomy ventilation (TV) in patients with motor neurone disease (PwMND). In the UK NICE 2016 MND guidance, does not provide guidance for use of TV. Some UK centres offer TV as a treatment option. Data suggest TV in PwMND can prolong life and is more readily accepted by young males. It is hypothesised that starting TV in PwMND is intrusive to quality of life and leads to unacceptably, long hospital stays.

Methods: 4 UK HMV centres obtained data by retrospective case-note review of patients set-up on TV as a consequence of MND between January 1998 and December 2016.

Results: 38 patients (26 male) were included. Average age at tracheostomy was 59.3 (range 26-78). 79% (n=30) of patients had emergency tracheostomy v 21% elective. 76% (n=23) of emergencies were related to acute illness requiring intubation. 65% had tracheostomy within 2 years of diagnosis of MND. 75% (n=6) of those who elected for TV wanted to live as long as possible or were struggling with continuous use of non-invasive interfaces, all of these lived with a partner or parent. 41% were managed on respiratory wards for the majority of the inpatient stay. After commencing TV, mean length of stay was 7 weeks for those admitted electively v 18 weeks as an emergency. Elective patients were medically fit for discharge after 14 days v 52 days for emergencies. 2 patients died in hospital, 1 asked for withdrawal. 71% were discharged to their own home. Majority of home care was undertaken by skilled carers (22 hrs/day) rather than Registered Professional (1.8 hrs/day). 3 patients were weaned, 1 successfully. Mean length of life post TV was 3.7 years (range 0-15yrs), with longer life expectancy in the elective group (5.1 years). 52% of patients died during the timeframe. 45% of deaths were unexpected the rest expected or planned withdrawal.

Conclusion: TV in PwMND could be associated with increased length of life. In keeping with published data there appears to be a high incidence of unexpected death. PwMND and TV tend to be discharged to their own home with skilled carers. Length of hospital stay for planned admission is not long as is anecdotally suggested although there is a significant delay in discharge once patients are medically fit.

Further work, including detailed nationwide audit, national ventilation registry and national guidance may be helpful.

Free communication 43 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 Poster 43

TRACHEOTOMISED HOME MECHANICAL VENTILATION (HMV): 10-YEAR MORTALITY DATA

Mike Mackie[1], Gurpreet Beghal[2], Michelle Ramsay[1,2], Eui-Sik Suh[1,2], Georgios Kaltsakas[1,2], Hina Pattani[1], Phil Marino[1,2], Patrick Murphy[1,2], Nicholas Hart[1,2], Joerg Steier[1,2]

[1]Lane Fox Respiratory Unit, Guy's & St Thomas' NHS Foundation Trust, London, UK.
[2]Faculty of Life Sciences and Medicine, King's College London, UK.

Introduction: Patients who fail to wean from invasive ventilation become dependent on long-term invasive mechanical ventilation to control chronic hypercapnic respiratory failure (HRF). We present the 10-year mortality data based on the underlying condition for the Lane-Fox Respiratory Unit (LFRU), one of the largest tertiary referral centres for weaning in the UK.

Patients & Methods: Mortality data were collected from the LFRU over a decade. Patients were grouped into neuromuscular disease/chest wall disease (NMD/CWD), obstructive airway disease (OAD), obesity related respiratory failure and other (ORRF and Other). Parameters recorded included age, gender, diagnosis, treatment compliance and period. Data are presented as standard deviation (SD), the 50% survival time is presented as median (interquartile range, IQR) and non-compliance is defined as zero usage.

Results: In total, 127 deaths were recorded. Mortality was grouped according to diagnosis (table 1), all groups had similar survival times (figure 1). All groups had a similar age (p=0.15), there were more males in NMD/CWD group, more females in OAD group and a balanced gender ratio in ORRF and Other group. There was no significant difference in the compliance between the groups (p=0.21). There was no difference in survival time between the groups (p=0.06). The blood gases in ORRF and Other group indicated a more significant hypoxia (p<0.05). 3.9% of patients were non-compliant with treatment (n=2 NMD/CWD, n=1 OAD, n=0 ORRF and n=2 Other).

Diagnostic Group	Age (years)	Male/ Female	Compliance (hours)	50% Survival (years)	Last arterial blood gas analysis recorded prior to death		
					pH	PaO_2 (kPa)	$PaCO_2$ (kPa)
NMD/CWD (n=84)	62.1 (15.2)	52/32	23.2 (2.8)	1.8 (0.3-4.2)	7.43 (0.06)	10.2 (2.5)	6.0 (1.5)
OAD (n=9)	65.3 (10.4)	3/6	22.5 (4.2)	2.9 (1.2-3.9)	7.40 (0.03)	9.0 (2.2)	7.0 (1.2)
ORRF and Other (n=33)	59.2 (15.5)	18/15	24.0 (0.0)	0.9 (0.3-2.9)	7.45 (0.08)	7.8 (1.6)	7.0 (2.8)

Table 1: Characteristics of the different diagnostic groups. Other = post-surgical, Prader-Willi syndrome, acute lung injury, cystic fibrosis.

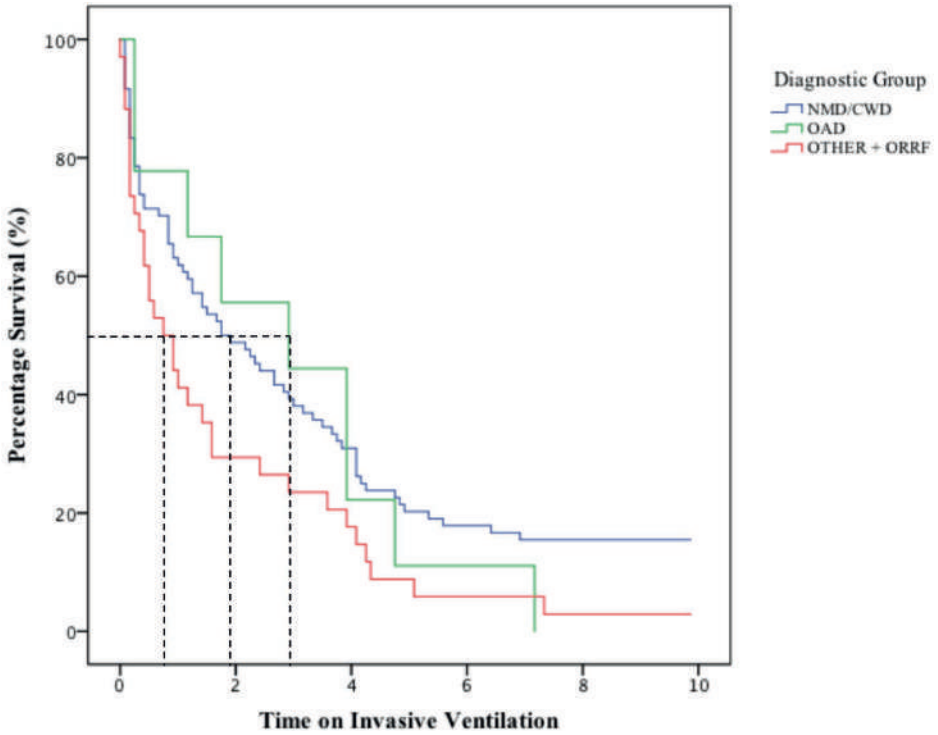


Figure 1: Mortality following initiation of invasive HMV

Conclusion: Survival time of invasively ventilated patients following discharge from hospital remains limited, after 5-years less than 20% of the entire cohort were alive. All patients with OAD died within a period of 7-8 years and patients with associated hypoxia had a high likelihood of long-term mortality. Mortality in long-term invasive HMV reflects the complexity of the care and needs of intensive care survivors in the community.

Free communication 44 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 Poster 44

A NURSE LED PATHWAY FOR RESPIRATORY CARE IN PATIENTS WITH MOTOR NEURONE DISEASE

Palmer, J.

Plymouth Hospitals NHS Trust, UK.

Background: There is an ever-increasing number of patients with chronic disease accessing health care services. In the UK the NHS is under severe operational and financial pressure. Some organisations need to save 10% of their total budget as part of the current NHS financial improvement plans.

Nearly all patients with Motor Neurone Disease (MND) die from a respiratory cause. NIV improves survival in patients with non-bulbar MND. It's not surprising therefore that in the NICE 2016 MND summary guidance the word respiratory is used 97 times with 383 uses in the full guidance. The term 'respiratory physician' however is only used twice in the full guidance and not at all in the summary guidance. The guidance states "The GDG considered it essential that the core MDT have the expertise to regularly assess respiratory function and that this did not require a respiratory physician."

For the past decade Plymouth Hospitals NHS Trust has employed a nurse led respiratory service for patients with MND. Patients are referred to a consultant nurse on, or soon after diagnosis. Patients rarely see a respiratory physician but follow a nurse led pathway from diagnosis through to death including withdrawal. In line with NICE 2016 Guidance whilst on the pathway, patients are reviewed with respiratory muscle testing every 3 months, with more frequent interactions as required.

The service was audited in summer of 2017.

Method: A retrospective audit of the home ventilation database was performed in the summer of 2017.

Results: 200 patients with MND had been set up on long term ventilation (LTV) for MND since April 2004. 170 patients with MND were referred to the pathway from April 2013. 35% (58) of these had a trial of NIV, 75% went on to continue and comply with LTV in the long term. 6 of these went onto use tracheostomy ventilation at home. There were no recorded incidents related to the respiratory management of patients with MND within Plymouth Hospitals NHS Trust from April 2013.

Discussion: A nurse led pathway for MND has a number of benefits for patients, staff and the organisation. For the patient and family, there is excellent continuity from diagnosis to death. The pathway is rapid and access to diagnostics and treatment options unimpeded by internal referrals; many patients are reviewed, have sleep study and set up on LTV within 48 hours of being seen. For some NIV set-up takes place during the consultation. For the organisation, less expensive nursing time is employed during less appointments, with physician time being released to deal with more complex respiratory patients.

Free communication 45 - Saturday, March 17th from 12h15 to 13h45 - Rhône 2 Poster 45

AUGMENTING EXERCISE CAPACITY WITH NON-INVASIVE VENTILATION DURING WHOLE-BODY FUNCTIONAL ELECTRICAL STIMULATION ROWING IN AN INDIVIDUAL WITH C5 SPINAL CORD INJURY

Isabelle Vivodtzev, Morgan W. James & J. Andrew Taylor

Cardiovascular research Laboratory, Physical Medicine & Rehabilitation department, Harvard Medical School, Spaulding Rehabilitation Hospital, Cambridge, MA, USA

High level spinal cord injury (SCI) results in profound limitations to respiratory function leading to lower exercise capacity. Therefore, when adding functional electrical stimulation (FES) of the paralyzed legs to produce higher exercise capacity (hybrid FES exercise), peak ventilation may be a key limitation to aerobic capacity. Based on prior research on individuals with respiratory restriction, we hypothesized that non-invasive ventilation (NIV) would improve the increases in aerobic capacity with FES-row training in individuals with high-level SCI. Our assumption was that the systemic adaptations to hybrid FES

exercise training are delimited by the maximal ventilation that can be achieved. Herein we present a case showing a marked increase in aerobic capacity through a first and unique session of exercise with NIV that exemplifies the important determinant role of maximal ventilation for aerobic capacity during whole body hybrid FES exercise in those with high level injuries.

An 18-year-old male with C5 SCI (FVC = 4.01 L, 75% of predicted and FEV_1 = 3.80 L, 82% of predicted) performed arms-only row training for 6 months prior to whole body FES-row training for 18 months. Peak minute ventilation (VEpeak) and peak aerobic capacity (VO_2peak) increased with arms only training (+14%), then increased with the addition of the paralyzed legs with hybrid FES rowing (+37%), and then increased with 6 months of hybrid FES row training (+8%). Thereafter, despite long term (+12 months), intense (> 80% max heart rate), frequent (>2x weekly) and whole body (FES) exercise training, neither VO2peak nor VEpeak increased further (1.94 L/min and 66.0 L/min). Thus, it appeared that aerobic capacity increased up to ventilatory capacity. However, a single session of whole body FES-rowing with the addition of NIV (inspiratory/expiratory pressure = 23/5 cmH_2O; increase in peak minute ventilation to 71 L/min) increased VO2peak by 12% (2.23 L/min with NIV vs. 1.99 L/min with sham NIV).

This case demonstrates that non-invasive ventilation can overcome limitations to ventilation in high level SCI and improve aerobic capacity during whole-body hybrid exercise to a level never achievable before. In addition, it broadly illustrates the intimate role of pulmonary function in determining the capacity to perform exercise.

Free communication 27 bis - Friday, March 16th from 16h to 17h30 - Rhône 1 **Poster 27 bis**

HOW IS HOME NIV USED TODAY IN FRANCE?

JM Arnal[1], S Toche[2], V Halter[2], A Garnero[1]

1: Unité de ventilation à domicile, Hôpital Sainte Musse, Toulon, France
2: Homeperf, Aix en Provence, France

Objectives: This retrospective study assessed patients' characteristics, ventilator settings, and daily use of NIV at home.

Method: Anonymous database of a home care provider servicing the french territory was analyzed. All patients treated with home NIV from 2012 to 2018 were included. Ventilator settings, daily use, and obstruction index were averaged over a 3 months period using the ventilator built in software at the last visit at home. Subgroup analysis was performed for chronic obstructive failure (Obs), obesity hypoventilation syndrome (OHS), chronic restrictive failure (Res), and overlap syndrome (Association of COPD and OSA: Ov).

Results: 309 patients were included.

	All patients	Obs	OHS	Res	Ov	Anova
n	309	109	84	38	27	
Age (year)	69 (59-79)	74 (65-80)	69 (57-77)	64 (47-77)	69 (58-76)	0.002
Sex ratio (M%/F%)	50 / 50	52 / 48	43 / 57	66 / 34	41 / 59	
Body Mass Index (Kg/m^2)	32 (25-39)	26 (23-33)	37 (32-45)	25 (22-32)	40 (32-43)	< 0.001
Duration of home NIV (month)	9 (2-25)	11 (3-27)	13 (3-35)	9 (1-19)	17 (7-35)	0.192

Table 1: Characteristic of the patients.

Ventilator used were level 1 (no battery), level 2 (short term battery), and level 3 (life support) in 67%, 28%, and 5% of cases, respectively. ST mode was used in 90% of patients with an intentional leak circuit in 98% of patients.

	All patients	Obs	OHS	Res	Ov	Anova
n	309	109	84	38	27	
EPAP (cmH2O)	6 (5-7)	5 (4-6)	7 (5-8)	5 (4-6)	6 (5-8)	<0.001
IPAP (cmH2O)	16 (14-20)	16 (14-18)	16 (14-18)	15 (10-19)	17 (15-20)	0.142
Pressure support (cmH2O)	10 (8-12)	10 (8-12)	9 (8-12)	10 (6-13)	12 (9-14)	0.197
Back-up RR (b/min)	13 (12-15)	12 (12-15)	14 (12-15)	13 (10-16)	14 (12-15)	0.648
Inspiratory trigger	3 (3-3)	3 (3-3)	3 (3-4)	3 (2-4)	3 (3-4)	0.349
Expiratory trigger (%)	37 (20-70)	70 (25-80)	2 5 (18-44)	10 (10- 55)	NA	0.095
Pressure rise time (ms)	250 (150-300)	200 (150-300)	250 (175-325)	200 (150-300)	250 (162-375)	0.585
Minimum Ti (s)	0,4	0,3	0,6	0,4	0,6	0.002
	(0,3-0,7)	(0,3-0,6)	(0,3-0,8)	(0,3-0,8)	(0,3-0,8)	
Maximum Ti (s)	1.5 (1.4-1.5)	1.5 (1.3-1.5)	1.5 (1.5-1.6)	1.5 (1.3-1.5)	1.4 (1.3-1.5)	0.100
Daily use (h)	6 (3-8)	7 (4-9)	6 (2-8)	7 (2-10)	5 (3-8)	0.385
Patients with daily use < 3h/d (%)	21%	13%	27%	26%	15%	
Obstruction index (n/h)	2 (0-6)	2 (1-6)	2 (1-6)	2 (0-8)	2 (1-3)	0.842

Table 2: Ventilator settings and daily use.

Discussion: The lack of information about the interface and unintentional leaks is the main limitation of this study. High intensity PS is not commonly used in obstructive diseases. Inspiratory trigger setting is often kept on factory default setting. Insufficient daily use is too high, especially in OHS.

Conclusions: Obstructive chronic failure and OHS are the most common cause of home NIV prescription. There is a homogeneity in the mode and ventilator circuit selected. Apart from EPAP, all ventilator settings selected are the same whatever the lung condition.

JIVD

ERCA

ABSTRACTS BOOK

POSTERS

Poster 46

NEUROMUSCULAR PATHOLOGIES CHARACTERIZATION IN PNEUMOLOGY

Aguiar F[1], Pacheco C[1], Vieira AL[1], Lages J[1], Araújo MJ[1], Pereira R[1], Cunha J[1]

[1] *Pneumology Department, Hospital de Braga, Portugal*

Introduction: The natural history of a wide range of neuromuscular (NM) diseases involves respiratory insufficiency. Deterioration of respiratory function occurs insidiously and is often responsible for mortality. Respiratory involvement is variable according to each NM disorder, not only for distribution of symptoms and their severity but also for age and previous functional status.

Objective: Clinical characterization of population with NM disease followed in the pneumology outpatient clinic.

Methods: Retrospective analysis of clinical data from patients followed in the Neuromuscular Respiratory Insufficiency clinic of a Central Hospital from September 2016 to December 2017.

Results: 92 patients were considered. Their median age was 58,0 years. 41.8% (n=38) patients were diagnosed with a motor neuron disorder, most commonly Amyotrophic lateral sclerosis (ALS) (65.8% n=25). 22.4% (n=22) had a diagnosis of muscle and neuromuscular junction disorder, that included the muscular dystrophies (54.5% n=12) (Becker muscular dystrophy, myotonic dystrophy, limb-girdle dystrophy and fascioscapular-humeral dystrophy), metabolic myopathy of Pompe Disease (18.2% n=4) and other Myopathies (18.2% n=4). There was also a small number of Neurodegenerative diseases (9.9% n=9), Nerve Root and Peripheral Nerve Disorders (3.3% n=3) and Hereditary ataxias (2.2% n=2). Patients suffering from spinal cord injury (6.6% n=6), severe kyphoscoliosis (5.5% n=5) and cerebral palsy (2.2% n=2) were also followed in this clinic.
The median Forced Vital Capacity was 70%, and median Peak Cough Flow was 300 L/min.
Considering the whole population, 56.5% (n=52) were treated with bi-level ventilation. 28.8% (n= 15) of those performed mechanical ventilation for more than 16 hours a day. 8.7% (n=8) patients were treated with nocturnal positive pressure ventilation. The other 34.8% (n=32) were not treated with ventilation until the last follow up. Of those, 21.8% (n=7) refused being treated.
51.1% (n=47) of patients met criteria for Mechanical Insufflation-Exsufflation treatment. One patient was tracheostomized.
The mortality rate during follow up was 10,9% (n=10). The majority of deaths (60% n=6) were non-supervised, at home. Pneumonia caused 20% (n=2) of deaths, and respiratory arrest caused the other 20% (n=2), either due to food or respiratory secretion plug. Half (n=5) of patients that died had diagnose of ALS. The dead patients were 9.1 years older than the rest but without statistical significance (p=0.193)

Conclusion: This retrospective study showed a heterogeneous group of NM disorders with respiratory repercussion.
The patients with NM pathologies are at permanent risk for ventilation-related complications, as well as, cough impairment and aspiration. 60% of deaths in this study were non-supervised at home.

Poster 47

NON INVASIVE VENTILATION IN PATIENTS AFFECTED BY ALS WITH NASAL PILLOWS

Giulia Rovere, Elena Rindone, Luana Focaraccio, Renza Ambrosanio, Elisa Clivati, Sabrina Marchisio,Tabbia Giuseppe, Alessio Mattei.

Pulmonary Division, Ospedale S. Giovanni Battisa, Torino. Italy

Introduction: Amiotrophic Lateral Sclerosis (ASL) Patients affected by ALS highly dependent on ventilation need to change ventilation masks to prevent decubitus lesions that can occur during non invasive ventilation, particularly in patients using double profile of ventilation. Often in the literature, the interface proposed for high dependency NIV is a mouth piece with volumetric ventilation.
However, in our respiratory division, we have frequently found difficulties using this method of ventilation caused by the low autonomy of these patients and facial muscles fatigue (messeters and buccinator muscles).

Patients and Methods: Instead of the mouth piece ventilation method we tested another diurnal ventilation profile using nasal pillows mask.
We considered 19 high NIV dependency ALS patients with spinal onset symptoms with a good adherence to the method proposed.
79% of patiens analysed started NIV because of diurnal hypercapnia, 5.3% for initial OSAS but susbsequent NIV dependency, 15.7% because of symptoms like dyspnea or orthopnea. We proposed this mode of ventilation due to the high dependence on ventilation during the day and dyspnea at rest with use of the respiratory accessory musculature. The average time from the beginning of nocturnal NIV to noctural and daily NIV was 3.5 months. The ventilation setting is pressure assisted-controlled mode (ACPV) with respiratory rate little lower than neural respiratory pattern and as low as possible Positive End Expiratory Pressure (PEEP) (depending by the ventilator model used) (depending by the ventilator model used). The pressure support was decided according to patients' needs. During the ambulatory ventilation sessions we already noticed a reduction of patients' dyspnea and the decreased use of respiratory accessory musculature. This method has been proposed as needed ventilation or as diurnal ventilation in patients with high ventilatory dependence, with good compliance to improve QoL and give the possibility to perform usual activities such as speaking, eating and allow social exchanges.

Conclusion: In our experience diurnal NIV with nasal pillows masks is a valid alternative to mouth piece ventilation in patients affected by ALS who are highly dipendent on NIV.

Poster 48

COMPARISON OF SELF-REPORT DIARY AND DATA LOGGER FOR RECORDING LUNG VOLUME RECRUITMENT SESSIONS IN PEOPLE WITH NEUROMUSCULAR DISEASE

Naughton P,[1,2] Sheers N,[1,3,4] Ruehland W,[1,3] Rochford PD,[1,3] Howard ME,[1,3,4] Berlowitz DJ.[1,2,3,4]

- *Institute for Breathing and Sleep, Heidelberg, Victoria, Australia*
- *Department of Physiotherapy, Austin Health, Heidelberg, Victoria, Australia*
- *Department of Respiratory and Sleep Medicine, Austin Health, Heidelberg, Victoria, Australia*
- *The University of Melbourne, Parkville, Victoria, Australia*

Background and Aim: Lung volume recruitment (LVR) is used by people with neuromuscular disease to augment cough and lung capacity. To assess the efficacy of performing regular LVR, a robust measure of adherence is required. This study aimed to determine concordance between self-report LVR use and LVR use recorded on a purpose-built data logger.

Methods: Adherence data from participants enrolled in the intervention arm of a randomised controlled trial were analysed. Study inclusion criterion was neuromuscular disease greater than 3 months diagnosis with respiratory system involvement, defined as forced vital capacity less than 80% predicted. Participants reported the number of therapy sessions performed per day in a study diary and activated a data logger (Omega® OM-CP-State101A data logger) fitted to their LVR circuit (Mercury Medical®). Percent agreement and Cohen's kappa coefficient for pairs of participant adherence data per day (reported diary sessions and data logger record) were determined over 60 study days.

Results: Data from 16 participants (960 participant study days) were analysed. A total of 933 sessions were reported in diaries and 880 recorded on the data logger. One diary and one data logger were lost. Two data loggers malfunctioned. Paired data were available for 853 participant study days.

Table 1: Summary of paired data sets

		Diary					*Total*
		0	1	2	3	4	
Data Logger	0	138 (16.2%)	36	35	1	0	210
	1	12	80 (9.4%)	74	1	1	168
	2	5	11	433 (50.8%)	9	0	458
	3	1	1	12	2 (0.2%)	0	16
	4	0	0	1	0	0 (0%)	1
Total		156	128	555	13	1	853

There was substantial agreement (77%) between the number of sessions reported in diaries and recorded on the data logger (Cohen's K = 0.66, p<0.0005). Disagreement typically favoured more sessions reported in the diary (18%) versus data logger (5%).

Conclusion: Participants demonstrated high concordance between number of self-reported sessions and data logger recordings. There was greater bias towards the diary, suggesting over-estimation of self-reported LVR use or a potential failure to activate the data logger. Absolute agreement or discordance favouring the data logger is likely to represent a true measure of adherence (82% of paired data), as the data logger cannot overestimate activity. However, adherence measured using the data logger could be underestimated when there is discordance in the direction of the diary due to limitations with the technology.

Poster 49

RESPIRATORY FUNCTION, PEAK COUGH FLOW AND HISTORY OF RESPIRATORY TRACT INFECTION IN PEOPLE WITH NEUROMUSCULAR DISEASE

Sheers NL[1,2,3], Howard ME[1,2,3], Rautela L[1,2], Chao C[1,2], Rochford PD[1,2], Nicholls C[2], Berlowitz DJ[1,2,3]

- *Victorian Respiratory Support Service, Austin Health, Heidelberg, Victoria, Australia*
- *Institute for Breathing and Sleep, Heidelberg, Victoria, Australia*
- *The University of Melbourne, Parkville, Victoria, Australia*

Aim: To determine the relationship between vital capacity, peak cough flow and past history of respiratory tract infection in people with neuromuscular disease.

Design: Cross sectional baseline data from a randomised controlled trial.

Method: Participants were recruited from specialised, state-wide, adult respiratory or neuromuscular services. People with neuromuscular disease and respiratory system involvement (forced vital capacity <80% predicted) were referred by clinical staff or identified from routine outpatient clinic attendees. Self-reported history of respiratory tract infection in the preceding 12 months and measurements of respiratory function (vital capacity and unassisted peak cough flow) were made. Descriptive statistics and Pearson's correlations were performed. Independent sample t-tests were used to assess between group (with or without chest infection) differences in pulmonary function.

Results: Preliminary data is presented from 46 participants. Eighty percent of the cohort used non-invasive ventilation at least nocturnally. No person performed regular, prophylactic respiratory physiotherapy. Mean(SD) vital capacity and unassisted peak cough flow were 1.46(0.84) L and 173(55) L/min respectively. There was a moderate correlation between vital capacity and peak cough flow (r=0.68, R^2=0.46, p=0.000). Forty-four participants (96%) had a peak cough flow less than 270 L/min. Twenty-five people (54%) reported no respiratory tract infections in the previous 12 months, 23 of whom had peak cough flows less than 270 L/min. Vital capacity and peak cough flow were lower in those who had experienced an infection compared to those who had not (mean(SD), 1.15(0.76) vs 1.72(0.83) L, p=0.022; 148(41) vs 194(58) L/min, p=0.004).

Discussion: In this cohort of people with neuromuscular disease and severe respiratory impairment, all but two participants had a peak cough flow lower than 270 L/min, the threshold cited in guidelines as necessary for the prevention of respiratory tract infection. Interestingly, over half of the sample had not had an infection in the preceding 12 months. Those that did have a history of infection had lower peak cough flows and vital capacities, consistent with lung capacity and cough being factors. However the large degree of overlap between the groups suggests that neither peak cough flow nor vital capacity alone are likely to be strong predictors of chest infection. This observation should be confirmed in a well-designed, longitudinal study investigating the predictive value of these markers.

Poster 50

INCIDENCE OF CHEST INFECTIONS (CI) IN PATIENTS WITH NEUROMUSCULAR DISEASE (NMD) IN THE FIRST 2 WEEKS AFTER COMMENCEMENT OF NON-INVASIVE VENTILATION (NIV) OR MECHANICAL IN-EXSUFFLATION (MI-E)

Mr Liam Campbell, Specialist Physiotherapist & Dr Ben Messer, Consultant in Home Mechanical Ventilation & Critical Care

Regional Assisted Ventilation Service
Newcastle Upon Tyne Hospitals NHS Foundation Trust.

Rationale: Chest infections are serious complications in NMD requiring mechanical ventilation. Zhang et al (2015) concluded the incidence of nosocomial pneumonia in a respiratory ICU population on NIV was 4 times greater than that of the general hospital population. The longer the length of time NIV is required, the greater the incidence. Chenoweth et al (2007) reviewed the general long term NIV population, with 47% of the patient group experiencing at least 1 episode of ventilator acquired pneumonia in the first 500 days. It is therefore important to inform patients and clinicians of the associated risk and thus devise treatment plans to account for this.

Background: An increasing number of patients with NMD are now being referred for long term NIV as outpatients. Whilst incidence of hospitalisation due to CI is well documented, little is known about incidence in the early stages of intervention in this population, who remain in their home environment supported by oral antibiotics and their caregivers.

Objective: To inform current practice and allow informed consent with regard to the risk of CI following set up of NIV or MI-E.

Methods: Retrospective data were collected on 92 patients referred for NIV or MI-E between 01/11/16 and 01/11/17 with a diagnosis of NMD. 41 patients were excluded due to not commencing treatment or already being dependent on NIV. The records of the remaining 51 patients were reviewed for documented incidence of CI, defined as the requirement for antibiotics to treat a respiratory deterioration, in the first 14 days after commencement of NIV or MI-E.

Results: 52% (27) of all patients commenced on NIV or MI-E had a documented CI requiring antibiotics within the first 14 days of treatment. Those starting MI-E only, were at greater risk than those on NIV only, with CI incidence of 72% for MI-E and 48% for NIV.

Conclusion: CI's in the NMD population are common but can have a significant impact on health outcomes and quality of life. NIV and MI-E are both well-established treatments in this patient population however they may be associated with an increased risk of CI and need for antibiotics following commencement of treatment. There is no indication as to a specific disease group within NMD which shows an increased risk. Further study into the physiological reasons for this increased incidence is required. We recommend patients with NMD commencing NIV or MI-E therapy be counselled about the possible risks of CI following commencement of treatment.

Poster 51

VITAL CAPACITY AND MAXIMAL INSUFFLATION CAPACITY IN PATIENTS WITH AMYOTROPHIC LATERAL SCLEROSIS: PROGNOSIS AND RELATIONSHIP WITH BULBAR FUNCTION

Daniela Rodrigues[1], Tiago Pinto[2,4], Anabela Marinho[2], Filipa Pires[2], Miguel R. Gonçalves[2,3,4].

1- Pulmonology Department, Hospital Pedro Hispano, Portugal; 2- Respiratory Physiopathology and Ventilation Unit, Pulmonology Department, Centro Hospitalar de São João, Portugal; 3- Faculty of Medicine, University of Porto, Portugal; 4- Institute of Research and Innovation in Health, University of Porto, Portugal.

Introduction: Vital Capacity (VC), maximal insufflation capacity (MIC) and bulbar-innervated muscle function are good outcome predictors in Amyotrophic Lateral Sclerosis (ALS). The MIC has been described as a useful tool for lung expansion and augmentation of cough flows.

Objectives: Analysis of VC and MIC progression over time and their relationship with bulbar function, timing and usage of Noninvasive ventilation (NIV), tracheostomy placement and survival.

Methods: Recruitment of ALS patients from a university hospital neuromuscular clinic. Inclusion of patients with VC<2000mL and a minimum of 4 VC measurements through an average of 3 months. Division of patients into 2 groups (Bulbar and Slow Bulbar) according to initial ALS presentation. Analysis of the evolution of VC-MIC difference throughout the 4 evaluation moments and correlation with timing and usage of NIV, tracheostomy placement and survival.

Results: 33 patients (54.5% male) with a median age at diagnosis of 67 (P25-P75: 52-71) years were included. Eighteen patients (54.5%) belonged to the Bulbar Group (BG) and 15 (45.5%) to the Slow Bulbar Group (SBG). NIV was started in average 11 (P25-P75: 3-36) months after diagnosis (7 (P25-P75: 2-12) months in BG and 24 (P25-P75: 7-48) months in SBG, p=0,11). VC decreased over time in both groups. Overall, mean MIC was higher than mean VC in all 4 evaluations (p<0,05). In the subanalysis of each group, the SBG showed significant VC-MIC differences in all but the last evaluation moment (p<0,05); in the BG significant MIC-VC differences were found only in the first evaluation moment (p=0,04). Time under NIV was significantly higher in the SBG (60 (P25-P75: 42-132) vs 24 (P25-P75: 12-30) months, p=0.01). Tracheostomy was performed in 12 patients (36.3%), 75% from BG. Median survival after NIV initiation was 42 (P25-P75: 22-94) months. This survival was higher in the SBG then in the BG (81 (P25-P75: 46-122) vs 22 (P25-P75: 12-39) months respectively, p<0,001).

Conclusion: The MIC-VC difference is a good predictor of bulbar-innervated muscle integrity in ALS. MIC showed a slower decline in time than VC in both BG and SBG. In SBG patients, MIC-VC differences were higher and more durable which reflected on more time on NIV and better survival comparing with BG patients. These results suggest MIC-VC difference may have a role in predicting the total time under NIV, tracheostomy indication and survival in ALS.

Poster 52

ADHERENCE TO LUNG VOLUME RECRUITMENT IN YOUTH WITH DUCHENNE MUSCULAR DYSTROPHY

Katz SL[1,2,3], Blinder H[2,3], Bijelic V[3], Barrowman N[3], Hoey L[3], Momoli F[3,7], Campbell C[4], MacLusky IB[1,2,3], Mah JK[5], McMillan H[2,3], McKim D[2,6,7], on behalf of the STEADFAST Study Group

[1] *Children's Hospital of Eastern Ontario, Department of Pediatrics, Division of Respiratory Medicine, Ottawa, Ontario, Canada*
[2] *University of Ottawa, Faculty of Medicine, Ottawa, Ontario, Canada*
[3] *Children's Hospital of Eastern Ontario Research Institute, Clinical Research Unit, Ottawa, Ontario, Canada*
[4] *Western University, Schulich School of Medicine, Children's Hospital London Health Sciences Centre, Department of Pediatrics, Epidemiology and Clinical Neurologic Sciences Neurology, London, Ontario, Canada*
[5] *Alberta Children's Hospital Research Institute, Department of Pediatrics, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada*
[6] *The Ottawa Hospital, Department of Medicine, Division of Respiratory Medicine*
[7] *The Ottawa Hospital Research Institute, Ottawa, Ontario, Canada*

Background: Lung volume recruitment (LVR) exercises have been shown to reduce the rate of decline of forced vital capacity and to maintain maximum insufflation capacity and peak cough flow in individuals with Duchenne muscular dystrophy (DMD). There are, however, no long-term prospective studies evaluating twice daily use of LVR. As its use poses an additional treatment burden on families, we examined adherence to this therapy over a two-year period.

Methods: A data-logging device was placed on LVR equipment (resuscitation bag and interface with in-line one-way valve) used in a multicenter randomized controlled trial of LVR in youth 6-16 years with DMD. Participants received usual care, or usual care plus twice daily LVR, over a two year period. Adherence rates and patterns were analyzed amongst those randomized to receive LVR. Adherence was defined as use of LVR at least once daily on > 50% of days. Associations between adherence and baseline characteristics were tested using Wilcoxon test for continuous variables and Fisher's exact test for categorical variables. The relationship between LVR adherence and baseline forced vital capacity (FVC) was evaluated using logistic regression.

Results: 34 individuals were randomized to receive LVR and had adherence data, with a median age of 11.4 years (IQR 2.4) and median baseline FVC of 90 % predicted (IQR 79, 98%; range 79-98%). Nine (26%) were wheelchair assisted. Twenty (59%) were found to be adherent. Initial pattern of adherence tended to continue throughout the study period. No statistically significant associations were found between baseline characteristics and adherence.

Conclusions: Youth with DMD are moderately adherent with regular LVR therapy over a two-year period. Analysis of the ongoing trial will determine whether this level of adherence preserves lung function. A data-logger device can monitor frequency of LVR use.

Poster 53

MIND THE GAP: HEALTHCARE PROVIDERS' KNOWLEDGE AND USE OF MECHANICAL INSUFFLATION-EXSUFFLATION THERAPY FOR CHILDREN WITH NEUROMUSCULAR DISEASE FROM TWO CANADIAN INSTITUTIONS

J Chiang MA MD[1,2,3], F Syed BHSC RRT[1,3], J Polyviou RN NP[1], A Almajed MD[1,3], A Alawadi MD[1,3], T Tran RRT[1], R Amin MD Msc[1,3]

1. Division of Respiratory Medicine, Hospital for Sick Children, Toronto, Canada
2. Holland Bloorview Kids Rehabilitation Hospital, Toronto, Canada
3. University of Toronto, Toronto, Canada

Rationale: Mechanical insufflation-exsufflation (MI-E) is a therapy prescribed to improve airway clearance in children with neuromuscular disease at risk of hypoventilation. Although, MI-E therapy has been recommended by experts, the uptake in Canada has been relatively poor.

Methodology: As part of a quality improvement initiative to advance the knowledge and use of MI-E within 2 paediatric institutions located in Toronto, Canada, a questionnaire was administered to key stakeholders including General Paediatric staff and trainees, Respiratory Medicine staff and fellows, Respiratory Therapists and Nurses via REDcap, an electronic data capture tool.

Results: The survey was sent to 429 individuals and 154 responded (36% response rate). One hundred and eighteen respondents (77% with 1 missing respondent) indicated that they had previously cared for a patient using MI-E. Regarding the indications for MI-E, only 38 (25%) and 34 (22%), respectively, correctly identified peak cough flow less than 270 Litres/minute in a child 12 years of age or more and maximal expiratory pressure less than 60 cmH2O as indications for MI-E. Twenty (13%) responded 'did not know' regarding the indication for MI-E therapy. Barriers to MI-E therapy included: patients not bringing their own machine from home (n=49 of 119 respondents to this question; 41%); hospital not having an MI-E machine available for use (n=42; 35%); lack of awareness from the medical team with regards to its use (n=49; 41%); lack of trained of healthcare providers (HCPs) in the administration of MI-E therapy (n=35; 29%); HCPs not available to perform the therapy (36; 30%).

Conclusions: Although the majority of survey respondents reported involvement in the care of children using MI-E, we identified gaps in MI-E knowledge and barriers to its use highlighting the need for both MI-E therapy education as well as a system based process intervention for paediatric HCPs at these two institutions to improve best practice.

Poster 54

ADHERENCE TO LUNG VOLUME RECRUITMENT IN YOUTH WITH DUCHENNE MUSCULAR DYSTROPHY

Katz SL[1,2,3], Blinder H[2,3], Bijelic V[3], Barrowman N[3] Hoey L[3], Momoli F[3,7], Campbell C[4], MacLusky IB[1,2,3], Mah JK[5], McMillan H[2,3], McKim D[2,6,7], on behalf of the STEADFAST Study Group

[1] Children's Hospital of Eastern Ontario, Department of Pediatrics, Division of Respiratory Medicine, Ottawa, Ontario, Canada
[2] University of Ottawa, Faculty of Medicine, Ottawa, Ontario, Canada
[3] Children's Hospital of Eastern Ontario Research Institute, Clinical Research Unit, Ottawa, Ontario, Canada
[4] Western University, Schulich School of Medicine, Children's Hospital London Health Sciences Centre, Department of Pediatrics, Epidemiology and Clinical Neurologic Sciences Neurology, London, Ontario, Canada
[5] Alberta Children's Hospital Research Institute, Department of Pediatrics, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada
[6] The Ottawa Hospital, Department of Medicine, Division of Respiratory Medicine
[7] The Ottawa Hospital Research Institute, Ottawa, Ontario, Canada

Background: Lung volume recruitment (LVR) exercises have been shown to reduce the rate of decline of forced vital capacity and to maintain maximum insufflation capacity and peak cough flow in individuals with Duchenne muscular dystrophy (DMD). There are, however, no long-term prospective studies evaluating twice daily use of LVR. As its use poses an additional treatment burden on families, we examined adherence to this therapy over a two-year period.

Methods: A data-logging device was placed on LVR equipment (resuscitation bag and interface with in-line one-way valve) used in a multicenter randomized controlled trial of LVR in youth 6-16 years with DMD. Participants received usual care, or usual care plus twice daily LVR, over a two year period. Adherence rates and patterns were analyzed amongst those randomized to receive LVR. Adherence was defined as use of LVR at least once daily on > 50% of days. Associations between adherence and baseline characteristics were tested using Wilcoxon test for continuous variables and Fisher's exact test for categorical variables. The relationship between LVR adherence and baseline forced vital capacity (FVC) was evaluated using logistic regression.

Results: 34 individuals were randomized to receive LVR and had adherence data, with a median age of 11.4 years (IQR 2.4) and median baseline FVC of 90 % predicted (IQR 79, 98%; range 79-98%). Nine (26%) were wheelchair assisted. Twenty (59%) were found to be adherent. Initial pattern of adherence tended to continue throughout the study period. No statistically significant associations were found between baseline characteristics and adherence.

Conclusions: Youth with DMD are moderately adherent with regular LVR therapy over a two-year period. Analysis of the ongoing trial will determine whether this level of adherence preserves lung function. A data-logger device can monitor frequency of LVR use.

Poster 55

SURVIVAL IN DUCHENNE MUSCULAR DYSTROPHY WITH NON-INVASIVE VENTILATION IN CHILE

R. Torres-Castro[1,2], R. Vera Uribe[1,2], G. Villarroel[2], G. Moscoso[2], L. Vasconcello[1,2], J. Rosales[1,2], R. Valenzuela[3], P. Pontoni[3], R. Paiva Reinero[3]

[1]Programa Nacional de Ventilación Domiciliaria, Unidad de Respiratorio, Ministerio de Salud (Chile)
[2]Departamento de Kinesiología, Facultad de Medicina, Universidad de Chile - Santiago (Chile)
[3]Unidad de Respiratorio, Ministerio de Salud Chile - Santiago (Chile)

Background: Duchenne muscular dystrophy (DMD) is an inherited x-linked dystrophy that affects one in 3500 male live births. In this patients, the commonest cause of death is respiratory failure. The 90% of patients with DMD who do not use ventilatory support die between 16 and 19 years of age, and uncommonly after age 25. In 2006, in Chile was created a national program of ventilated patients, and were incorporated all patients with DMD.

Introduction: Duchenne muscular dystrophy (DMD) is an inherited x-linked dystrophy that affect one in 3500 male live births. In this patients, the commonest cause of death is respiratory failure. The 90% of patients with DMD who do not use ventilatory support die between 16 and 19 years of age, and uncommonly after age 25. In 2006, in Chile was created a national program of ventilated patients, and were incorporated all patients with DMD. The objective of this report is describe the survival of patients with DMD with non-invasive ventilation in Chile.

Methods: A retrospective study was design. Patients with DMD and non-invasive ventilation during the period 2006-2016 in the national program of ventilated patients were included. We identified all patients with DMD who died by all causes mortality during the period studied.

Results: In the period 2006-2016 was incorporated 140 patients. The mean age was 17.4 ± 4.3 years (range 4.3 – 27.4). Twenty-four patients died. The survival mean was 24.0 years (CI95% 22.9-25.1). The mean age of entry to the program was 13.0 ± 3.4 years and the time of permanence in the program was 4.2 ± 2.9 years. The 100% of patients use bilevel positive airway pressure.

Conclusion: Use of ventilatory support can prolong survival in Chilean patients with DMD.

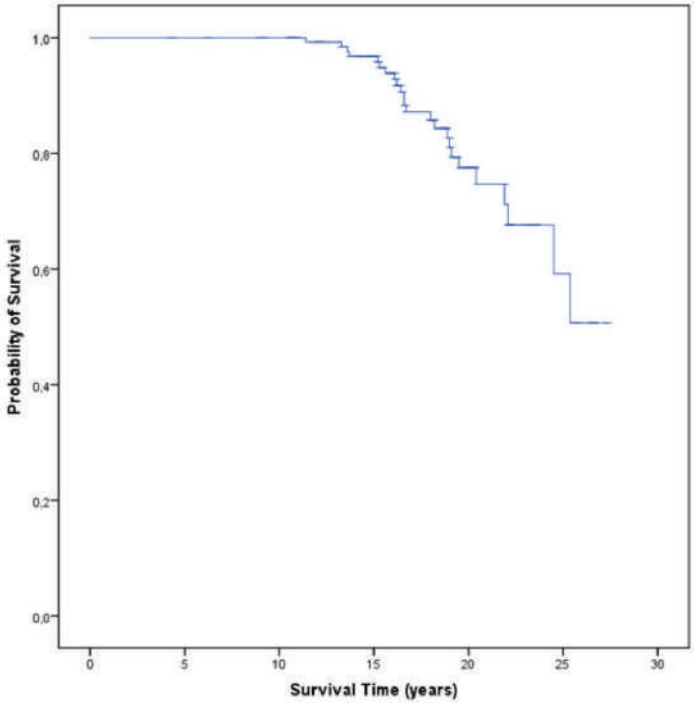


Image 1: Survival of patients diagnosed with Duchenne Muscular Dystrophy belonging to the national program of non-invasive ventilation

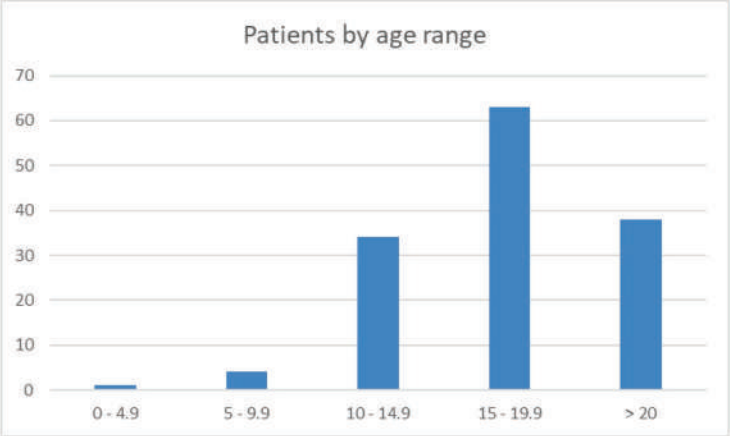


Image 2: Bar graph of age range of patients with Duchenne Muscular Dystrophy incorporated in the national program of non-invasive ventilation

Poster 56

SLEEP-DISORDERS IN NEUROMUSCULAR DISEASE

Filipa Aguiar[1], Cecília Pacheco[1], Ana Luísa Vieira[1], Joana Lages[1], Maria João Araújo[1], Raquel Pereira[1], João Cunha[1]

[1] *Pneumology Department, Hospital de Braga, Portugal*

Introduction: Neuromuscular pathologies can affect sleep in multiple ways. Reduction in lung volumes during supine, upper airway collapse, and diaphragmatic weakness can all contribute to nocturnal hypoventilation, hypopnea, and apnea. These culminate in a worse quality of sleep, quality of life and poorer outcomes. Specific characteristics of neuromuscular disorders, such as pharyngeal neuropathy or weakness, macroglossia, bulbar manifestations, or low lung volumes, predispose these patients to the development of obstructive events.

Objective: Characterization of sleep disorders in patients with neuromuscular pathologies.

Methods: Retrospective analysis of the clinical records from patients followed in the Neuromuscular Respiratory Insufficiency outpatient clinic of a university hospital, submitted to type III sleep test from September 2016 to December 2017.

Results: The clinical data from 57 patients were collected. Their median age was 59,0 years. The most frequent diagnosis were Amyotrophic lateral sclerosis in 29.8% (n=17), Myotonic Dystrophy in 7.0% (n=4), Spinal Cord Injury in 7.0% (n=4), Primary Lateral Sclerosis in 5.2% (n=3), Multiple system atrophy in 5.2% (n=3), severe Kyphoscoliosis in 5.2% (n=3) and Pompe Disease in 5.2% (n=3).
The population median Forced Vital Capacity was 72%, and median Peak Cough Flow was 300 L/min.
Regarding the whole population, 81.0% (n=46) had a sleep disorder. 62.1% (n=36) had an apnea/hypopnea index (AHI) ≥5 without desaturation, while 13.8% (n=8) had an AHI ≥ 5 with desaturation and 5.2% (n=3) were shown to have desaturation. The median apnea/hypopnea index was 21.0 (minimum of 5 and maximum of 71).
80.7% (n=46) of the patients met the criteria for treatment with mechanical ventilation. 11% (n=5) refused to initiate non-invasive ventilation.

Conclusion: These data show the high frequency of sleep disorders in the population with neuromuscular pathologies. The type III sleep test is known for underestimating the results, which represents a limitation of this retrospective study.
The screening of sleep disorders in all neuromuscular patients is a topic of discussion, some consider it futile, others advise it only in the presence of symptons. Based on our results, we consider the use of sleep tests essential in all neuromuscular patients to identify sleep-disordered breathing at an early stage and to determine when to start noninvasive ventilatory support.

Poster 57

EXCESSIVE DAYTIME SLEEPINESS IN MYOTONIC DYSTROPHY TYPE 1 AND ITS ROLE IN NIV DECISION-MAKING PROCESS

Sannicolò G[1], Lizio A[1], Falcier E[1], Conti C[1], Zanolini A[1], Mauro L[1], De Mattia E[1], Proserpio P[2], Amico F[2], Nobili L[2], Rao F[1], Sansone VA[1,3]

[1] *NEuroMuscular Omnicentre (NEMO) – Fondazione Serena Onlus, Milan, Italy*
[2] *Sleep Medicine Center, Niguarda Hospital, Milan, Italy*
[3] *Dept. Biomedical Sciences for Health, University of Milan, Italy*

BACKGROUND: Excessive Daytime Sleepiness (EDS) is among the most frequent complaints in Myotonic Dystrophy type 1 (DM1). Hypothesis about EDS pathogenesis favour a direct brain/brainstem involvement, virtually manageable with psychoactive drugs, but the presence of chronic respiratory failure signs, usually treated with non invasive ventilation (NIV), can play a role in its development.
The NEMO Center is conducting the GUP15004 placebo-controlled, double-blind, randomized clinical trial, investigating efficacy of Modafinil alone or together with NIV in DM1 patients affected by EDS, assessed through Multiple Sleep Latency Test (MSLT).

AIM: To describe respiratory and sleep features of GUP15004 patients with objective EDS, identifying the prevalence of subjects with EDS requiring NIV according to the ENMC criteria[1].

METHODS: Among all the 19 DM1 patients evaluated so far in GUP15004, only patients having EDS (Mean Sleep Latency ≤ 8 at MSLT) were included in this analysis. Respiratory and sleep parameters were investigated.

RESULTS: Table 1 shows demographic and clinical characteristics of our 11 GUP15004 subjects with objective EDS. Only 1 of them (9%) had objective necessity of NIV adaptation.

CONCLUSIONS: Our cohort confirms that EDS is a common feature of DM1 patients with respiratory and sleep evaluations within normal ranges, therefore EDS alone cannot be a criterion for NIV launching in this population.

REFERENCES: [1] Sansone VA, et al. 207th ENMC Workshop on chronic respiratory insufficiency in myotonic dystrophies: management and implications for research. Neuromuscul Disord. 2015; 25:432-42

Table 1 – Respiratory and sleep-related features of 11 DM1 patients with objective EDS.

Variable		Mean ± std
Age at evaluation (yrs)		36.79 ± 13.54
Time from diagnosis to evaluation (mth)		57.74 ± 42.13
Type of onset. n (%)		
	Adult	5 (45.45)
	Childhood	6 (54.55)
pH		7.51 ± 0.02
$PaCO_2$ (mmHg)		35.40 ± 5.94
PaO_2 (mmHg)		107.34 ± 25.31
HCO_3^- (mmol/L)		28.44 ± 3.61
Seated FVC (%)		78.64 ± 11.65
Supine FVC (%)		72.91 ± 8.75
MIP (cmH_2O)		61.00 ± 25.17
MEP (cmH_2O)		53.36 ± 20.49
PCEF (L/min)		353.45 ± 104.13
ESS		9.82 ± 4.12
Mean SpO_2 (%)		94.61 ± 3.83
ODI (events/h)		6.77 ± 8.49
AHI (events/h)		6.69 ± 8.20

Abbreviations: $PaCO_2$. arterial partial pressure of carbon dioxide; PaO_2. arterial partial pressure of oxygen; HCO_3^-. Bicarbonate; FVC. Forced Vital Capacity; MIP. Maximum Inspiratory Pressure; MEP. Maximum Expiratory Pressure; PCEF. Peak Cough Expiratory Flow; ESS. Epworth Sleepiness Scale; SpO_2. peripheral Oxygen Saturation; ODI. Oxygen Desaturation Index AHI. Apnea-Hypopnea Index.

Poster 58

HOME VENTILATION AND RESPIRATORY SUPPORT SERVICE IN SINGAPORE: PATTERN OF USE AND SURVIVAL OUTCOME

Lydia Soon[1], Geak Poh Tan[1], Adrian Tan[1], Ai Ching Kor[1], Peters Anura[1], Hong Cheng[1], Tao Sun, Bin Ni[1], Janet Chua[1], Yeow Chan[1]

[1]*Home Ventilation and Respiratory Support Service, Tan Tock Seng Hospital, Singapore.*

INTRODUCTION: The multidisciplinary Tan Tock Seng Hospital Home Ventilation and Respiratory Support Service (HVRSS) provides inpatient consults, clinic consults and home visits for adult ventilator assisted individuals (VAIs). It was set up in 2009 to provide home care for spinal cord injured VAIs, but has since expanded its scope of service. In South East Asia, there is a paucity of literature on home mechanical ventilation (HMV). We aimed to study the pattern of use and survival outcomes of our ventilator assisted individuals (VAIs).

METHODS: We examined a historical cohort of 155 adult patients referred to HVRSS from September 2008 to December 2015. The patients were divided into two groups: amyotrophic lateral sclerosis (ALS) and non-ALS. For survival analysis, only patients initiated on long term HMV were included; survival was determined from HMV initiation to the date of death or 1st August 2017 whichever was earlier. Log-rank test for survival equality was used for between-group comparison.

RESULTS: The three most common diseases referred for HMV were ALS (43%), other neuromuscular diseases (23%) and spinal cord injury (19%). Median (interquartile range) age was 59 (35-74) years and body mass index was 19.6 (16.9-23.4) kg/m2 and majority were male (64%). Ventilatory capacity was severely impaired (FVC 1.19 (0.72-1.86); 42 (24-65) % predicted and most (62%) had pCO_2 >45mmHg at baseline. Majority of (96%) VAIs stayed at their own home; cared for by at least one full time carer (61% primary carers were foreign domestic helpers). ALS patients were older (63 (56-70) vs 59 (35-74) years, p = 0.07), lived further from hospital (10 (6-13) vs 7 (5-12) km, p = 0.07) and were more likely to suffer from hypertension, hyperlipidaemia or diabetes mellitus (62 vs 41%, p <0.01) compared to non-ALS patients. There were 111 VAIs, of which 75 (68%) were initiated on non-invasive ventilation (NIV). Fifteen (14%) NIV patients were transitioned to invasive mechanical ventilation (IMV). Median (95% confidence interval) survival of ALS patients and non-ALS patients using HMV were 1.4 (0.7-2.2) years and 5.5 (3.9-8.2) years respectively (p<0.001). Survival for patients on NIV transitioned to IMV was better than for individuals on NIV only or initiated on IMV (p<0.01).

CONCLUSION: HVRSS managed a varied group of predominantly advanced neuromuscular VAIs. ALS patients were older, had more cardiovascular risk factors and worse prognosis. Transition from NIV to IMV appeared to improve survival but further study to identify key prognostic factors is required. This data can be used for healthcare resource planning and for decision support for HMV initiation.

Poster 59

COMPARISON BETWEEN NASAL AND ORONASAL INTERFACE DURING NIV TITRATION IN PATIENTS WITH ALS

Vrijsen B, Buyse B, Testelmans D

Leuven University Centre for Sleep/wake disorders, University Hospitals Leuven, Leuven, Belgium

Introduction: Non-invasive ventilation improves survival, quality of life and sleep in patients with amyotrophic lateral sclerosis (ALS). Limited research has been performed on the different modalities of NIV in the titration procedure in these patients. This study provides a comparison between the use of a nasal or oronasal interface.

Methods: In this randomized cross-over trial, patients were accustomed to NIV during a first night with a nasal interface. Afterwards, patients were randomized to a night with an oronasal interface followed by a night with a nasal interface or vice-versa. NIV titration was performed with polysomnography and transcutaneous carbon dioxide measurement ($PtcCO_2$).

Results: Six patients (58 [IQR 53-67] years, VCseated 57 [IQR 37-74.5] %pred, SNIP 25 [IQR 17-32] cmH_2O) were evaluated. No difference in sleep parameters and nocturnal oxygen saturation was shown when comparing both interfaces. Mean (48.3 [IQR 44.8-52.4] vs 43.2 [IQR 41.9-46.7] mmHg; p < 0.05) and maximum (53.0 [IQR 48.5-58.3] vs 49.2 [IQR 46.7-53.0] mmHg; p < 0.05) nocturnal $PtcCO_2$ levels were lower during treatment with the oronasal interface.

Conclusion: Preliminary data show better results for nocturnal $PtcCO_2$ when using an oronasal interface. No differences were found in sleep architecture. Further inclusions could offer more insight into the reasons why oronasal interfaces provide better gas exchange.

Poster 60

WITHDRAWAL OF ASSISTED VENTILATION AT THE REQUEST OF A PATIENT WITH MND AND THE EFFECT ON RELATIVES

Palmer J, Faull C.

Plymouth Hospitals Trust, UK ; LOROS Hospice, Leicester, UK

Background: In 2015 the Association of Palliative Medicine of Great Britain and Ireland (APM) published Guidance for professionals on the withdrawal of assisted ventilation at the request of a patient with motor neurone disease (MND). Hitherto evidence suggested that if sub-optimally managed there can be negative outcomes for patients, family and professionals.

Method: Prospective data was collected during the process of withdrawal of ventilation in patients with MND for 2 years from November 2015.

Results: Data was submitted by 3 respiratory nurse specialists (7 cases) and 19 palliative care doctors about the withdrawal process for 27 patients. This took place at home for 14 patients, in a hospice for 12 and in a care home for 1 patient. The day before withdrawal 18 patients were fully alert, 6 were drowsy but responding to voice, 3 were unresponsive. None appeared to be in a locked in state.
26/27 patients were using the ventilation for >22hr/day. 1 patient could manage a few hours without ventilation. 11 patients (9 with NIV and 2 with TV) were completely ventilator dependent. 10 could only manage a few minutes without ventilation and 5 could self-ventilate for up to an hour before symptoms became problematic.
15/27 patients had used assisted ventilation for more than a year and 7 had used it for less than 6 months. No-one had less than 1 month's use. 21 patients had capacity to make the decision at the time of withdrawal. 1 patient had agreed the details but lost capacity on the day of withdrawal. A best interest's decision was made for 4 patients. 1 patient had a delegated attorney. None had an advance decision to refuse treatment.
24/27 audits reported that the experience was positive for the family, or as expected in more complex psych-social situations, and that emotions expressed by the family were those expected with the death of a loved one and not apparently compounded by the experience of withdrawal of ventilation.
In 3 cases the withdrawal was thought to be emotionally very difficult for the family. In all of these the patient's symptoms were very effectively managed and were not the cause of distress. The difficulties for the family related to: the suddenness of the patients' decision; the length of time the patient lived post withdrawal; the circumstances in which ventilation had been commenced. In only one of these was the outcome for the family members considered to be problematic. In the others, reactions were thought to be a normal response to loss and grieving.

Conclusion: If withdrawal of ventilation is managed in accordance with APM Guidance symptoms can be well controlled. The experience for relatives can be positive but for some the choice by the patient to stop ventilation may have greater emotional impact those ordinarily expected with the death of a loved one.

Poster 61

DECISION-MAKING IN PATIENTS WITH AMYOTROPHIC LATERAL SCLEROSIS (ALS) FACING TREATMENT DECISIONS CONCERNING PALLIATIVE CARE (PC), NON-INVASIVE VENTILATION (NIV) OR INVASIVE HOME MECHANICAL VENTILATION (IHMV)

Dorte Winther, DW[1], Charlotte Lorenzen[1], CKL, Dorthe Trojel[1], DET, Pia Dreyer[2,3], PD

1: Respiratory Centre West, Aarhus University Hospital
2: Department of Anesthesiology and Intensive Care, Aarhus University Hospital
3: Institute of Public Health, Department of Nursing Science, Aarhus University

Background: Decision-making concerning PC, NIV or IHMV is by many patients with ALS considered a complex decision. Healthcare professionals experience patients having difficulties facing the decision, which causes postponed decisions, increasing risk of acute tracheostomy and IHMV. Furthermore, some patients regret their choice of treatment due to unrealistic expectations. Shared decision-making supplemented by decision aids is known to improve the decision-making process.

Aim: To identify patients' needs and considerations related to decision-making and to help the patients make a qualified decision. Developing a decision-making programme.

Method: A complex intervention study during the year 2017. Firstly, identifying needs and experiences, secondly developing patient decision aids and thirdly implementation.

Findings: Patients expressed lack of information in relation to the consequences of the treatments options. What everyday life would be like was expressed as hard to imagine.
We developed two interventions 1) A patient decision aid, at onset of respiratory failure, regarding the decision about PC or NIV (optionally supplemented with PC) 2) A patient decision aid, at the time of NIV for more than 12 hours a day, concerning continued NIV or IHMV (both optionally supplemented with PC). The interventions involved healthcare professionals from the Respiratory Center, Department of Neurology and Palliative Care Unit. The conversations took place both at home and at the hospital including the possibility of involvement from close relatives, as many patients considered their relatives to be an important part of the decision-making process. Along with the conversations we recommended the patients to visit a website, developed as part of the project, which provides information about the treatment options through short movies and text. Furthermore, we encouraged the patients to weight benefits and harms based on their preferences for a good everyday life. The relatives are also recommended to use the decision aid to clarify different views.

Evaluation: The analysis of the patients' needs and development of the intervention started January 2017 and implementation started November 2017. Continuously evaluation is ongoing and will be ready for presentation at the conference.

Perspectives: It is our intension that the intervention will gain currency among patients with other diagnosis suffering from chronic respiratory insufficiency.

Poster 62

LONG TERM COMPLIANCE AND OUTCOME IN MYOTONIC DYSTROPHY PATIENTS REFERRED TO THE REGIONAL ASSISTED VENTILATION AND SLEEP SERVICES

Dr Ben Messer,[1] Dr Simon Baudouin,[1] Dr Sophie West.[2]

[1] *Consultant in Home Ventilation, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust.*
[2] *Consultant in Respiratory and Sleep Medicine, Regional Sleep Service, Newcastle upon Tyne Hospitals NHS Foundation Trust.*

Background: Poor sleep, daytime somnolence and hypercapnia are commonly identified in patients with Myotonic Dystophy (MD).[1,2] Compliance with Non-Invasive Ventilation (NIV) may be poorer than in other conditions.[3] We have developed a referral pathway from clinical genetics to the Regional Assisted Ventilation and Sleep Services for hypersomnolent MD patients based on the results of an overnight sleep study and a morning arterial blood gas. Data from our cohort study suggested benefit from and compliance with NIV or CPAP treatment of 35% of MD patients at 1-5 years follow up.[4] The prognostic implication of hypercapnia in MD patients has not been defined in contrast to the poor outcomes seen in hypercapnia with other neuromuscular disease such as Duchenne Muscular Dystrophy and Motor Neurone Disease.

Objective: To define the long term (3-7 years) compliance with NIV and Continuous Positive Airway Pressure (CPAP) in patients with MD from our original cohort study and to assess the outcome at follow up in these patients.

Method: 120 MD patients in the original study with ESS≥10 were referred for a sleep study and morning arterial blood gas. Patients were offered no intervention, Modafinil, CPAP, or NIV based on these results. Patients were followed up at 3-7 years and compliance with NIV or CPAP noted. Survival was also analysed.

Results: At long term follow up 3/21 CPAP patients and 4/33 NIV patients were using treatment for more than 4hours/night. There was a significant fall in compliance at 3-7 year follow up compared to 1-5 years. Compliance was predicted by ESS. Mean baseline pCO_2 was 5.4kPa in Modafinil and CPAP groups and 6.8kPa in the NIV group. 3/30 no intervention, 2/36 Modafinil patients, 2/21 CPAP patients and 2/33 NIV patients had died at follow up.

Conclusions: Compliance with NIV and CPAP in MD patients is less than in other disease groups and falls over time. Despite a significantly increased daytime CO_2, an excess mortality at follow up was not seen in hypercapnic MD patients.

References:
1. Bianchi MLE, Losurdo A, Di Blasi C et al. Sleep Breathing 2014; 18: 579-89
2. Poussel M, Thil C, Kaminsky P et al. Neuromuscular Disorders 2015; 25: 403-8
3. Monteiro R, Bento J, Goncalves MR, Pinto T, Winck JC. Sleep Breathing 2013; 17: 1087-92
4. West S D, Lochmuller H, Hughes J et al. Journal of Neuromuscular Diseases 2016; 3: 529-537

Poster 63

ANALYSIS OF 118 PATIENTS WITH MULTIPLE SCLEROSIS REFERRED TO 3 LTV CENTRES 2014 – 17

Campbell L[1], Ewles S[2], Cull F[2], Cozens S[2,4], Moses R[3], Bullock R E[1].

[1] *Royal Victoria Infirmary, Newcastle upon Tyne, UK*
[2] *University Hospital Southampton, UK*
[3] *Royal Preston Hospital, UK*
[4] *Breas Uk Ltd*

Advanced Multiple Sclerosis (MS) can lead to symptoms of respiratory insufficiency through the involvement of brainstem centres and neural pathways by demyelinating plaques, and through general immobility and muscle weakness. Respiratory dysfunction in MS has been reviewed recently (Tzelepis, McCool, Resp Med 2015; 109: 671-9) and the use of mechanical insufflation-exsufflation devices (MI-E) and respiratory muscle training recommended.

During the 4 years 2014 -17 a total of 118 patients with advanced MS were referred to specialist physiotherapy services at 3 long term ventilation(LTV) centres in UK. Patients presented with a variety of symptoms of impaired respiratory function. 54 had recurrent chest infection (45%); 45 had reduced ability to cough or clear secretions (38%); 7 presented in respiratory failure (6%); 5 had inability to take a deep breath (4%); 2 complained of weak voice (2%) and 1 was breathless (1%),

Respiratory function tests were not consistently recorded between the centres.

9 patients could not be helped, and no treatment was given. All others (92%) reported symptomatic improvement with a variety of treatments; 31 patients needed two, and 11 patients 3, different treatment modalities. Respiratory muscle training was not offered.

Treatments prescribed ranged from long term drugs through to mechanical cough assistance (MI-E), depending on the presenting symptom.

Treatment Modality	Patients prescribed treatment	% of total treatments
Lung Volume Recruitment (LVR)	57	33
Mucolytics	36	21
MI-E	31	18
Saliva Suppression	31	18
Long term Antibiotics	10	6
Mask Ventilation (NIV)	6	4
Total	171	100

There was considerable difference in the incidence of MI-E device prescription, and LVR bag usage, between the three centres.

This analysis demonstrates that most advanced MS patients with respiratory symptoms can be assisted via a specialist assessment at a LTV centre with skills in management of long term neuromuscular disorders. In many patients simple drug therapy or regular lung volume recruitment is successful; others need MI-E coughing augmentation devices.

Further prospective studies are indicated to explore which therapies are appropriate at different stages of MS; together with formalised respiratory function measurements.

Poster 64

A NOVEL DEVICE TO ALLOW PORTABLE AMBULATORY VENTILATION IN PATIENTS WITH NEUROMUSCULAR DISEASE

Brooke J, RRT, Vincent H, BS/RN, Benditt JO, MD.

University of Washington, Division of Pulmonary Critical Care and Sleep Medicine

Background: Some patients with neuromuscular respiratory failure retain the ability to ambulate. We have devised a novel hands-free interface to allow ambulatory ventilation using a backpack, stable mouthpiece interface and the Astral™ mechanical ventilator. We are aware of no device that exists to allow these patients to be mobile without the use of a wheelchair, cart or other heavy support for the ventilator.

The Device: The device that we designed is a lightweight hands-free interface that allows an individual to use an Astral™ mechanical ventilator carried in a backpack and used while ambulating to support ventilation.

Study Design: We studied 6 consenting adults with a variety of neuromuscular diseases without and with the use of the portable ambulatory mechanical ventilator set-up describe above. We measured the FVC immediately prior to the intervention. Study measurements included 6' walk distance without and with backpack ventilator support, a Borg score and end-tidal CO_2 ($ETCO_2$) at beginning and end of each 6' walk measured.

Results:

AGE/DX	GENDER	FVC %	ETCO2 WITHOUT	ETCO2 WITH	DISTANCE WITHOUT	DISTANCE WITH
41/ALS	MALE	37	56	38	150	940
38/ALS	MALE	44	66	42	422	875
70/PPS	FEMALE	36	43	41	10	710
60/ALS	MALE	36	47	39	478	515
78/PPS	MALE	27	34	35	965	790
48/LGMD	FEMALE	24	62	44	230	1250
MEAN		**34**	**51**	**40 ***	**421**	**847 ***
ST DEV		**7**	**12**	**3**	**336**	**247**

AGE/DX	GENDER	BORG WITHOUT PRE	BORG WITH PRE	BORG WITHOUT POST	BORG WITH POST
41 /ALS	MALE		0.5	7	2
38 /ALS	MALE	3	0	9	0
70 /PPS	FEMALE	3	3	4	4
60 /ALS	MALE	0	0	3	0.5
78 /PPS	MALE	0	0	1	1
48 /LGMD	FEMALE	0	0		0
MEAN		**1**	**1**	**5**	**1 ***
ST DEV		**2**	**1**	**3**	**2**

* $p < 0.05$ Student's t-test. Diagnoses: ALS (amyotrophic lateral sclerosis, PPS (post-polio syndrome), LGMD (limb girdle muscular dystrophy)

Discussion: Ambulation and symptoms were improved in 6 patients with neuromuscular disease during a 6 minute walk test while using our set up for ambulatory ventilation support. with the use of a currently available ventilator device, backpack and stable mouthpiece interface. Obviously a larger study as well as use of the device during daily activity will be important to assess the true efficacy of this device.

Conclusions: Portable hands free ventilation is feasible in patients with neuromuscular respiratory failure who are still ambulatory. Portable hands free ventilation appears to improve symptoms, distance walked as well as end-walk $ETCO_2$.

Future directions:
- Study of a larger group of patients with NMD.
- Application of this device with a nasal mask interface.
- Application of this device to other diseases such as COPD.

Poster 65

RESPIRATORY PROFILE OF NEUROMUSCULAR DISEASE PATIENTS FOLLOWED IN A REFERENCE CENTER FROM BRAZIL – PRELIMINARILY DATA

Santos DB [1], Rodrigues SL [1], Codeço V [1,2], Moura MC [1], Cirne H [1,2], Boussaid G [3].

1. Centro de Referência em Doenças Neuromusculares – Hospital de Apoio de Brasília – SES/DF/Brazil

2. Hospital Regional da Asa Norte – SES/DF/Brazil

3. Association Française contre les Myopathies / AFM-Téléthon

The Center of Reference of Neuromuscular Diseases at State Secretary of Health in Brasilia-Brazil, follows in a multidisciplinary program, patients with neuromuscular diseases referred to diagnostic and follow-up. The aim of the present study is to characterize minimally the respiratory profile of some of these patients, followed between 2012 and 2017.

We retrospectively examined data from pulmonary function, polysomnography, final status of eventual noninvasive ventilation (NIV), and delay between the onset of the first symptoms and initiation of NIV. We excluded data from dead patients or those who evolved to invasive mechanical ventilation. The most frequent diagnostics ALS and Muscular Dystrophy. We obtained data from 76 patients, divided in these 2 groups.

Among the 61 ALS patients, 33 were male. During their first visit, they presented a mean age of 57,5±11,4 years-old, a VC at seated position of 69,7±24,4 % predicted, and a mean of time during sleep with $SpO_2 \leq 88\%$ of 120,4±141,0 minutes. The delay between the onset of the first symptoms and the initiation of NIV was 45,3±50,0 months. The mean age of onset of NIV was 59,9±11,5 years-old. Eleven patients presented VC < 50% predicted and 14 patients presented $SpO_2 \leq 88\%$ for a period over than 5 % of sleep time. During the follow-up, 7 patients evolved to VC < 50% predicted, but only 4 of them were sequentially ventilated. NIV was finally required for 24 patients. Among the non-ventilated patients, 4 presented $SpO_2 \leq 88\%$ for a period over than 5 % of sleep, and 10 patients presented VC< 50% predicted. Concerning 15 patients with muscular dystrophy, 10 were male. The diagnostics were Duchenne Muscular Dystrophy (6 patients), Myotonic Dystrophy (4 patients), Facioscapulohumeral Muscular Dystrophy (2 patients), Limbe-Gird Muscular Dystrophy (2 patients), Bethlem Muscular Dystrophy (1 patient). At their first visit, they presented a mean age of 33,1±14,7 years-old, a VC at seated position of 65,1±28,4 % predicted, and a mean of time during sleep with $SpO_2 \leq 88\%$ of 73,0±78,3 minutes. Only 2 patients presented VC < 50% predicted and 5 patients presented $SpO_2 \leq 88\%$ for a period over than 5 % of sleep time. NIV was finally required to 4 patients. The mean age of onset of NIV was 33,5±17,6 years-old. Among the non-ventilated patients, 4 patients VC< 50% predicted and 3 presented $SpO_2 \leq 88\%$ for a period over than 5 % of sleep. The comparison of VC and of mean time of $SpO_2 \leq 88\%$ during sleep were not different between the groups. On the other hand, the age of onset of NIV between groups was significantly different.

The patients with ALS initiated NIV later than the patients with muscular dystrophy, and these first one were proportionally more ventilated. Even if some patients of both groups presented formal criteria to NIV, they were finally not, possible due to normal blood gases and/or capnography during sleep.

Poster 66

DIRECT COSTS OF NEUROMUSCULAR DISEASE IN CANADA: A POPULATION-BASED MATCHED COHORT STUDY

Rose L[1], Mckim D[2], Leasa D[3], Nonoyama M[4], Tandon A[1], Bai Y-Q[1], Katz S[2], Amin R[1], Goldstein R[1], Gershon A[1]

[1] University of Toronto, [2] University of Ottawa, [3] University of Western Ontario, [4] University of Ontario Institute of Technology

Introduction: Although many individuals with neuromuscular diseases (NMD) experience progressive respiratory muscle weakness requiring respiratory related healthcare services, data on the direct costs of healthcare utilization are limited.

Aim: To estimate direct costs of publicly funded healthcare utilization for NMD compared to costs of individuals (both adults and children) with similar demographic and health conditions without NMD. Costs were estimated for physician billing; hospital including emergency, same-day surgery, rehabilitation, and extended care; drug costs for those eligible for public coverage; home care including nursing homes; and 'other' costs including laboratory and non-physician billing.

Methods: Using health administrative databases, we created a population-based propensity score (age, collapsed aggregated diagnosis group, geographic region, and rurality index) matched cohort (2003-2008) of individuals with NMD and calculated attributable costs of publicly funded healthcare utilization in the one year before and one year after identification of NMD (index event) for individuals surviving ≥ 1 year.

Results: We matched 193,331 of 203,749 (95% match) individuals with NMD with 193,331 controls. Mean (standard deviation [SD]) age was 48 (19.8), 41.6% were male, and 18.7% were in the lowest income quintile. The mean (SD) cost of healthcare utilization in the year before the index event was $5,063 ($10,478) NMD vs $3,723 ($9,308) control; in the year following it was $9,281 ($24,332) NMD vs $3,452 ($10,322) control, equivalent to an attributable cost of $4,489 (95% confidence interval [CI] $4,182 to $4.795). The higher costs associated with a diagnosis of NMD compared to the non NMD population were noted even during the year prior to identification of this diagnosis, due to greater healthcare utilization in the 90 days prior to the identification of NMD ($1,657 ($4,760) vs $957 ($3,564). The attributable cost of NMD was similar for adults ($4,494, 95% CI $4,186 to $4,801) and children ($4,429, 95% CI $4,135 to $4,723). Hospital costs contributed to 73% of attributable costs, physician billing 14%, home care (8%), drugs (3%), and other (2%).

Conclusion: In a heterogeneous group of individuals with NMD, direct costs in the year following NMD identified using health administrative databases increased compared with non NMD controls Costs incurred in the year following index event were highly variable which is consistent with the variable clinical course of NMD

Poster 67

THE EFFECT OF NUSINERSEN ON RESPIRATORY EXACERBATIONS AND REQUIREMENT FOR RESPIRATORY PHYSIOTHERAPY IN TWO SMA TYPE 1 CHILDREN

Wooler L, Mitchinson V

Children's Long Term Ventilation Service, Great North Children's Hospital, Newcastle Hospitals NHS Trust, UK.

Background: Spinal muscular atrophy (SMA) type 1 is the commonest and most severe form of spinal muscular atrophy. Proximal weakness is severe and manifests itself in difficulties moving, eating, swallowing and breathing. Due to the high risk of serious respiratory problems, most children with this type of SMA rarely survive their second birthday without respiratory support, cough augmentation and regular chest physiotherapy. Nusinersen is the first approved drug to treat SMA administered directly to the CNS via intrathecal injection. Clinical trials have demonstrated the drug halts disease progression and in around 60% of infants also significantly improved motor function. Two children in Newcastle were commenced on this treatment. All data collected during the trials has focussed on the impact on motor function.

Aim: To describe the effect on respiratory exacerbations and impact on respiratory physiotherapy intervention on 2 children receiving Nusinersen.

Results/Discussion: Two SMA Type 1b children (3yrs, 5yrs) under the care of the Children's Long Term ventilation were entered onto the SHINE open-label extension trial. Both children were already established on nocturnal non-invasive ventilation (using dual profile machines) and daily chest physiotherapy programmes (including cough augmentation) and had had frequent hospitalisations requiring PICU and intensive physiotherapy. Comparisons were made 6 months pre and post Nusinersen administration to establish if a reduction in respiratory exacerbations, hospitalisations and respiratory physiotherapy was noted. On average the length of hospital stays reduced, including the number of PICU days. Physiotherapy in-patient face to face contacts was reduced including overnight physiotherapy call outs. There were also some improvements in the ventilator support the children required when they became unwell/ admitted to hospital. The children also either required less, or no regular suction on a daily basis (when well) and parents reported improved quality of life such as regularly attending nursey and school.

Conclusion: Both these children had repeated hospitalisations (including PICU admissions) for respiratory infections which required intensive chest physiotherapy. In this short period of time since commencing this treatment there has been some improvement in length of hospital stay and the amount of requirement for additional physiotherapy involvement. It appears that whilst Nusinersen does not prevent respiratory infections requiring hospitalisations; these children appear to be more robust when unwell, are recovering quicker, needing less time in hospital and are less demanding on the physiotherapy service.

Paediatrics

Poster 68

A TRACHEOSTOMY DECANNULATION PATHWAY IN A PEDIATRIC REHABILITATION HOSPITAL

C Gnanasabesan[1,2] BSc, MSc, RRT, FCSRT and J Chiang[1,3,4] MA, MD, FRCPC

1. Holland Bloorview Kids Rehabilitation Hospital, Toronto, Canada
2. The Michener Institute of Applied Sciences, Toronto, Canada
3. The Hospital for Sick Children, Toronto, Canada
4. University of Toronto, Toronto, Canada

Rationale: A growing number of children appear to be receiving tracheostomy tubes with many requiring transition from pediatric acute care hospitals to rehabilitation hospitals. Once such children are transitioned, it is important to provide ongoing reevaluation of tracheostomy need as some individuals may be deemed suitable for decannulation.

Objectives: The aim of this project was to redevelop a tracheostomy decannulation protocol and pathway at Holland Bloorview Kids Rehabilitation Hospital in order to standardize processes internally and optimize patient safety.

Methods: Two tools, 'Interprofessional Tracheostomy Decannulation Checklist' and the 'Decannulation Map and Pathway' were redesigned after a careful review of the existing tracheostomy guidelines in addition to feedback from various key internal stakeholders from multiple health care disciplines.
When a patient is identified as a potential candidate for tracheostomy decannulation, the checklist is reviewed to ensure that the essential investigations and interdisciplinary consultations (including Nursing, Respiratory Therapy, Speech Language Pathology, Occupational Therapy, and Otolaryngology) are completed for proper evaluation of safety for decannulation.

The decannulation map serves as a decision tree/algorithm to guide the clinicians through three stages of the decannulation process. Stage 1 comprises of the assessment for decannulation. This stage utilizes the Interprofessional Tracheostomy Decannulation Checklist to determine readiness for stage 2. Stage 2 includes trials of capping to determine patient specific tolerance and to evaluate potential need to downsize the tracheostomy tube. The final step, Stage 3 involves actual decannulation and post decannulation monitoring.

Conclusions: The newly revised decannulation checklist and pathway will be utilized to guide clinicians within a Canadian pediatric rehabilitation hospital in approaching the eligibility and process of tracheostomy decannulation in a more streamlined manner with emphasis placed on patient safety.

Poster 69

MONITORING COUGH EFFECTIVENESS AND USE OF AIRWAY CLEARANCE STRATEGIES: A CANADIAN AND UK SURVEY

Rose L[1,2], Mckim D[3], Leasa D[4], Nonoyama M[5], Tandon A[1], Kaminska M[6], O'Connell C[7], Loewen A[8], Connolly B[2], Murphy P[2], Hart, N[2], Road J[9]

[1] University (U) Toronto; [2] King's College London; [3] U Ottawa; [4] U Western; [5] U Ontario Institute of Technology; [6] McGill U; [7] Dalhousie U; [8] U Calgary; [9] U British Columbia

Introduction: Regular monitoring combined with early and appropriate use of airway clearance can reduce unplanned hospital and intensive care unit admissions for patients with neuromuscular disease (NMD) and spinal cord injury (SCI).

Aim: To describe knowledge of guidelines, current practice of monitoring cough effectiveness, clinician prescription/provision of airway clearance strategies, and constraints to service provision.

Method: Cross sectional survey of clinicians affiliated with NMD and SCI clinics in Canada, Home Mechanical Ventilation UK 2016 meeting attendees, and UK physiotherapist networks.

Results: We received 155 surveys (63 UK; 92 CAN;) from respiratory & physio-therapists, respiratory medical specialists, nurses, & neurologists. In Canada, most (32%) respondents worked in clinics starting 10-25 patients on mechanical in-exsufflation (MI-E) each year; in the UK most worked in clinics starting ≤5 (22%) or >25-50 (22%) patients. More UK (76%) than Canadian (56%) respondents were aware of airway clearance guidelines (P=.02). Routine assessment of cough effectiveness was reported by more UK (59%) than Canadian (42%) respondents (P=.04). Most common method (both countries) was peak cough flow (PCF) though used more commonly in the UK (96%) than Canada (81%, P=.02). Other common methods were qualitative assessment (45% vs 44%), and MIP/MEP (31% vs 44%) with no between country differences. Fewer Canadian respondents reported using PCF before initiation of airway clearance (94% vs 81%, P=.05), and showed results to patients for technique feedback (97% vs 76%, P=.007); no differences in PCF after initiation to ensure technique adequacy (72% vs 73%, P=.92).

Combination therapy (MI-E + lung volume recruitment (LVR) + manually assisted cough (MAC)) when PCF ≤270 L/min was the strategy most routinely recommended (41% overall). Monotherapy was infrequent (LVR 15%, MAC 7%, and MI-E 4%). More Canadians identified constraints to service provision, specifically insufficient public funding of equipment (39% vs 68%, P=.002) and inadequate knowledge of community workers (34% vs 56%, P=.02). Funding for community support was a common constraint in both countries (42% vs 49%).

Conclusion: More UK than Canadian clinicians reported guideline awareness, routine assessment of cough strength, and PCF to guide initiation of airway clearance. Similar numbers used PCF after initiation to ensure technique adequacy. More Canadians reported constraints in service delivery although insufficient funding for equipment and community support were common constraints in both countries.

Airway clearance

Poster 70

THE *KALOS* DEVICE: EXPERIMENTAL PROTOCOL FOR AIRWAY CLEARANCE IN PATIENTS WITH INEFFECTIVE COUGH

Stefano Belli[1], F. Masocco[1], Davide Cattaneo[1], G. Savio[1] ,B.Balbi[1].

[1] *ICS Maugeri, Istituto Scientifico di Veruno (Veruno, IT)*

Introduction: Respiratory physiotherapists have a wide range of possibility to face up to the problem of bronchial secretions. The real challenge for clinicians is to identify the best available treatment, technique or device compatible with the needs/preferences of the patient and/or caregiver. This pilot project proposes the use of a new device that integrates three different techniques (CPAP, Free Aspire and Cough Assist).

Aim: To assess the effectiveness of *Kalos* device and the feasibility of our rehabilitation project.

Setting: ICS MAUGERI-VERUNO (Novara, Italy): Respiratory, Cardiology and Neurology departments.

Materials & Methods: Five patients (3M-2F, aged 68÷88) with ineffective cough, bronchial encumbrance, lung parenchyma integrity and good collaboration were consecutively recruited. Ten treatment sessions were performed with *Kalos* device (5' in CPAP functionality, 15' in Free Aspire functionality, 3/5 cycles x 3/4 sequences in Cough Assist functionality). The following data were recorded: subjective perception of mucus encumbrance (Visual Numeric Scale), PaO_2/FiO_2, vital parameters (SpO_2 and HR), perceived health status (EuroQol scale) and chest X-ray.

Results: The variation of subjective perception of secretions (VNS) was analyzed both within the session and among the ten treatment sessions: for all the patients there was a decrease in VNS during the treatment session, while the trend among the sessions has been decreasing for 4 out of 5 patients. Arterial Blood Gas Test showed an increase in the PaO_2/FiO_2 ratio for all the analyzed subjects. All the patients reported a remarkable improvement in perceived health status (assessed with EuroQol scale). SpO_2 and HR monitoring was necessary to verify the safety of the treatment: generally, no changes were recorded neither in the above parameters nor in the respiratory rate.

Conclusions: The research allowed to verify the validity and appropriateness of this protocol: the device was effective in reducing bronchial encumbrance and easy to use. Further studies will be useful to confirm these data and to understand, in clinical practice, in which categories of subjects the device could be used.

Poster 71

A PILOT STUDY ON THE NON-INVASIVE MANAGEMENT OF TRACHEOBRONCHIAL SECRETIONS IN TRACHEOTOMISED PATIENTS

Stefano Belli[1], Davide Cattaneo[1], F. D'Abrosca[2], I. Prince[1], G. Savio[1] ,B.Balbi[1].

[1] *ICS Maugeri, Istituto Scientifico di Veruno (Veruno, IT)*
[2] *IRCCS Ca' Granda-Ospedale Maggiore Policlinico (Milano, IT)*

Increased production and/or impaired removal of mucus is a common problem in tracheotomised (TCS) patients and is associated with adverse clinical outcomes.

Most TCS patients are routinely suctioned to remove tracheobronchial secretions.

That Procedure is invasive, uncomfortable and not free from side effects that needs an experienced operator.

Free-Aspire® (MPR, Italy) is a non-invasive device that allows a light acceleration of airflow during spontaneous expiration, without a measurable negative pressure in the airways.

The aim of the study was to assess the efficacy and the feasibility of this device in reducing the need for daily suctions in TCS patients.

25 TCS patients (13M/12F, average age 69,88±9,0) in stable condition were studied in the Study Group (SG).

The number of shallows and suctions (both superficial and deep), Arterial Blood Gas analysis (ABG) and the perception of mucus encumbrance (VNS) were recorded for five days.

The first two days (T1 and T2) suctioning was performed as usual, the following three days (T3, T4 and T5) patients were treated also with Free-Aspire (20 minutes, 3 times a day).

Furthermore 11 TCS patients (9M/2F, average age 62.09±11.95) were studied as Control Group (CG). They had the same protocol but didn't receive the Free-Aspire® treatment.

In the SG the use of the noninvasive device was associated with a reduction of the total daily number of aspirations from T1 to T5: 8.68±3.64 vs 4.48±3.08 p=0.0009, especially between T2 to T5 (8.48±2.62 vs 4.48±3,08, p= 0,0003).

We observed a reduction of deep suctions from T1 to T5 (6.16±3.53 vs 1.80±1.50, p=0.0001) particularly from T2 to T3 (6.36±3.08 vs 4.72±2.33, p= 0.0179) and from T2 to T5 (6.36±3.08 vs 1.80±1.50, p< 0.0001).

The VNS score decreased from 7.03±1.42 at T1 to 4.05±1.80 at T5, p <0.0001, as well from T2 to T3 (6.91±1.85 vs 6.15±1.89, p=0.029) and from T2 to T5 (6.91±1.85 vs 4.05±1.80, p=0.0002).

In the CG, successively observed, it has been noticed that the total number of aspiration didn't decrease in a significant way (T1=10.00±1.90, T5=9.27±1.49, p=0.4008).

The perception of the catarrhal encumbrance with the VNS didn't diminish importantly (T1=7.03±1.38, T5=6.61±1.52, p >0.9999).

These data suggest that alternative strategies to suctioning tracheobronchial secretions in TCS patients may be useful, as they can reduce the number of daily suctions, particularly the deep ones, and may improve the perception of mucus encumbrance, without significant side-effects.

More studies are needed to confirm these data and to understand in which categories of TCS patients (e.g. non-collaborative patients) noninvasive device can be introduced safely in clinical practice.

Poster 72

MANAGEMENT OF THE AIRWAY IN THE TRACHEOSTOMY PATIENT IN CRITICAL AREAS: A COMPARISON OF TWO DEVICES FOR A PILOT STUDY.

L.Cavanna[1] PT, C. Blardone[2] PT, M. Bertoni MD[3], P. Severgnini MD[4]

[1/3] Rehabilitation Department ASST-Sette Laghi, Varese; [2] Pulmonology Department ASST-Sette Laghi, Varese;
[4] University of Insubria - DBSV – ICU ASST Settelaghi Varese, Italy;

INTRODUCTION: in Italy the physiotherapist is an integrative part of the intensive care team, which is in charge of dealing with critical patients. A prolonged bed stay, mechanical ventilation, tracheostomy tube, ineffective cough and comorbidities lead to accumulation of secretions and dis-ventilated areas in the lungs.

OBJECTIVE: comparing two devices, commercially available to keep the airway open and clear. The EzPaP®, adopting a positive airway pressure and SuctionFREE®, which uses Vakum technology, generating low negative airway pressure.

MATERIALS METHODS: Consecutive patients admitted to intensive care unit, tracheostomized, able to stay without mechanical ventilation support for a minimum of 20 minutes.

Group 1: treatment for 5 consecutive days, 15 minutes every day, with the technology Vakum.
Group 2: treatment for 5 consecutive days, 15 minutes every day, with the EzPaP® system.

Inclusion criteria: full age, Glasgow Coma Scale >8, tracheostomy, spontaneous breathing for at least 20 minutes, respiratory rate (RR) <30, heart rate (HR) <110, systolic blood pressure (SBP) <150 mmHg, previous medical consensus and in case of full consciousness the consensus of the patients. Exclusion criteria: young patients <18 years, pregnancy or supposed pregnancy.

Procedure: 3 evaluation sessions, pre-treatment, during the treatment (7 minutes) and post-treatment after 30 minutes.

Statistical analysis: T-student test.

SETTING: Intensive Care Unit, ASST Sette Laghi Ospedale di Circolo e Fondazione Macchi Varese, Italy. Period of study: May 2015 to September 2016.

RESULTS: 20 patients were involved: 10 patients drop out due to different problems (2 not completed data, 2 failed weaning, 3 early transfered, 3 EzPaP® compliance (1 patient with SBP>200 mmHg, 2 with dyspnea)). In the group treated with SuctionFREE® a better washout of CO2 arises. Discomfort signals have been pointed out during the use of EzPaP®.

CONCLUSIONS: SuctionFREE® could start joining the set of devices used by the physiotherapist in critical areas and, above all, it could be employed for all patients who have higher CO2 levels and with little compliance, this thanks to the capacity of transferring the bronchial secretion to the high airway, in total security and without requiring physical effort. Further and larger studies are required to validate these results.

BIBLIOGRAPHY: Mendez-Tellez PA, Needham DM. Early physical rehabiliation in the ICU a ventilator liberation. Respire Care, 1663-1669.2012.

Poster 73

RUNNING TITLE: EFA AND PEP PHYSIOTHERAPY AFTER PULMONARY LOBECTOMY

Nicola Rotolo[1], Maria Cattoni[1], Michele D'Andria[1], Laura Cavanna[1], Giorgia Patrizio[1], Cecilia Sampietro[1], Lorenzo Dominioni[1], Annamaria Grande[1], Andrea Imperatori[1], Erminia d'Amanzio[1], Antonello Nicolini[2]

[1] Center for Thoracic Surgery, University of Insubria, Ospedale di Circolo, Varese, Italy
[2] Respiratory Diseases Unit,Hospital of Sestri Levante,Italy

Background: A new technology expiratory flow accelerator (EFA) has been recently introduced in chest physiotherapy treatment as a support of tracheobronchial secretions removal. The peculiarity of this device is to produce an expiratory flow acceleration, and promote mucus clearance without generating any pressure gradient, requiring patients breathe at tidal volume, against no resistance. This study aimed to compare this device to the traditional positive expiratory pressure (PEP) bottle in enhancing mucus clearance in patients undergoing pulmonary lobectomy.

Methods: This randomized study enrolled fifty adult patients candidate for pulmonary lobectomy by thoracotomy because of lung cancer. Patients undergoing a surgical procedure different from that planned or admitted to the intensive care unit during the postoperative stay were excluded from the study. The patients were randomized in two groups: EFA (n=26) PEP group (n=24).The primary outcomes were : the incidence of postoperative pulmonary complications and the length of postoperative stay and the secondary outcomes : postoperative trends of inspiratory capacity, respiratory rate, oxygen saturation, subjective perception of dyspnea and the drop in FEV_1 on the seventh postoperative day. The compliance of patients in using the two devices was evaluated by a five point -Likert Scale.

Results: Non-significant difference was observed in postoperative pulmonary complications between the EFA and PEP group (8% vs 25%; p = 0.21). The postoperative length of stay was similar in the two groups (12±4 vs 12±5 days; p = 0.83). We did not find significant differences for trends of inspiratory capacity, respiratory rate, oxygen saturation, dyspnea and postoperative drop in FEV_1 between the two groups. Patients compliance in using the PEP bottle group was not statistically different than EFA group.

Conclusions: Regarding techniques used for chest physiotherapy post-thoracic surgery, EFA device could not be considered a replacement for the PEP bottle, but an ulterior device for tracheo-bronchial secretion removal with preference for weaker patients and/or patients with important airway leakages, for whom PEP has limited indications.

KEY WORDS: Pulmonary lobectomy, lung cancer, chest physiotherapy, postoperative complications, clearance airway.

Poster 74

CONSECUTIVE USE OF FLOW ACCELERATOR AND COUGH ASSISTANT IN PATIENTS WITH NEURO-MUSCULAR PATHOLOGY: 2 CLINICAL CASES

Mantellini E., MD, Pizzorno M., PT

Respiratory Rehabilitation Alessandria Hospital
Italy

Patient No. 1: 55-year-old man with Multiple Sclerosis for about 10 years.3 years ago difficulty in expectoration with stagnation of bronchial secretions and 2 episodes of bronchopneumonia treated in a traditional way with broad-spectrum antibiotic therapy and resolution of symptoms.About 2 years ago

episode with major respiratory crisis and bronchopneumonia with high fever: subsequent admission to the emergency room and resuscitation with subsequent intubation and subsequent tracheostomy due to the impossibility of extubation.Since then frequent respiratory exacerbations (1 every 2 months). At our observation, it is subjected to functional evaluation with the detection of an important cough deficit in addition to a prevalently restrictive ventilatory deficit.The tracheostomy tube is then occluded and subjected to treatment cycles with Free Aspire followed by a cough assistant.Respiratory function is re-evaluated by highlighting an improvement in FVC and Peak Cough Flow.Removed the tracheostomy tube.Constant use of devices.No exacerbations in the 18-month follow-up.

Patient No. 2: 78-year-old woman with SLA diagnosed 4 years ago.NIV for about 1 year.Last 2 years frequent recurrent bronchitis episodes (about 1 per month).
12 months ago the appearance of febrile respiratory exacerbations with acute respiratory failure and emergency hospitalization in intensive care; subsequent tracheal intubation and then tracheostomy.
At discharge from intensive care began treatment with flow accelerator followed by cough assistant.
12 month follow-up no respiratory infectious episodes have occurred.

Poster 75

LONG-TERM EVALUATION OF EXPIRATORY FLOW USING MECHANICAL INSUFFLATION-EXSUFFLATION (MIE-EF) IN DUCHENNE MUSCULAR DYSTROPHY

Toshihiko Miura (TM), Yuka Ishikawa (YI)

Department of Pediatrics and Division of Chest Physical Therapy, National Hospital Organization Yakumo Hospital JAPAN

Background: It was reported that proactive use of mechanically assisted cough (Mechanical insufflation-exsufflation: MI-E) can prevent aspiration pneumonia, and avoid transition to gastrostomy, tracheal intubation or tracheostomy for patients with dysphagia related to Duchenne Muscular Dystrophy (DMD) (Disability and rehabilitation 2016)
Up until this point, it was recommended to used MI-E at the pressure setting of ±40cmH_2O. However, it has been recently proposed to use MI-E at the higher pressure setting, targeting ±55hPa, to get enough cough peak flow (CPF) to expectorate secretions. (Am J Phys Med Rehabil. 2013) It is also necessary to consider the set-up of MI-E, and to evaluate for continued airway clearance using MI-E with facemask due to progression of DMD and aging.

Objective: The purpose of this study is to investigate the change in expiratory flow using MI-E (MIE-EF) over a period of time, and to consider the possibility of maintaining the effectiveness of MI-E in DMD patients.

Subject: Participants of this study were hospitalized DMD patients in our hospital, who did not have tracheostomy and were candidates of MI-E by their respiratory function evaluation.

Methods: Vital capacity (VC), maximum insufflation capacity (MIC) and unassisted CPF□MIE-EF was evaluated and compared on October 2013 and November 2017. Cough Assist E70 (Philips-Respironics, US) with facemask was used for this evaluation. The setting of the MI-E was as follows: Insufflation / Exsufflation / Pause-time: 2.0 / 2.0 / 1.0 sec in automatic mode, Flow: High, Oscillation: Off, Cough Trak: Off. Measurements were taken in 3 different pressure settings: ±40hPa / ±50hPa / ±60hPa. Student's t-test was used to compare each sequential change. Bonferroni's multiple comparison tests was used to compare MIE-EF between pressure settings. SPSS Ver 22.0 was used for statistical processing.

Results: 35 patients with the average age of 32.2±7.6 years (range, 17-48) participated in this study. Between 2013 and 2017, VC, MI-E and CPF decreased to VC (520.9±403.8ml→371.1±325.3ml), MIC (1796.0±639.4ml→2010.0±653.2ml) and CPF (104.4±75.1ml→68.1±65.6ml). Meanwhile, MIE-EF changed as follows: 312.9±43.8L/min→308.0±31.8L/min at ±40hPa, 348.0±51.7→360.1±34.8L/min at ±50hPa, 373.5±62.5L/min→392.8±34.5L/min at ±60hPa. It only increased significantly at ±60hPa. 22 patients had a change in the settings on their MI-E during the period of this survey.

Discussion: Respiratory function decreases with progression of DMD and aging, however, MIE-EF can be maintained if the setting of MI-E is appropriate. In order to maintain the effectiveness of MI-E, it is necessary to have frequent evaluation of MIE-EF and to adjust the settings of MI-E appropriately.

Poster 76

THE USE OF HIGH FREQUENCY CHEST WALL OSCILLATION (HFCWO) AND MECHANICAL IN-EXSUFFLATION (MI: E) TO AID SECRETION CLEARANCE IN A PATIENT WITH MOTOR NEURONE DISEASE (MND) AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Mr Liam Campbell.
Specialist Physiotherapist in Assisted Ventilation.

Newcastle Upon Tyne Hospitals NHS Foundation Trust.

Rationale: Rafiq et al (2012) concluded that neuromuscular respiratory weakness associated with MND leads to ineffective cough and retained airways secretions, predisposing to recurrent chest infections, which is the leading cause of hospital admission in MND. Chronic cough and sputum production are well documented aspects of disease progression in patients with COPD. Lange et al (2006) and Chakravorty et al (2011) both concluded an improvement in their respective patient groups when using HFCWO. It must be taken into account however that simply mobilizing secretions without the ability to effectively clear them is inappropriate, therefore more than one treatment technique may be required.

Background: 62 year old man with end stage COPD (MRC Score 5) and MND. Despite maximum medical management including muscarinics, non-invasive ventilation, humidification, physiotherapy and optimal MI: E – including oscillations, the patient had numerous hospital admissions with inability to clear respiratory secretions.

Objective: To assess the effectiveness of HFCWO as an adjunct to conventional treatment to clear respiratory secretions, thus reducing hospital admissions.

Methods: The Hill-Rom HFCWO device (The Vest) was applied via large chest wrap around the patient's lower thoracic region. Initial treatment of low pressure (2) and high frequency (12 Hz) was applied for 5 minutes. The patient then received normal airway clearance with MI: E. The same was repeated at high pressure (8) and low frequency (5Hz) for a further 5 minutes before receiving normal MI: E. This occurred 4 times per day.

Results: The patient experienced no further hospital admissions due to retained secretions with a verbally reported increased quality of life.

Conclusion: Patients with multiple co-morbidities are becoming more prevalent with an aging population. In this single case report, HFCWO and MI:E proved to be an effective management plan, reducing hospital admission and keeping the patient at home in his final months of life. Further work on the combination of therapies, treatment duration, frequency and optimal settings are required.

Poster 77

SYNERGIC ACTION BETWEEN EXPIRATORY FLOW ACCELERATOR (FREE ASPIRE) AND THE IN-EXSUFFLATOR IN SECRETIONS REMOVAL OF PATIENT COMPLEX: CASE REPORT

Giancarlo Garuti MD

Respiratory Diseses Dpt ; Santa Maria Bianca Hospital, Mirandola ;
Local Health Unit, Modena, Italy

The removal of secretions in not tracheostomized patients having multiple pathologies related to the respiratory system is always a difficult challenge. It is the case of cerebral palsy, where, often, in addition to a cough impairment there is, at the same time, a distortion of the thoracic cage with consequent difficult respiratory mechanics. Our hypothesis is that the consecutive use of a expiratory flow accelerator and subsequently of the machine of the cough has a synergistic effect in the effective of secretions removal: in fact the free aspire for its peculiarity of action allows a rising of secretion toward the more proximal airwaos, while the in-exsufflator helps the ejection.

The case that we are going to describe is that of a girl of 30 years affected by Cerebral Palsy, whose clinical history of hypersecretion, bronchial obstruction and respiratory infections lasted from about 10 years. The patient in addition to the cognitive impairment and the lack of coordination of the cough has a severe Kyphoscoliosis too. In association also presented GERD treated pharmacologically and subsequently dysphagia that has led to the implantation of PEG by retrograde track , having regard to the important distortion in the chest and concomitant distorsion of the stomach. Also these actions have not reduced the frequency of exacerbations (average 4,3+1,2 year), there was an average of use of cycles of antibiotics of 5.1+0.5 for year, hospitalization of 1.5±0.01 time for Year. The patient has performed for about two years PEPmask, then In-Ex for another 2 years .The patient showed constantly high PCR and bronchial hypersecretion. It was begun Free aspire with cofflator according to this scheme: freeaspire 20 'min consecutive and subsequently In-Ex device (cycles of 6 Inspirations and exhalations and pause) for about 30 minutes, twice a day. After a year of treatment it is noted a reduction of hospitalization, of the use of antibiotics and of exacerbations.

Conclusions: the synergetic use of two device could improve more effectively removing the secretion , helping the upwelling of mucus from the distal portions of the lung and subsequently its removal. Such evidence needs of randomised controlled trials with a large number of patients

Home Care

Poster 78

PROFILE OF THE BRAZILIAN POPULATION IN DOMESTIC INVASIVE MECHANICAL VENTILATION ATTENDED BY THE SUS

Rodrigues, DLG[1]; Carvalhaes, SRF[1]; Cifuentes, T[1]; Gonçalves, CR[1], Souza; NC[1], Sala; AD[1], Saks; FH[1], Hamada; ASP[1], Guimarães; TAA[2], Borges; Dias; MB[2].

1- German Hospital Oswaldo Cruz (HAOC) - São Paulo, Brazil,
2- Coordination of Home Care (CGAD), Ministry of Health, Brazil.

INTRODUCTION: The increasing number of patients with chronic diseases and the development of new positive pressure ventilators have increased the incidence of chronically dependent patients with invasive mechanical ventilation (IMV) in Brazil, with an increase in related hospital costs. The high impact on the occupation of hospital beds, scarce in the public hospitals of the country, can also be perceived. The "Best Home Health Program" of the Unified Health System (SUS), instituted in 2011 by the Brazilian Ministry of Health, aims to provide public home care for people with complex diseases by multidisciplinary teams.

OBJECTIVES: To outline the diseases and epidemiological profile of the patients in home IMV who use SUS and to identify the greatest difficulties faced by the families in relation to the management of the MV appliance at home.

METHOD: The HAOC, through a Program to Support the Development of the Unified Health System (PROADI-SUS) in partnership with CGAD, carried out an observational, descriptive study with the application of questionnaires to patients, or caregivers when it was impossible to ask them, and to the teams that perform the care of patients in invasive mechanical ventilation by SUS. These questionnaires included data on the pathologies that demand home IMV, socioeconomic profile of this population, degree of satisfaction, difficulties faced by the families and patients and family perception about home care in IMV. The questionnaires were sent to 25 services, and 151 patients were identified in home IMV, mainly in the southeastern, southern and northeastern regions of the country. The results of the questionnaires were analyzed through the program Stata version 13.1 with descriptive analysis of the data collected. The categorical variables were described by proportion and the continuous variables by mean and standard deviation.

RESULTS: The neuromuscular diseases corresponded to 78% of the pathologies, the majority of patients being female (57%). The Trilogy ® brand device is used in 80% of the patients for home IMV - 78% of caregivers consider it easy to use. Although the financial impact is considered high (27%) and average (41%), all respondents said they were satisfied (61%) or very satisfied (39%) with the new routine.

CONCLUSION: Although the sample corresponds to approximately 14% of the patients currently receiving mechanical ventilation at home in our country, our study demonstrates that the use of home IMV at SUS is feasible, safe and brings quality of life to the patient and family members evaluated.

Poster 79

ORGANIZATION AND PRACTICE OF HOME RESPIRATORY CARE IN PORTUGAL AND SPAIN: AN EXPLORATORY STUDY BETWEEN DIFFERENT CARE MODELS

Caneiras, C. [1,2], Mayoralas-Alises, S. [3,4], Calvo, J. R. [3], Escarrabill, J.[5,6], Winck, J. C. [7,8]

[1] *Healthcare Department, Praxair, Vila Franca de Xira, Portugal*
[2] *Instituto de Saúde Ambiental (ISAMB), Faculdade de Medicina, Universidade de Lisboa, Lisboa, Portugal*
[3] *Healthcare Department, Praxair, Madrid, Spain*
[4] *Hospital Universitario Moncloa, Respiratory Department, Madrid, Spain*
[5] *Hospital Clinic de Barcelona, Barcelona, Spain*
[6] *Master Plan for Respiratory Diseases (Ministry of Health) & Observatory of Home Respiratory Therapies (FORES)*

[7] *Centro de Reabilitação do Norte, Valadares, Portugal*
[8] *Faculdade de Medicina da Universidade do Porto, Porto, Portugal*

Introduction: Chronic Respiratory Diseases are becoming the dominant causes of death and disability worldwide with consequent increasing of Home Respiratory Care (HRC), mostly Long-term oxygen therapy (LTOT), mechanical ventilation (MV) and continuous positive airway pressure (CPAP) ventilation. The aim of this study is to increase the knowledge and understanding of home respiratory models in Portugal and Spain in order to identify good practices to ensure optimal care for respiratory patients.

Methods: The general organization for HRC was evaluated between specialists in chronic respiratory care for Spain and Portugal. The information recovered was then categorized: Information on home treatments; Equipment provided; Regulation of prescription; Organization of supply of service; Home supervision and Reimbursement system. The trends of the last five years were also evaluated.

Results: About 800.000 patients currently receive HRC in Portugal (18.8%) and Spain (81.3%) with similar prevalence in both countries (1.460 and 1.427 patients per 100.000 population, respectively). Analogous therapies are available, essentially LTOT (19.87%), MV (4.85%) and CPAP (67.74%). The National Health Service is mainly responsible for the reimbursement and clinical guidelines but in Spain there are different protocols according to the autonomous communities. Significantly, a national program was implemented in Portugal by Health Authorities in 2013 with well-defined economic and clinical standards, which allowed a geographical equity of access and free choice of provider by the patient. Additionally, innovative technology has been implemented (electronic prescription, dematerialization and telemonitoring) with improvements in healthcare delivery.

Conclusons: Important differences were identified. An innovative HRC model has been successfully implemented in Portugal, representing a change of paradigm in this therapeutic area. Future studies should help to identify Quality of Care indicators based on Patient-Centered Care, including Safety, Effectiveness and Patient Experience.

Poster 80

A 10-YEAR EXPERIENCE OF HOME MECHANICAL VENTILATION IN A SINGLE CENTER IN CENTRAL POLAND

Jacek Nasiłowski[1], Katarzyna Mycroft[2], Joanna Klimiuk[1], Tadeusz Przybyłowski[1]

1. Department of Internal Medicine, Pulmonary Diseases and Allergy, Medical University of Warsaw, Poland
2. Students' Scientific Association, "Alveolus", Department of Internal Medicine, Pulmonary Diseases and Allergy, Medical University of Warsaw, Poland

BACKGROUND: Home mechanical ventilation (HMV) in Poland is still evolving in comparison to Western European countries. However, a national reimbursement system established in 2004 has allowed significant development of HMV. The aim of this study was to analyze patient characteristics, treatment methods and survival prognosis and its factors in a single HMV Center in Central Poland.

METHODS: We retrospectively analyzed all patients treated with HMV since the founding of the center in 2006 until 31st of October 2017. The following data was collected and analyzed: criteria of HMV initiation, diagnosis, outcomes, mode of ventilation and settings, compliance, type of device, interface and the need of oxygen use. Kaplan-Meyer analysis was used to calculate survival.

RESULTS: In total 227 patients were treated; 109 men (48%), out of which 53 died (23%), 6 (3%) refused to continue, 6 (3%) were referred to another facility and 4 (2%) withdrew after clinical improvement. At the time of preparing this abstract there were 158 patients continuing HMV. Patients with restrictive disorders of the chest wall constitute the biggest group - 48 patients (30%), followed by obesity hypoventilation syndrome (OHS) - 38 (24%), neuromuscular diseases (NMD) - 34 (21%) and COPD – 31 (20%). Overall mortality was 10% after 6 months, 13% after 1 year, 18% after 2 years and 26% after 3 years. Significant statistical differences were observed between the groups. The worst prognosis was noted in COPD (median survival 15 months) compared to the NMD group (median survival 29 months). A surprisingly low survival rate was found in OHS (median survival 17 months). The number of new admissions per year systematically increased over the survey period from 2 patients in 2006 to 45 in 2017.

CONCLUSIONS: HMV is a rapidly developing form of treatment. The leading indication for HMV are restrictive diseases. COPD patients have the worst survival prognosis.

Poster 81

EXPERIENCE OF HOME INVASIVE MECHANICAL VENTILATION PROGRAM IN SAUDI ARABIA

Eiad Kseibi MD[1], Mohammad Albaqami RRT[2], Khaled Kardesh RN[3], Mouhamad Jamil MD[1], Mohammed Hijazi MD[1], Nawal Salahuddin MD[1]

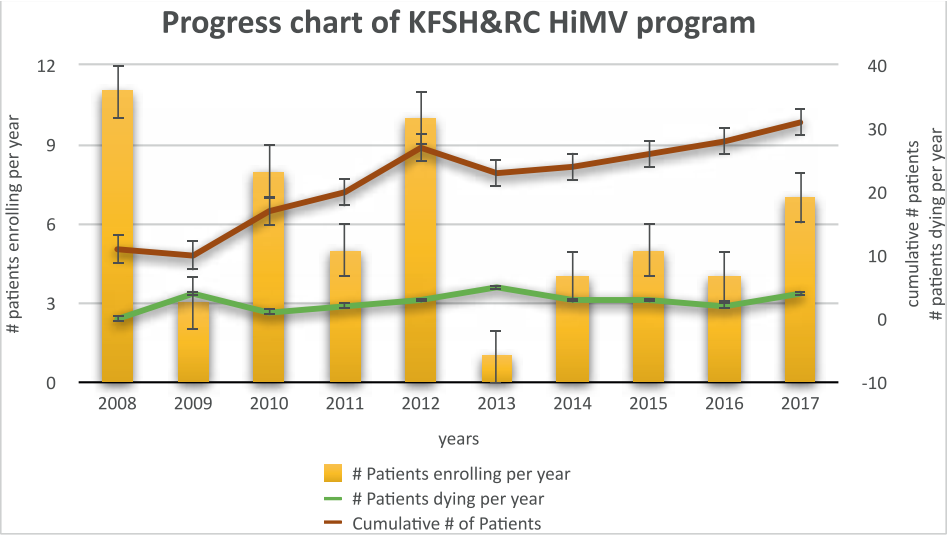
[1] *Adult critical care medicine department, King Faisal specialist Hospital and research center (KFSH&RC), Riyadh, KSA*
[2] *Respiratory care services, KFSH&RC, Riyadh, KSA*
[3] *Critical Care Nursing, KFSH&RC, Riyadh, KSA*

Background and introduction: In countries with under developed home health care systems and varying practices around end-of-life, such as Saudi Arabia, home invasive mechanical ventilation (HiMV) remains scarcely utilized. A home invasive mechanical ventilation program was started at King Faisal specialist Hospital and research center (KFSH&RC) in 2008, this is a report of our experience.

Methods: a retrospective audit of all patients enrolled in the KFSH&RC HiMV program was carried out. Data is presented on all patients enrolled in the program from start in 2008 until December 1st 2017. We collected demographic identifiers, initial diagnosis, type of ventilatory support, number of emergency room (ER) visits and hospital admissions, and inpatients days. The results are presented as frequencies, proportions or rates.

Results: a total of 58 patients have been enrolled in the program. Of those 30 pts (52%) are male, 47 (81%) are adults (Age > 14 years). The most common reasons for instituting HMV were neuromuscular disease 23 patients (40%), followed by pulmonary disease 15 patients (26%), congenital syndromes 11 patients (19%). 16% (9 patients) had miscellaneous conditions including heart disease, pulmonary hypertension, etc. Types of ventilatory supports included only nocturnal invasive mechanical ventilation in 10 pts (17%), and continuous invasive mechanical ventilatory support in the remaining 48 patients (83%). Median days of home mechanical ventilation were 952 (range 36 – 3589). There were a total of 271 ER visits, with 1.45 ER visits per patient - years. 10 patients (17%) had 0 ER visits, 31 patients (53%) had between 1-5 visits, 10 patients (17%) had 6-10 visits, and 7 patients (12%) had > 10 visits. There were 127 hospitalizations with 0.68 admissions per patient – years. Median length of hospitalization was 15 days (range 0 – 1958).

Conclusions: We have shown that home mechanical ventilation programs can be successful in countries with limited domiciliary supportive medical care, such as Saudi Arabia.



Poster 82

HEALTHCARE UTILIZATION AND COSTS OF HOME MECHANICAL VENTILATION

ML Nonoyama[1], DA McKim[2], J Road[3], D Guerriere[4], PC Coyte[4], M Wasilewski[5], M Avendano[6], SL Katz[7], R Amin[8], R Goldstein[6], B Zagorski[4], L Rose[5]

[1] Faculty of Health Sciences, University of Ontario Institute of Technology, Oshawa, ON
[2] Division of Respiratory Medicine, The Ottawa Hospital, Ottawa, ON
[3] Division of Respirology, Department of Medicine, University of British Columbia, Vancouver, BC
[4] Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, ON
[5] Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, Toronto, ON
[6] Respiratory Medicine, West Park Healthcare Centre, Toronto, ON
[7] Division of Respirology, Department of Pediatrics, CHEO, University of Ottawa, Ottawa, ON
[8] Division of Respiratory Medicine, The Hospital for Sick Children, Toronto, ON, Canada

Background: Individuals using home mechanical ventilation (HMV) frequently choose to live at home for quality of life, despite financial burden. Previous studies of healthcare utilization and costs do not consider public and private expenditures, including caregiver time.

Objectives: To determine public and private healthcare utilization and costs for HMV users living at home in two Canadian provinces, and examine factors associated with higher costs.

Methods: Longitudinal, prospective observational study (April 2012 to August 2015) collecting data on public and private (out-of-pocket, third party insurance, caregiving) costs every two weeks for six months using the Ambulatory Home Care Record. Functional Independence Measure (FIM) was used at baseline and study completion. Regression models examined variables associated with total monthly costs. A priori variables selected using Andersen and Newman's framework for healthcare utilization, relevant literature, and clinical expertise. Data in 2015 Canadian dollars ($1CAD=$0.78USD=£0.51=€0.71).

Results: We enrolled 134 HMV users; 95 with family caregivers. Overall median (interquartile range) monthly healthcare cost was $5,275 ($2,291-$10,181) with $2,410 (58%) publicly funded; $1,609 (39%) family caregiving; and $141 (3%) out-of-pocket (< 1% third party insurance). Median healthcare costs were $8,733 ($5,868-$15,274) for those invasively ventilated and $3,925 ($1,212-$7,390) for non-invasive ventilation. Variables associated with highest monthly costs were Amyotrophic Lateral Sclerosis (1.88, 95% CI 1.09-3.26, p<0.03) and lower FIM quintiles (higher dependency) (up to 6.98, 95% CI 3.88-12.55, p<0.0001) adjusting for age, sex, tracheostomy, and ventilation duration.

Conclusions: For individuals using HMV and living at home, most healthcare costs were publicly supported or associated with family caregiving. Highest costs were incurred by the most dependent users. Understanding healthcare costs for community-residing HMV users will inform policy decisions to optimize resource allocation, helping these individuals live at home while minimizing caregiver burden.

Poster 83

CARE OF PATIENTS IN HOME INVASIVE MECHANICAL VENTILATION AND ITS IMPACT ON HEALTH TEAMS

Rodrigues, DLG[1]; Carvalhaes, SRF[1]; Cifuentes, T[1]; Santos; GCSD[1], Souza; NC[1], Sala; AD[1], Hamada; ASP[1], Verdi; DS[2], Reis; S[2].

1- German Hospital Oswaldo Cruz (HAOC) - São Paulo, Brazil,
2- Coordination of Home Care (CGAD), Ministry of Health, Brazil.

INTRODUCTION: The Unified Health System (SUS) was created in 1988, guaranteeing, among other principles, universal access to health for all Brazilians. One of its modalities is the «Best at Home» program, instituted in 2011, where public home care is provided.

OBJECTIVE: to evaluate the degree of satisfaction and the impact that the care of patients in home invasive mechanical ventilation (HIMV) cause in the SAD teams.

METHOD: The HAOC, through a Program to Support the Development of the Unified Health System (PROADI-SUS) in partnership with CGAD, conducted an observational, descriptive study with the application of questionnaires to the teams that perform the care of patients on HIMV by the SUS with information about the criteria used for dehospitalization and routines established for then, aiming to know the items of quality and safety, resources spent and satisfaction of the professionals in the specific care of these users. We sent questionnaires to 25 services, mainly in the southeastern, southern and northeastern regions of the country. The results were analyzed through the program Stata version 13.1 with descriptive analysis of the data. The categorical variables were described by proportion and the continuous variables by mean and standard deviation.

RESULTS: The vast majority of SAD treat patients in a generalized way (71%), and there are no specific criteria regarding the pathology to incorporate this patient into the role of patients. Most SAD have municipal administration (45%) or state (46%), with a small university administration group (9%). Most SAD have municipal administration (45%) or state (46%), with a small university administration group (9%). All SAD have routines for disinfecting the device,

battery presence, pulse oximetry, spreadsheets for clinical and ventilatory monitoring of the patient. The impact in relation to the allocation of material resources was considered average by 67% of the teams. The stress related to the care of these patients was considered of medium impact by 75% of the professionals. The need to hire new health professionals was considered low by 34% of the teams. The vast majority of SAD present home care plans, consisting of guidelines for caregivers on hand hygiene, care for mechanical ventilation devices, hospital referrals in the event of medical emergencies, and preventive and corrective maintenance for ventilation devices mechanics.

CONCLUSION: Despite of the technical complexity involved in the HIMV, the home care teams report a medium impact on the care routine, making it possible to follow up on these patients with well-established protocols and routines.

Poster 84

A HOME VENTILATION NURSING AND ALLIED HEALTH PROFESSIONAL NETWORK

Mrs Alison Armstrong, Nurse Consultant, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust.

Background: It is well recognised that professional networking provides invaluable support for those working in the healthcare setting. There is an established Home Mechanical Ventilation (HMV) network for the multi-professional group working within long-term ventilation (LTV) in the United Kingdom (UK), but this is not designed to address the challenges facing members of the nursing and allied health professional (AHP) teams working in the actual delivery of this treatment outside of the hospital setting.

Objective: To provide and co-ordinate a supportive network for nurses and AHPs who work in the delivery of LTV in the community setting.

Method: The Home Ventilation Benchmarking Group was originally established by a home ventilation team in Scotland, with an aim to bring together services working remotely. For the last 10 years, this has now been hosted from Newcastle upon Tyne. The name has evolved along with the growth and development of the network, and the Specialists in Long-term Ventilation at Home (SiLVaH) group currently stands at over 100 nurses and AHPs. Many of the LTV services around the UK are represented, and there is also representation from home ventilation centres world-wide. A conference is held annually, which is attended by many of the group members, but a very well utilised email forum allows for regular discussion and problem solving around issues pertinent to the speciality of long-term ventilation.

The focus of SiLVaH is to share ideas around practise development, standardisation and service improvement. It provides a valuable insight into the management and service delivery methods employed by other centres. The conference itself allows networking opportunities with other health care professionals working within this, often isolated, specialist field of practice. The forum promotes the creation of new innovations and facilitates protocol and guideline development, which subsequently receive national endorsement.

Results: This SiLVaH network is very highly praised by the group members. It gives the healthcare personnel an opportunity to 'down tools' and think about the delivery of service. Members report benefits in terms of being able to discuss operational issues with other teams, as well as have the opportunity to be part of larger audits, practice development projects and research.

Conclusion: It is clear from the feedback that this national group is found by its members to be of both personal and professional benefit. Home ventilation is a relatively small specialist area, but being part of a larger network provides a benchmark for practice standards. This ultimately improves the quality of patient care.

Poster 85

ADMISSION PATTERN FOR NEUROMUSCULAR DISEASE PATIENTS ON HOME MECHANICAL VENTILATION: NOTTINGHAM (UK) EXPERIENCE

M Iqbal, J Colt, C Goodin, S Burrows, A Khanna, A Wills, W Kinnear, M Sovani

Introduction and Methods: We are a centre for complex Home Mechanical Ventilation (HMV) and provide care for 150 patients with Neuromuscular (NM) diseases who need HMV over the last three years. This is a retrospective descriptive study of hospital admissions for this group to help plan service and identify areas of improvement.

Results: Of the 150 HMV patients 30% have Motor Neurone Disease (MND), 10% have Duchenne's muscular dystrophy and 10 % have Myotonic dystrophy. The remainder of patients have other muscular dystrophies or myopathies. In this study all patients who did not have MND have been classed as Muscle Weakness group (MW).

Of the 150 patients, 49 (23 MND, 26 MW) had at least one (1) admission over the three years study period leading to a total of 89 admissions, with median number of admissions being one (1). Ten (10) patients had three (3) or more admissions and three admissions were due to more than one reason.

MND-HMV group (mean age 61 years) had a mean of 12 admissions per year requiring a mean total of 113 bed days. The MW-HMV group was younger (mean age 39) and required a mean of 18 admissions and 195 bed days per year.

38 admissions were due to pneumonia or bronchopneumonia. 14 admissions were due to problems with oropharyngeal secretions. 13 were to facilitate Radiologically Inserted Gastrostomy (RIG). 13 admissions were for acute inpatient non-invasive ventilation (NIV) initiation and 15 were for other reasons.

The median length of stay (LOS) for all admissions was 6 days for MND and MW groups. The median LOS for chest infections was 6 days (MND) and 7 days (MW). LOS for RIG insertion was 4 days (MND) group and 3 days (MW). LOS for RIG related complications was median of one (1) day both groups. Median LOS for problems related to excessive secretions was 4 and 5 days in MND and WM groups respectively. Acute Ventilation required median of 13 days in MND and 7 days in MW group.

Of the 150 patients, 38 died over the 3 year period (17 in 2015, 12 in 2016 and 9 in 2017). Out of the 49 patients who needed at least one admission during the study period, 20 died; 6 MW and 14 MND. All deaths in MW group were in hospital, four of which were related to chest infection, one to Ischaemic heart disease and one was expected and one on Palliative pathway. In the MND group all except one died at home. Nine (9) were expected and on Palliative pathway, while 4 died of chest infections.

Conclusion:

1) NM-HMV patients accounted for a mean of 30 admissions and 308 bed days per year. Admissions for RIG insertions were shortest whereas Acute NIV were longest.
2) Trend for reduced mortality will be investigated.
3) As MW patients died in hospital we intend to explore whether those approaching end of life would prefer to spend last days at home.

Poster 86

DEVELOPMENT OF HOME VENTILATION PASSPORT IN THE UK

Colt. J and Ross J.S

The Authors: Jacqueline Ross is a physiotherapist working in a spinal injuries centre in Sheffield. Juliet Colt a nurse working with patients with neurological conditions in Nottingham.

Context:

Home Ventilation in the UK

Every year in the UK hundreds of patients are started on Home Mechanical Ventilation. Despite being funded by one National Health Service patients managed individually by numerous home ventilation services based in major towns and cities. There is no universal management protocol and services are run in different ways. Patients with neurological need for ventilation might be managed by the same team or by a different service from those with respiratory diseases. Patients with Spinal Cord injury are managed from one of the eight supra-regional spinal injuries centres spread unequally around the country. Some patients might be a three of four hour journey from the managing centre. There is no national directory to provide information of services offered, types of patients included or staff running the service.

Care and equipment provision

Home care is provided by care agencies too numerous to count, directly employed staff or nursing homes. Funding comes via Continuing healthcare funding and Clinical Commissioning Groups. Variation in service can lead to involvement of numerous agencies and personnel arranging supply of equipment. Although informed on discharge information provided on the initiation of ventilation is complex and new to the patient and staff and will not always be remembered.

The authors set out to develop a patient held document which would give information to the individual patient to be carried with them. The aim of the document is to be all encompassing holding key information easily accessible and in one place.

If patients are admitted to their local hospital staff this might not be the centre who initiated and manage the ventilation. Staff in the acute hospital need clear information about who to contact regarding any clinical aspects of the ventilation or any equipment problems.

Document Development:

The Authors discussed the core information needed by the individual and their care team. Feedback was sought from colleagues from national specialist groups and from patients and carers. The current working documents were presented at the latest SiLVaH (Specialists in Long term Ventilation at Home) conference (December 2017), and is supported by this group. Development work continues.

Current document status:

The current working document has sections on the following:

- **Home ventilation Information**
- **Emergency Plan**
- **Tracheostomy Plan**
- **Airway Clearance Plan**
- **Advance decision to refuse treatment.**
- **Home Ventilation**

Only relevant sections are completed and provided to the individual, all can be edited as care changes and additional sections added as needed.

Poster 87

A SYSTEMATIC REVIEW OF QUALITY OF LIFE MEASURES IN LONG TERM HOME VENTILATION

Tom Doris, Ben Messer, Alison Armstrong, Simon Baudouin

Regional Home Ventilation Service, Royal Victoria Infirmary, Newcastle upon Tyne, UK

Aim: To perform a systematic review of quality of life (QOL) outcome measures in studies of patients receiving home mechanical ventilation

Background: Patient focused outcome measures are important in the assessment of the efficacy of any treatment. These both complement traditional study end points in HMV, such as survival and reduced hospitalisation, and give an additional perspective on the acceptability of treatment. QOL measures may also be used to explore "trade-offs" between increased survival and burden of treatment. QOL information can additionally inform health economic analysis of HMV. However, QOL measures can be difficult to interpret in cohort studies of conditions where the natural history is one of deterioration. A further issue is whether a statistically significant difference in a QOL measure constitutes a real change for the patient or career.

Methods: We performed a literature search of all clinical trials and cohort studies related to long term home ventilation for any condition which included one or more quality of life outcome measures, either as a primary or other outcome measure. We searched MEDLINE 1946 to December Week 2 2017, Embase 1996 to 2017 Week 52 and Web of Science. Search strategies for these databases were designed with the assistance of an experienced librarian information technologist. We included all published trials that were available in the English language.

Results: 5304 publications were identified from the searches performed. Of these, 17 were considered relevant. Seven of the studies were randomised controlled trials and 10 were observational cohort studies. A wide variety of quality of life tools were used including the SF-36, the Severe Respiratory Insufficiency questionnaire (SRI) and the Saint George Respiratory Questionnaire. Six studies included patients with COPD, 4 studies included patients with motor neurone disease, 1 study included patients with kyphoscoliosis, 1 study included kyphoscoliosis and neuromuscular disorders 1 study included patients with duchenne muscular dystrophy, and 2 trials were in patients with OSA/OHS. Two study included all patients requiring ventilation for chronic respiratory failure. Study size varied from 12 participants to 264 (median 30). Eleven trials demonstrated a statistically significant improvement in the quality of life measures employed. Only 2 of the 6 COPD trials demonstrated any improvement in quality of life with ventilation.

Discussion: There was a great deal of heterogeneity in case mix and quality of life measures used between the studies included. Overall, there seems to be a trend towards improved quality of life. Most COPD studies did not demonstrate improvement.

Poster 88

FEASIBILITY OF OVERNIGHT TRANSCUTANEOUS CO2 MONITORING IN THE HOME SETTING

Veronique Adam, RRT, David Zielinski MD, Marta Kaminska, MD, MSc

Programme national d'assistance ventilatoire à domicile (PNAVD) & McGill U. Health Centre, Montreal, Quebec

Introduction: The PNAVD supports adult and pediatric patients requiring chronic home mechanical ventilation. We have recently integrated the use of home overnight transcutaneous CO2 (TcCO2) monitoring.

Objectives:
- To validate the feasibility of home overnight TcCO2 monitoring
- To identify the specific diagnoses where this test was requested
- To evaluate the related human resources costs

Methods: A retrospective chart review was completed using the PNAVD administrative database on TcCO2 tests performed between May 2016 and May 2017. The Sentec Digital Monitoring System (Sentec AG) monitor was delivered to the patient's home by the PNAVD respiratory therapist (RT), transported in a protective case within a temperature-controlled compartment. Instruction on use of the monitor was given to the patient or caregiver. A first calibration of the device was done by the RT, a second calibration was done by the caregiver or patient just before installation and overnight recording and a third at the end of the test in the morning.

Results: During the study period, 51 tests were requested due to suspicion of residual hypoventilation for 42 ventilated patients (30 adult,12 pediatric). Five studies failed 1 due to a defective measurement membrane; 3 incorrect installations and 1 was not completed as the patient was hospitalized. Repeated tests were successfully done in these patients and in 3 patients as follow-up or post changes to ventilator settings. The adult patients' average age was 53 years (range 22 – 89, SD 18). The pediatric patients' average age was 9 years (range 3 – 16, SD 6). Patients' diagnoses are listed in table 1. Of the 46 completed tests, 10 (22%) showed a mean CO2 level > 50 mmHg.
Costs were as follows (in CAD):
Travel cost to deliver and recover the monitor: $3015.16 (average $59.12 and 68.7 km /study);
Cost of RT time (travel and download of data: $6120 (average $120 /study).
Human resources costs, in comparison, for laboratory polysomnography (PSG) performed at our centre, are as follows: $315 for the recording technician and $100 for scoring ($415 /study).
This does not include the cost of any staff required to help transfer patients from wheelchair to bed, when needed, nor the cost of travel incurred by the patient.

Conclusion: In conclusion, it is feasible to utilize the Sentec TcCO2 monitor at home in selected ventilated patients with various diagnoses. In the population tested, few studies failed, and residual sleep hypoventilation was detected in a significant number. Home overnight TcCO2 monitoring is more cost effective than TcCO2 recording as part of PSG in hospital.

Table 1. Diagnoses of patients tested

	Adult	Pediatric
Neuromuscular disease	**20**	**9**
ALS	8	-
Steinert's	4	1
SMA	2	2
Congenital Myopathies	1	4
Spina Bifida	-	1
Others (Myasthenia gravis, Ataxia, Becker, MS)	5	1
Central Hypoventilation	**2**	**1**
CCHS	1	-
Brain Tumor	1	1
Obesity-Hypoventilation	**2**	**-**
Kyphoscoliosis	**6**	**-**
Other	**-**	**2**

Poster 89

SKIN INTEGRITY IN NON-INVASIVE VENTILATION: A RETROSPECTIVE REVIEW OF ADULTS MANAGED BY THE SOUTHAMPTON NIV SERVICE

[1]Ewles S, [1]Cozens S, [2]Worsley P, [2]Ewings S, [2]Conway JH

[1]University Hospital Southampton NHS Foundation Trust, Southampton, UK.
[2]Faculty of Health Sciences, University of Southampton, UK.

INTRODUCTION: We wished to conduct a clinical audit on all domiciliary patients using the NIV service as part of the Southampton Respiratory Centre. This is the first such audit to be undertaken for our centre. We wished to identify the incidence of skin issues related to mask use in our patient groups, and to look for any correlations to those skin issues.

METHODS: All electronic records for those using NIV were reviewed and, where needed, further detail was obtained from written clinical notes. The following data were recorded: baseline patient demographics, comorbidities, type of NIV used, type of mask/interface used, number of hours per day on NIV, self-fitting of mask or not, presence of any skin issues, use of barrier dressing.

Skin issues were classified using the www.reacttoredskin.co.uk staging for pressure ulcers.

RESULTS:
- 278 patients on NIV
- Average age 55.3 yr
- There were a large number of diagnoses and comorbidities.
- 34 patients had skin issues (12%)
- 19 patients needed barrier dressing (7%)
- Of those with skin issues:
  - All skin issues were at Stage 1 of the www.reacttoredskin.co.uk classification/grading system.
  - Nine people (26% of those with a skin issue) had only a barrier dressing issued and five (15%) had an alternative mask, while ten (29%) more people had both a barrier and an alternative mask.

- 61% of patients with skin issues had a diagnosis of NMD, 18% a diagnosis of COPD, 9% OSA/OHS and 12 % other various conditions.
- A relationship between hours on NIV and skin issues could not be determined.
- 82 % of patients with skin issues had a primary interface issued as a full face mask, 6 % minimal-contact full face mask, 6 % nasal mask and 6 % nasal pillows.

CONCLUSION: Of our total domiciliary NIV patient population we found a 12% incidence of skin issues. Of those with skin issues all were considered to be at the equivalence of a stage 1 grading according to the www.reacttoredskin.co.uk classification/grading system. 26% of those with a skin issue had only a barrier dressing issued and 15% had an alternative mask fitted, while 29% more people had both a barrier dressing issued and an alternative mask fitted.

There was no relationship found between number of hours on NIV and skin issues at this point of the analysis.

It was interesting to note that of those who developed skin issues there appeared to be a trend for those with MND to develop issues at a higher rate than other conditions.

We intend to further examine our patient cohort's records for possible links between oral steroid prescription and skin care issues, and use of humidification and skin care issues.

Poster 90

INTEGRATING TELEHEALTH VIDEO CONSULTATION INTO A HOME MECHANICAL VENTILATION SERVICE

S Conti, L M Hannan, C Chao, D J Berlowitz, N Sheers, D Megas, M E Howard

Austin Health & Institute for Breathing & Sleep. Melbourne, Australia

Background: The Victorian Respiratory Support Service (VRSS) is a home mechanical ventilation provider that delivers medical, physiotherapy and outreach nursing services to over 850 individuals using assisted ventilation across the state of Victoria, Australia. This poses considerable geographic and logistical challenges for the service and its clients.

Objective: To develop and evaluate models of care that incorporate video calls (Telehealth) for medical, physiotherapy, and outreach nursing.

Methods: A 12-month project was undertaken utilising a video call platform (HealthDirect). Telehealth consults occurred between physicians and VRSS clients in remote areas and/or clients with physical disability. High-risk ventilator dependent clients that were unable to attend in-person were prioritised. Similarly, a nursing outreach model utilised Telehealth for carer training and to address ventilator equipment issues that could not be resolved via phone. VRSS physiotherapists also provided training and supervision of staff at a regional health service via Telehealth to initiate long-term non-invasive ventilation (NIV). Outcomes included travel avoided (time, distance), change in the number of ventilator dependent clients without medical review for 12-months, client and clinician satisfaction. The System Usability Scale (SUS) was included in client surveys to evaluate the video call platform.

Results: Over 12-months, 192 video calls were conducted for 130 VRSS clients. Telehealth was used less often for outreach nursing than for medical consults (n=5 vs n=186). Two clients commenced NIV at a regional health service with VRSS physiotherapist supervision via Telehealth. Clients saved over 840 hours and 62,000 kilometres of travel by not attending in-person. There was a 43% reduction in the number of ventilator dependent clients who had not undergone medical review in 12 months (n=28 to n=16). The HealthDirect platform was rated on average 84.6/100 by clients on the SUS. Over 90% of respondents to the client survey reported that Telehealth saved them time and 100% rated it a success that they would use again. Clinician satisfaction with Telehealth was also high, however, most reported that it produced time savings for clients but not clinicians.

Conclusion: Telehealth substantially reduced travel, re-engaged high-risk clients with physicians and allowed for NIV implementation in remote locations. Although all users were satisfied with Telehealth, clients attributed greater time savings to it than clinicians did. This may have been a contributing factor to the low utilisation of Telehealth by outreach nursing. Telehealth appears to have utility as a complimentary communication strategy to support users of home mechanical ventilation.

Poster 91

CASE STUDY: INCREASE AWARENESS OF HOME NON-INVASIVE VENTILATION (BI-LEVEL VENTILATION) IN REGIONAL HOSPITALS AND HEALTH SERVICES

Su, Yingli, Clinical Nursing Consultant

Victorian Respiratory Support Service Outreach Department, Institution of Breathing and Sleep, Australia

Background: A 68-year-old female with Muscular Dystrophy who is dependent on Non-Invasive Ventilation (Bi-level ventilation), living in regional Victoria has raised her concerns to our service regarding some health professionals' awareness level on home Bi-level ventilation. She reports that when she presented to local health institutions including Emergency Department and other inpatient and outpatient departments in the local hospitals, her Bi-Level ventilator has been frequently mistaken as Continuous Positive Airway Pressure (CPAP) machine or portable oxygen. This patient is under the care of Victorian Respiratory Support Service (VRSS), which is a statewide home mechanical ventilation service in Victoria caring for over 800 clients in the community. There is no formal studies done to assess awareness of home Noninvasive Bi-Level ventilation in regional health institutions in Victoria. And there is minimal research done elsewhere on this topic. However, in our day-to-day work, we have noticed that Bi-Level ventilation can be mistaken as CPAP or oxygen therapy by some health professionals that have not had exposure to it. As a result, patient might not receive appropriate care when presented to these institutions. In this case study we exam the likely causes of the issue. We established some ways to overcome this issue.

Aim: Improving awareness of home Non-invasive Bi-Level ventilation in regional health services in Victoria.

Methods and procedures:

1. Encouraged patient to continue to reinforce staff members attending to her care in the regional health institutions that her ventilation is not CPAP
2. Encouraged patient to refer health professionals that are unclear about the difference between Bi-Level ventilation and CPAP therapy to our service so we could provide them with information.
3. Develop NIV emergency plans for this patient to direct the patient and her caregivers to manage NIV related emergencies.
4. Bright sticker on the machine showering "Bi-Level ventilation – NOT CPAP, Austin Health 9496 3688).

Outcome and results: The above interventions decreased patient anxiety in worrying that her Bi-level ventilation might be mistaken as other therapy. Increased staff awareness, ensure appropriate care was provided to the patient, and direct staff to seek assistance when required.

Conclusions and discussions: Bi-Level ventilation can be mistaken as CPAP or oxygen therapy in regional health services in Victoria due to lack of exposure. Patient education, clear written emergency plans and distinctive signs are useful to improve this issue. However, this is one single isolated case, a formal study is to be conducted to gain more understanding on the topic.

Poster 92

DELIVERING LONG TERM VENTILATION FOR CHILDREN AND YOUNG PEOPLE IN A HOSPICE CARE SETTING- ENSURING SAFE AND EFFECTIVE CARE

Ridout, J. Van Den Brink-Budgen, R. Lynn, D. Devereux, H. Pipe, C. Chilvers, E & Maynard, L.

East Anglia's Children's Hospices

Background: Children and young people (CYP) with long term ventilation (LTV) needs have been accessing the hospice setting in increasing numbers over recent years. A serious incident involving a young person in a UK hospice, highlighted the need for a review of services and triggered an audit of LTV practice standards across East Anglia's Children's Hospices (EACH). This revealed: a lack of standardised LTV care plans or escalation plans, child specific plans without detail and an absence of formal competencies/training for staff across the EACH network of three hospice services. As a consequence, care was suspended to EACH's 27 LTV CYP. This paper outlines the development and delivery of a training model delivered to teams across our network by novel specialist nurse roles which enables safe effective care to this group of CYP.

Method: The 'LTV project' was initiated by a Matron and four nurses seconded from the hospice care teams across the network. Through spending time with family's, child specific LTV folders were created, including vital documentation; equipment lists, escalation plans and pictorial guides. The seconded nurses attained competence, using a train the trainer model for ventilators and then became responsible for training nurses and care assistants. A questionnaire was sent to all nurses and carers regarding what training and/or competencies they had, those with previous experience in LTV were then fast tracked onto the programme. The model of training combines e-learning, face to face learning, work book and practical competency assessment. The model of care was enhanced with two clinical nurse specialist (CNS) roles in LTV and respiratory care.

Results: Barriers to the training model included: staff being unavailable to shadow trainers; and lack of confidence resulting in reluctance to undertake the LTV skills. A supportive network was created across the three hospices to combat these, study days and shadow shifts were adapted and tailored to individual nurse and care assistant needs. At 9 months, since introduction of the 'LTV project' across EACH there are 26 nurses and care assistants fully competent in LTV care and 21 children and their families accessing care, with new referrals underway.

Conclusion: We are confident that care of CYP with LTV needs is safe and effective. We have made a positive impact on care for CYP in the wider community and improved communication channels with all multidisciplinary teams involved. We are accepting an increasing number of referrals of CYP into our services with these additional needs, a group of CYP who will increase in complexity and numbers as health care and technology advances. Further evaluation of seconded nurses and CNS roles is ongoing.

Poster 93

CHARACTERIZATION AND SURVIVAL OF PATIENTS WITH SPINAL MUSCLE ATROPHY TYPE 1 ON HOME MECHANICAL VENTILATION PROGRAM OF MINISTRY OF HEALTH, CHILE

R. Vera Uribe[1,2], R. Torres-Castro[1,2], C. Suranyi Gonzalez[2], G. Villarroel[2], L. Vasconcello[1,2], M. Barros Poblete[2], J. Rosales[1,2], R. Valenzuela[3], P. Pontoni[3], R. Paiva Reinero[3]

[1] *Programa Nacional de Ventilación Domiciliaria, Unidad de Respiratorio, Ministerio de Salud (Chile)*
[2] *Departamento de Kinesiología, Facultad de Medicina, Universidad de Chile - Santiago (Chile)*
[3] *Unidad de Respiratorio, Ministerio de Salud Chile - Santiago (Chile)*

Introduction: Spinal muscular atrophy type 1(SMA1) is the most frequent genetic cause of mortality in infants. Without ventilatory assistance, the life expectancy does not reach two years. Providing noninvasive/invasive ventilatory support is a controversial issue. In any case, they have clinical stability, making it possible for them to be moved and managed at home, where patients and their families benefit.
Our objective was to describe and characterize the patients with SMA1 admitted in the home mechanical ventilation program in Chile (HMVP), and its economic implications.

Methods: A retrospective study was designed. Patients with SMA1 with invasive and non-invasive ventilation during the period 2006-2016 in the HMVP were included. We describe age, gender, the age of entry, evaluating the decrease in the care costs, length of stay and mortality of all patients with SMA1.

Results: Since 2008, 36 children have been admitted, 34 with genetic confirmation of their diagnosis, all patients ventilated 24 hours/day, 31 with invasive ventilation. During the period 8 patients died, all due to respiratory failure, 3 in non-invasive ventilation modality. 13 were female, 19 lived in Santiago (capital of Chile). Mean age of admission was 2.0 years (range 0.5-10.9 years) and permanence time of 3.1 years (range 0.1-9.0 years). All invasively ventilated patients have a paramedic provided by HMVP at their home for 12 hours. Mean age of survival was 11.9 years (95% CI9.5-14.2) EE: 1.2. The costs for patients admitted to HMVP decrease by 76,5% vs. intensive care units.

Conclusion: There is important clinical stability, decrease in the resources used and an increase in survival.

Poster 94

AN INCREASE IN CHILDREN REQUIRING HOME VENTILATION IN THE EAST ANGLIA OF THE UK – HOW DO WE PLAN AHEAD FOR A SEAMLESS SERVICE?

Tyson F RNc BA (Hons) & Morley S FRCPCH FFICM PhD

Cambridge University Hospitals NHS Foundation Trust | Addenbrooke's Hospital Cambridge

Background: Technological and medical advancement in the care of children requiring long-term ventilation (LTV) has increased the need for specialist support of these patients in the community setting. Facilitation of a discharge from the acute hospital setting needs to be both efficient and effective. Once discharged, the continuing coordination within the multidisciplinary team (MDT) is essential to ensuring the children remain at home. The provision of Long Term Ventilation services across the UK has increased over the past ten years to support these patients as discussed by Wallis et al (2015). A recent national review by PICANET titled 'Paediatric Critical Care and Specialised surgery in children review' took place in 2015-2016. The data showed an increase in the average length of stay of patients in PICU across the country some of these are taken up by technology-dependent children.

Aim: To outline future approaches to overcome the challenges associated with a significant increase in patient numbers both as inpatients and outpatients.

Method: The Long term ventilation Service based in Cambridge University Hospital has seen a steady increase in patient numbers over the last 5 years including both inpatient and outpatient workload. The increase in patient numbers brings an increase in the complex care surrounding these children. A review of the children and their journey through the service will allow us to review the processes involved and potential improvements.

Results: A review of the service both inpatient and outpatient demonstrated themes that will enable us to overcome some of the challenges we face. The key themes: understanding staffing requirements, joint working with other charity and hospital providers, improving the inpatient environment for home ventilated children needing admission, improving the equipment service to ensure patient safety.

Conclusion: Evidence suggests the number of children within the UK requiring ventilation in hospital or at home is increasing and we have seen this in our local population. The development of new approaches to support the needs of patients is essential to ensure a safe and sustainable service.

Poster 95

SCREENING FOR PSYCHOSOCIAL RISK AND RESILIENCE IN FAMILIES OF CHILDREN USING LONG-TERM VENTILATION

Polyviou, J. MN, NP-P[1], Shahidullah, S. MSc[1], Mehdian, Y.[1], Orkin, J. MD, MSc[1], Vinette, J. MSW[1], Netten, K. MSW[1], Edwards, A. MSW[1], Amin, R. MD, MSc[1,2]

[1] The Hospital for Sick Children, Toronto, Canada ; [2] University of Toronto, Toronto, Canada

Background: Medical and technological advances have resulted in a growing cohort of children using long-term ventilation (LTV) at home. Children using LTV at home are high users of health care with medical fragility, chronicity and complexity. To date, the prevalence of psychosocial risk in families of children using LTV has not been systematically reported using quantitative measures. The revised Psychosocial Assessment Tool (PATrev) is a brief screening tool that quantifies psychosocial risk in a parental caregiver of a pediatric patient. PATrev assigns family caregivers into three levels of psychosocial risk: universal (low risk), targeted (moderate risk) and clinical (severe risk). The aim of our study was to determine the prevalence of psychosocial risk in families caring for children using LTV followed at our tertiary, pediatric institution, The Hospital for Sick Children (SickKids).

Methods: Families of children using LTV at home were consecutively recruited from the LTV clinic at SickKids from June 6, 2017 to November 28, 2017. A family caregiver completed the PATrev during a regularly scheduled clinic visit. The PATrev survey was reviewed for suicidal or homicidal ideations prior to families leaving the clinic to assess the need for timely crisis management. The PATrev was scored by the research team within 24 hours of completion. If a family caregiver scored in the clinical or targeted risk categories, a social work consultation was arranged within 14 days. The primary study outcome was the prevalence of psychosocial risk characterized by the percentage of children in the clinical and targeted risk categories.

Results: To date, 57 family caregivers have completed the PATrev. Results have shown that 40.3% (n=23) scored in the universal range, 47.4% (n=27) scored in the targeted range and 12.3% (n=7) scored in the clinical range. When compared to the literature of other high-risk populations such as oncology, sickle cell, congenital cardiac disease and inflammatory bowel disease, children using LTV had the largest proportion of family caregivers in the targeted category and the smallest proportion of family caregivers in the universal category. The average PATrev score was 1.23, which was second highest amongst the comparator groups.

Conclusions: To date, our data shows that family caregivers of children using LTV have higher psychosocial risk and resilience scores when compared to most high-risk populations. This highlights the ongoing need for systematic identification of psychosocial risk of this population in addition to prioritizing the allocation of psychosocial services to help support these families.

Poster 96

DECIDING WHETHER OR NOT TO INITIATE CHRONIC VENTILATION IN CHILDREN: PARENTS EXPERIENCE

Laura Verweij, Esther Veldhoen.

Wilhelmina Children's Hospital, UMC Utrecht

Introduction: Technical possibilities in medicine increase the rapidly. More and more treatments can be given at home. In the Netherlands approximately 350 children are receiving mechanical ventilation at home. In 2016 the four Centres of Home Mechanical Ventilation in the Netherlands made a national guideline for chronic ventilation for children, consisting of indications for chronic ventilation. Technological and pharmacological developments go fast, like new drug therapies for children with SMA. These developments lead to changes in decisions about initiating ventilation. In addition, we notice that parents and children are better informed and claim certain treatments. As a result, ethical dilemmas arise in young children. The aim of this study was to explore the experience of the parents in the decision-making process and what their requirements are in order to improve this process.

Method: We organized two meetings with parents. During these sessions with each four couples, they shared their experiences with each another. Discussion was guided by two independent moderators. During these sessions the professionals involved in the care were present but not allowed to intervene in the discussion. The discussions were recorded and worked out and resulted in the selection of themes. Data were sent to the parents and the professionals for verification. Subsequently, these were discussed and used to improve care.

Results: Communication: Parents often feel like they are not heard and physicians do not take their opinion into account sufficiently. Parents are experts in knowing their child. Thereby, a lot of physicians are involved, which sometimes leads to contradictory communication to parents.

Information: Parents would like to receive honest and clear information sooner rather than later when chronic respiratory insufficiency is suspected. Thereby, they benefit from contact with parents who have experienced a similar situation.

Decision making: Parents want to participate in the decision making after being informed about the pros and cons.

Instruction: At the start parents still have a lot to learn; after a while they become the experts in the care for their child. Nurses and doctors need to respect this expertise.

Reachability and emergency care need to improve. Clear information who to call with which problem is important. Patients are reviewed in the emergency department sometimes, even when there is high probability to be admitted in ICU. Direct admission to ICU, instead of review in the emergency department is preferable.

Conclusion: A lot has changed around the decision making process for home mechanical ventilation. Due to technological developments parents are better informed and thus wish to be more involved in the decision making process. Open communication with parents and shared decision making help improve the care for these children.

Poster 97

THE CHANGING DEMOGRAPHICS OF A REGIONAL CHILDREN'S LONG TERM VENTILATION SERVICE OVER THE PAST 8 YEARS

Mckay L, Harrison L, Mitchinson V Ebdon AM,

Children's Long Term Ventilation Service, Great North Children's Hospital, Newcastle Hospitals NHS Trust, UK.

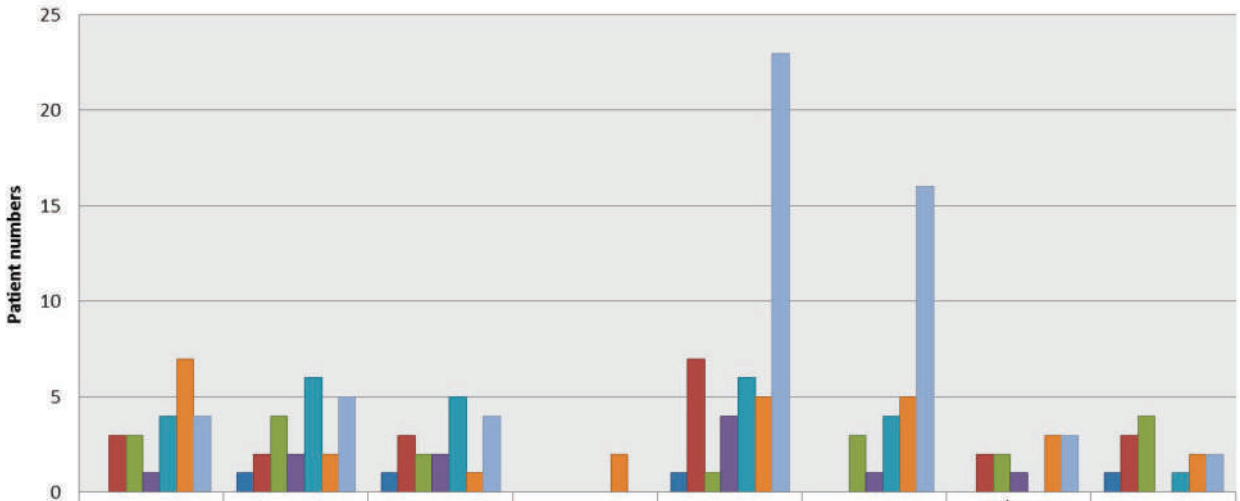
Background: Recent advances in Neonatal and Paediatric care have increased the incidence of survival of children with life threatening or life limiting conditions. Over the same period technological advances have produced a range of portable, easy to use, reliable and efficient mechanical ventilators. As a result of this, the number of children requiring either temporary on permanent ventilation has increased.
The Great North Children's Hospital's (GNCH) long term ventilation service (LTV) was formed in February 2010. The service offers a specialised regional service covering a large geographical area across the North East England and North Cumbria for children and young people aged 0-18 years.

Aims: To look at the change of patient population over the period the service has been in operation.

Methods: Patient data examined from database for years 2011 to date. Patients were grouped by year of set-up, method of ventilation and reason for ventilation. There are a small number of non-ventilated children within the service who are seen for cough augmentation and high flow devices but these are not included within this study.

Results: Patient numbers set up have increased from 4 (2011) to 57 (2017). The underlying reason for ventilation remains diverse with change over time demonstrated on the chart below. The infants born prematurely often have another primary reason for ventilation so possibly under-represented in our data set. The two patients groups that have grown in the past year are patients with obstructive sleep apnoea (OSA) and those with neurodisability.

Conclusion: Our patient numbers have grown particular in patients with OSA. There is an increased awareness of the benefits of treating OSA to prevent long-term effects and this supports evidence that obesity is a growing problem that is now impacting healthcare needs in childhood. Children with neuro-disability are another increasing patient group which may represent the changing expectations of parents and the increasing interventions offered within paediatric practice.
The absolute number of patients, although increasing, does not reflect the growing complexity of all patients within the defined categories as now many patients have overlapping diagnoses. This needs to be taken into account when service provision is reviewed.



	Neuromuscular disease	airways	cardiac	prematurity	osa	neuro disability	primary respiratory disease	other
2011	0	1	1	0	1	0	0	1
2012	3	2	3	0	7	0	2	3
2013	3	4	2	0	1	3	2	4
2014	1	2	2	0	4	1	1	0
2015	4	6	5	0	6	4	0	1
2016	7	2	1	2	5	5	3	2
2017	4	5	4	0	23	16	3	2

Poster 98

A CENSUS OF ACUTE PAEDIATRIC HMV PATIENTS IN THE WESSEX REGION

J Hiscutt, J Kerr, C Cairns and H Evans

University Hospital Southampton NHS Foundation Trust

Background: We are currently seeing high numbers of Home Mechanically Ventilated (HMV) children at University Hospital Southampton NHS Foundation Trust. As a tertiary centre we wanted to examine how our patient numbers and length of hospital stay compare to those elsewhere in the region. We also wanted to explore the complexity of these patients.

Method: A one day census was completed by the Wessex Critical care network. All hospitals in the region contributed to the audit to capture the location and numbers of current HMV inpatients.

Results: Of the 14 patients captured during this census, 50% of the patients were invasively ventilated via a tracheostomy and two thirds of the patients were ventilated 24 hours a day.12 children were inpatients at a tertiary centre within the region (three at Oxford University Hospitals, nine at University Hospital Southampton NHS Foundation Trust) Of the nine children in Southampton 6 were medically unstable and three were well awaiting discharge into the community. Of the two children in district general hospitals one was awaiting discharge into the community and one was acutely unwell. The average length of stay for these patients was 143 days.

Conclusion: Patients continue to spend prolonged periods of time in hospital whilst awaiting care package provision and as a result of protracted recovery from acute illnesses. Delivery of care in local hospitals occurs rarely. Overcoming the challenges that prevent care being delivered closer to home would improve patient and family experiences.

Poster 99

INTEGRATIVE SERVICE DELIVERY FOR PEDIATRIC PATIENTS WITH TRACHEOSTOMIES – UNDERSTANDING HEALTHCARE UTILIZATION

Kam K.[1,2], Sullivan J.[2], Mitchell I.[1,2]

[1] *Section of Respiratory Medicine, Alberta Children's Hospital, Calgary, Canada*
[2] *Child Health Administration, Alberta Children's Hospital, Calgary, Canada*

Background: The number of pediatric patients with a tracheostomy is small, but the population is resource intensive. Utilization data show that the numbers in the Calgary Zone are increasing; this is partly due to population increase but also increasing medical complexity (eg. multi-system co-morbidities, need for ventilation). Decision for tracheostomy placement impacts length of hospitalization, involvement of many specialists and pediatric homecare. However, previous consultations indicate suboptimal care with service gaps, ambiguous guidelines and lack of human resources. In 2013, Alberta Children's Hospital (ACH) launched a multi-stakeholder project with the goal of enhancing integration of health services and care coordination for children with tracheostomies. This study's objectives were to examine this patient population's characteristics and healthcare utilization, then to evaluate the effectiveness and efficiency of integrated service delivery of care for children with tracheostomies on patients, their families and use of healthcare facilities.

Methods: This was a longitudinal cohort study of health services, using a before and after approach. The first part of the study included children (<18 yrs) who received a tracheostomy at ACH between 2005-2015. Data extracted from administrative databases included: demographics, reason for tracheostomy, gestational age, co-morbidities, procedures, time to tracheostomy and length of stay (LOS). Descriptive analysis and the Kruskal-Wallis test were used to compare LOS.

Results: 80 patients were included (50 male, 30 female). Underlying reasons for tracheostomy were: primary airway anomaly (n=45, 56%), airway anomaly as part of an underlying syndrome (n=18, 23%) and for delivery of long-term mechanical ventilation (n=17, 21%). 63% of patients were born before 38 weeks gestational age. The mean number of co-morbidities associated with each patient was 20 (SD 6). The mean number of procedures performed during the tracheostomy insertion admission was 12 (SD 5).

Mean (SD) days	All patients	Primary anomaly	Component of underlying syndrome	Mechanical ventilation	p
Time to tracheostomy from admission	31 (36)	22 (30)	33 (26)	52 (48)	<0.01
LOS in PICU	35 (61)	17 (21)	16 (18)	100 (102)	<0.01
LOS on pediatric unit	82 (92)	80 (100)	79 (68)	91 (101)	0.81

Conclusions: The decision to proceed with a tracheostomy for long-term ventilation took more time and impacted hospitalization lengths. Next steps in the study are to determine changes after the integrative service delivery model is implemented. Other factors leading to complexity (social, language, family) may affect decision-making and homecare planning and should be examined.

Poster 100 - *Scientific session «How patients use internet»* - Friday, March 16th from 16h to 17h30 - Salon Pasteur

OVNI: A SMARTPHONE APPLICATION TO HELP ADOLESCENTS AND YOUNG ADULTS MANAGING THEIR VENTILATORY SUPPORT

J. Taytard M.D.[(1), (4)], L. Galeron[(2), (4)], V. Klepacki[(2), (4)], C. Mailhat[(3), (4)]

(1) Pediatric Pulmonology department, Hôpital Armand Trousseau, AP-HP, Paris, France
(2) RespiFIL, Pulmonary rare diseases network, Hôpital Armand Trousseau, AP-HP, Paris, France
(3) Clinical Operations department, GETAID, Hopital Lariboisière, Paris, France
(4) OVNI non-profit organization, Meudon, France

Introduction: The digital revolution is transforming healthcare to a proactive medicine that is personalized and participatory. Thereby smartphone applications and internet based education tools are flourishing in numerous areas. In the respiratory field, most of them were created for asthmatic adults or smokers. To date, there is no smartphone application designed to help adolescents and adults suffering from chronic respiratory insufficiency managing their nocturnal ventilatory support.

Presentation: OVNI (acronym for "Optimisation de la Ventilation Non Invasive", Non Invasive Ventilation Optimisation), was specifically developed to accompany, guide and support adolescents and young adults dealing with chronic respiratory insufficiency and long term nocturnal ventilatory support. The aim was to create an interactive application that would allow patients to take ownership of their treatment, help them manage their appointments and prepare for their hospital visits, and reinforce interactions with their specialists.
For doctors, the application will allow a better and more precise follow up, with less information loss and a better understanding of the patients' quality of life and treatment tolerance at home.
OVNI has been presented and awarded during the first "hackaton" dedicated to respiratory diseases, in September 2016. The first phase of the development has been achieved in September 2017.

Perspectives: A clinical study held in Armand Trousseau hospital is focusing on demonstrating the utility of the smartphone application OVNI in the management of patients treated with NIV. Studies led in other fields, such as gastro-enterology or diabetology, have already shown the acceptability and usefulness of smartophone applications. We hope to demonstrate that the same goal can be achieved for patients treated with long term Non Invasive Ventilation.

Poster 101

A PROSPECTIVE AUDIT OF WITHDRAWAL OF LIFE SUPPORT VENTILATION IN PATIENTS WITH TRACHEOSTOMY

Palmer J, Faull C.

Plymouth Hospitals Trust, UK
LOROS Hospice, Leicester, UK

Background: The use of long term ventilation (LTV) improves quality of life and survival in selected patients with respiratory failure due to MND. With disease progression patients can become completely ventilator dependent. For a minority of patients, continued ventilation in the context of increasing disability means ventilation becomes burdensome and a request is made to withdraw ventilation. Evidence suggests that if withdrawal of ventilation is sub-optimally managed there are negative outcomes for patients, family and professionals. UK Guidance for withdrawal of ventilation in patients with MND was published by the Association of Palliative Medicine of Great Britain and Ireland (APM) in 2015. A prospective audit of the guidance commenced concurrently with its publication.

Method: Between November 2015 and January 2017 professionals in the UK were asked to prospectively audit withdrawals of LTV. The audit tool was developed by a multidisciplinary group with an expertise in withdrawal.

Results: 16 withdrawals were audited, 3 patients had tracheostomy ventilation (TV). The rest were mask ventilation dependent. 2 used TV for MND, the other for a high spinal injury. In addition to their usual medication, all patients were given pharmaceuticals to manage anticipated symptoms before ventilation removal. Medication was administered to achieve total loss of awareness, judged as not responding to pain/touch (2/3) or looking calm (1/3). 2 patients received sc and iv medications. All patients had midazolam with the mean total dosage being 25mg. 2 were additionally given an opiate. 2 were given levomepromazine.

To assess level of symptom management, all patients had ventilator settings reduced before withdrawal. 1 had settings reduced by 50% the others had pressures titrated slowly downwards. Once ventilation was terminated, 2 patients died within 15 minutes, the SCI patient lived for 24 hours, this was not expected.

None of the respondents felt withdrawal was a difficult experience, nor was there any family distress noted beyond that expected during a normal end-of-life process.

Conclusion: Withdrawal of TV in patients who have requested it, using APM guidance appears to provide comfort to patients and family whilst not being overly difficult for professionals.

Recommendations: APM 2015 Guidance should be used to facilitate best outcomes for family and patients following decision to withdraw TV. Further data is required to ensure guidance is reviewed and updated appropriately.

Poster 102

DEVELOPMENT OF A HOME VENTILATION CURRICULUM AND EDUCATIONAL FRAMEWORK

Mrs Alison Armstrong, Nurse Consultant, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust.
Dr Simon Baudouin, Consultant in Respiratory and Intensive Care Medicine, Regional Assisted Ventilation Service, Newcastle upon Tyne Hospitals NHS Foundation Trust.

Rationale: Due to the complex nature and disease processes of those patients who require long-term ventilation (LTV) at home, it is recognised as an area where formal training is necessary.

Background: There is good evidence that long term ventilation is effective in both improving quality of life of users and in prolonging the duration of their lives. There has been a significant increase in the number of patients receiving LTV in the last 15 years, outside of traditional hospital inpatient settings. Both the Faculty of Intensive Care Medicine (FICM) and the British Thoracic Society (BTS) identified home ventilation as an area where formal training is necessary.

Objective: To provide a training framework which defines the knowledge, skills, behaviours and attitudes required for registered health care professionals who work within a long term ventilation service. This includes skills training for weaning complex patients; coping with changing care needs; the transition to domiciliary ventilation, and those requiring end of life care.

Method: Following discussion between the FICM and the BTS, a joint working group was constituted and a competency-based curriculum was created by this expert group using a modified Delphi process. Following the development of the draft curriculum the views of home ventilation providers and Patient and Public Involvement (PPI) input was sought and finally the curriculum was approved by the FICM before submission to the GMC. Formal approval from the GMC took place in August 2015.

Many LTV centres around the UK have other registered Health Care Professionals (HCP) as part of the senior clinical team. This contributes to the multi-disciplinary approach to patient care in a positive way. A subsequent, modified version of that owned by the FICM has now been developed. This educational framework is intended as a tool to acknowledge and assess the skill and competence of the multi-professional group.

Results: A curriculum and subsequent educational framework has been developed to allow formal training and assessment in the speciality of long-term ventilation. The objectives are covered by a series of competency domains.

Conclusions: This framework has enabled all professionals involved to be efficient and effective in delivering care to a patient receiving long-term ventilation. This process ensures appropriate training and achievement of adequate skill.

Poster 103

EVALUATION OF "A BREATH OF FRESH AIR" A HOME VENTILATION MEETING FOR PATIENTS RECEIVING HOME NON-INVASIVE VENTILATION

Stephanie K. Mansell MSc BSc(Hons) MCSP[1,2], John Hurst PhD FRCP FHEA[2,3], Shumonta Quaderi[3], Amanda Bailey[4], Swapna Mandal MRCP PhD[2,3]

[1] *Therapies Department, Royal Free London NHS Foundation Trust, London*
[2] *Thoracic Medicine, Royal Free London NHS Foundation Trust, London*
[3] *University College London, London, UK*
[4] *Palliative Care Team, Royal Free London NHS Foundation Trust, London*

Introduction: Patients receiving home non-invasive ventilation (NIV) have a range of underlying conditions including: neuromuscular disease (NMD), chronic obstructive pulmonary disease (COPD), obesity related respiratory failure (ORRF) and chest wall deformities (CWD). There are disease specific support groups, but none providing support specifically for patients receiving home NIV. Our team identified an unmet need to provide a peer support forum for these patients. The aim of this report is to evaluate a home ventilation meeting, entitled "A Breath of Fresh Air", provided specifically for patients receiving home NIV.

Methods: All patients and their carers/family receiving home NIV were sent a postal invitation to attend the patient meeting. The home ventilation meeting for patients took place at our home NIV centre, in a dedicated events room, on a Saturday. Refreshments were provided. Consideration was taken on disabled access and oxygen supply. The programme for the day included education on: oxygen, breathlessness management, palliative care, flying, diet and exercise plus an opportunity for questions and answers. Stands and literature were provided from: research department, manufacturers and patient support groups. The patient meeting was evaluated through a self-developed feedback form containing a mixture of closed, open and rating scale questions.

Results: 190 patients were invited to attend. 53 patients and their guests attended the patient meeting. 21 attendees completed the feedback form. The responders were representative of a home NIV service (3 NMD, 8 COPD, 5 ORRF, 2 CWD). There were more female than male responders (12:9). The mean score on a 1-10 scale for the education sessions was 8.6. 100% of respondents would recommend the meeting to other patients being treated with home NIV. 100% of respondents wanted the day to be run again. In the open questions, attendees reported the education sessions on flying, oxygen and the manufactures stands were the most useful aspects of the day.

Conclusion: Providing a home ventilation meeting for patients is feasible. Conference attendees highly rated the education sessions and were keen for a patient meeting to be run again in the future. The patient meeting provided clinicians with an opportunity to deliver education in more detail than routine clinical practice allows. Furthermore engagement with service users provided the team with an important patient engagement and feedback opportunity.

Poster 104

BREAKING DOWN BARRIERS FOR OUR VENTILATOR USERS – THE ROLE OF "PROFESSIONALLY ACCOMPANIED" EXCURSIONS FOR VENTILATOR USERS

Lydia Hse Yin Soon, Janet Chua, Tao Sun, Bin Ni, Hong Cheng, Yeow Chan

Home Ventilation & Respiratory Support Service, Tan Tock Seng Hospital, Singapore

The Tan Tock Seng Hospital Home Ventilation and Respiratory Support Service (TTSH HVRSS) was established in Sept 2009, beginning with four patients, and it remains the main adult home ventilation service in Singapore. To date we have looked after more than one hundred and fifty adult ventilator users at home. Most of our patients have neuromuscular weakness or cervical cord injuries, and a smaller number are elderly patients with catastrophic critical illnesses that led to long term ventilator dependence. Whilst the establishment of our service has allowed ventilator users to return to the comfort of their homes, our ventilator users who are dependent on continuous invasive ventilation often had perceived limitations in quality of life because of limited mobility. As Singapore society has only recently emerged from Third World to First, and only ratified the United Nations Convention on Rights of Persons with Disabilities in 2012, our ventilator users face many challenges in travelling freely and reintegrating into social and leisure activities.

TTSH HVRSS piloted excursions outside the home accompanied by professionals (doctors, nurses, physiotherapists and medical social workers) to improve the quality of life and morale of our patients, and to encourage our patients and caregivers to acquire the knowledge, skills and confidence necessary to safely make such trips independently on their own in future. Preparation for these "accompanied" excursions included reconnaissance of the intended venue for excursion, patient preparation, equipment preparation, transport arrangements and provision of adequately skilled professional escorts. These excursions took place outside of office hours as voluntary projects, hence explaining the small number of excursions to date. Funding for these excursions (transport arrangements, additional equipment such as external batteries, portable suction machines) had to be raised by donations if patient could not afford them as these trips are not recognised as part of standard care in Singapore. Here, we share our experiences and learning points from four such excursions. We hope this will encourage professionals in emerging societies to help their patients and families lead more fulfilling lives.

Poster 105

LUNG FUNCTION PARAMETERS DO NOT CORRELATE WITH RESPIRATORY INSUFFICIENCY OR THE NEED FOR NON-INVASIVE VENTILATION IN PATIENTS WITH MYOTONIC DYSTROPHY TYPE 1

Vosse BAH[1], Otte AAB[2], Joosten IBP[3], Cobben NAM[1], Wouters EFM[1] and Faber CG[3]

[1] *Department of Respiratory Medicine, Maastricht University Medical Centre+, P.O. Box 5800, 6202 AZ, Maastricht, The Netherlands*
[2] *Department of Respiratory Medicine, Zuyderland Medical Centre location Heerlen, P.O. Box 5500, 6130 MB, Sittard-Geleen, The Netherlands*
[3] *Department of Neurology, Maastricht University Medical Centre+, P.O. Box 5800, 6202 AZ, Maastricht, The Netherlands*

Introduction: Chronic respiratory failure is a common cause of morbidity and mortality in patients with myotonic dystrophy type 1 (DM1) and can be treated with non-invasive home mechanical ventilation. Currently, lung function testing is not only used as a tool to evaluate the respiratory status of patients with DM1 but is also applied to screen for respiratory failure and assess the need for ventilatory assistance. However, it has never been studied whether this approach is appropriate in this type of patients.

Objective: In the current study, we aimed to characterize patients with DM1 with regard to lung function parameters and blood gases in order to determine whether these values can be used to predict the presence of respiratory failure and/or the need for ventilation.

Methods: Data on anthropometrics, cytosine-thymine-guanine (CTG)-repeat length of the myotonic dystrophy protein kinase (DMPK) gene, lung function, blood gases and the appliance of non-invasive ventilation (NIV) were collected in 151 DM1 patients.

Results: Ventilatory restriction was present in 53% of the patients, whereas 31% of the patients were hypercapnic upon the time of screening. Diaphragmatic dysfunction was detected in 17% of the patients. When comparing hypercapnic patients (PCO_2 ≥6.0 kPa) with normocapnic patients (PCO_2 <6.0 kPa) we only found a lower Forced Vital Capacity (FVC) in supine position (p=0.046). However, hypercapnic patients presented with a large variability in FVC supine, varying from as low as 28.4% up to 104% (figure 1A), suggesting that FVC supine alone cannot predict hypercapnia. Also, an equal random distribution of FVC supine is seen in normocapnic patients (figure 1B).

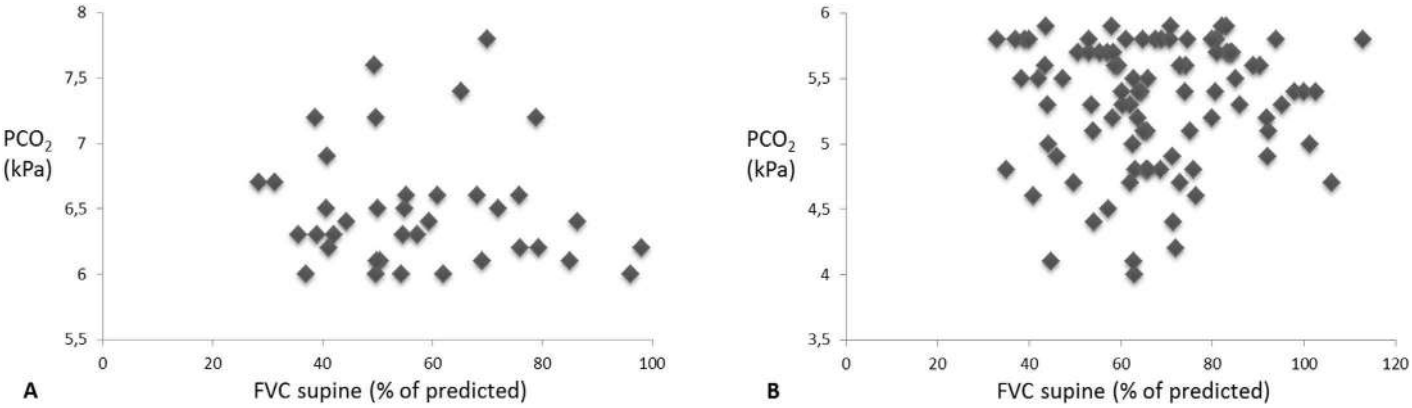


Figure 1. FVC supine is not correlated to PCO2 in both hypercapnic patients (A) and normocapnic patients (B). FVC: forced vital capacity

NIV was started in 82 patients (54%). In comparison with patients that did not start with NIV, patients with NIV had a higher BMI and a higher PCO2. However, no differences were present with regard to lung function parameters, age, gender, type of DM1, number of CTG-repeats and mortality between both groups.

In conclusion, lung function testing alone is inadequate in screening for respiratory failure and/or the need for non-invasive ventilation in DM1 patients.

Poster 106

REDUCING THE CARBON FOOTPRINT IN A REGIONAL LONG TERM VENTILATION SERVICE WITH THE USE OF REMOTE MONITORING- A ONE YEAR REVIEW

Moses R [(1)] Taylor C [(1)] Morris J [(1)] Vyas A [(1)] Wood S [(1)] Alexander N [(2)]

[(1)] *Lancashire and South Cumbria Long Term Ventilation Service (LSCLTVS), Preston, UK*
[(2)] *Brighton and Sussex University Hospitals, Brighton, UK*

Introduction: There is strong emerging evidence on the devastating effect of anthropogenic climate change on lung health. In England, the NHS accounts for 30% of the public sector carbon footprint, with patient travel being accountable for 8% of overall travel (17%). The climate change act (2008) resulted in the government and NHS committing to an 80% reduction in carbon emissions by 2050. In March 2017, the British Thoracic Society (BTS) published their Position Statement on the Environment and Lung Health which encouraged all respiratory teams to actively attempt to reduce their carbon footprint.

Aim: There are many studies detailing the benefit of telemonitoring in reducing carbon footprint within NHS services. Within the Lancashire and South Cumbria Long Term Ventilation Service (LSCLTVS) we have invested in a ventilator remote monitoring system (*EncoreAnywhere* TM) and evaluated the impact it may have on our carbon footprint.

Method: Over a 12 month time period we analysed the telephone consultations of all 276 patients under the care of the LSCLTVS. Patients or carers that called reporting deterioration in a clinical condition that could not be rectified over the telephone were identified. The normal intervention that would follow would be a visit from the GP or community respiratory team, hospital admission, clinic visit or home visit from the ventilation team. A ventilator review was indicated in 85 patients who would normally necessitate either a clinic visit to Royal Preston Hospital or a consultation at home. However as these patients had remote ventilator monitoring via the Encore Anywhere operating platform we were able to review data and make changes remotely.

Results: In a 12-month time-period 79 return journeys were prevented through the use of remote monitoring. This equated to 2703.6km (1980miles), 980kgCO2e (0.98tCO2e)* saved over 58.6 hours in commuting time and £792 in mileage costs (40p per mile). It also had a positive impact on patient experience and no hospital admissions or clinic visits were necessary after remote consultation. 52% (n=143) patients required use of rescue packs including antibiotics and mucolytics as well as remote ventilator changes.

**Emission factors from DEFRA 2012 show for an average petrol car the value is 0.24234kgCO2e per km*

Conclusion: The use of remote monitoring within the LSCLTVS has reduced the carbon footprint of the service with an average reduction of 12.4kgCO2e per patient. Patients also reported improved satisfaction and compliance.

Poster 107

HOME MECHANICAL VENTILATION FOR PATIENTS WITH NEUROMUSCULAR DISEASES: A COMPARATIVE ANALYSIS OF EPIDEMIOLOGICAL AND VENTILATORY SUPPORT PROFILE BETWEEN 2015 AND 2017

Claudio Flauzino de Oliveira (Oliveira CF); Heloisa Amaral Gaspar (Gaspar HA); Priscila Tarandach Melnik (Melnik PT);
Patricia Barcellos Caldeira (Caldeira PB)

Affiliation: Home Doctor, São Paulo, Brazil.

Introduction: Patients with neuromuscular diseases (NMDs) experience respiratory muscle weakness with impaired cough efficacy and frequently progress to chronic respiratory failure, with an increased risk of respiratory infections and hospitalizations[1]. The use of home mechanical ventilation (HMV) in NMDs can prolong survival and improve quality of life. It can be performed invasively (IMV) or noninvasively (NIMV).[2] Some studies have encouraged the adoption of NIMV as the preferred form of HMV. Purported advantages include improved communication, greater comfort and reduced production of respiratory secretions.[2,3]

Objective: To evaluate the prevalence of NIMV and IMV in patients with NMDs and compare data obtained in 2015 with data from 2017.

Methods: Data were obtained from the IW® system in October 2015 and October 2017. Comparisons and statistical analysis were performed using the chi-square test and Fisher's exact test.

Results: In 2015, 30 patients diagnosed with NMDs were in HMV and the number had grown to 44 in 2017. The diagnosis of amyotrophic lateral sclerosis (ALS) became more prevalent over time (13 cases in 2015 and 25 cases in 2017). Among pediatric patients, the leading diagnosis was spinal muscular atrophy in both years.
Use of mechanical insufflation-exsufflation (MIE) had grown significantly in 2017 as compared to 2015 (Table 1). Regarding HMV modalities, use of NIMV had also grown in 2017 as compared to 2015 (23% versus 13% of patients). There was no significant change in daily duration of HMV.

MIE	No	Yes	Total	p
2015	80.00%	20.00%	100.00%	0.059
2017	59.09%	40.91%	100.00%	
Total	**67.57%**	**32.43%**	**100.00%**	

Table 1 – Use of mechanical insufflation-exsufflation in 2015 and 2017.

Discussion: In developing countries, the preference for invasive ventilation remained until recently and was further justified by the ease of keeping patients on invasive ventilation at home (requires a smaller team of health care providers and less infrastructure). However, several studies have highlighted the benefits of NIMV.[2,4]
A recent study correlated early initiation of NIMV with increased survival in ALS patients, with a mortality rate of 35% in the early-start group versus 52.7% in the later-start group ($p = 0.022$).[5]
Although the optimal timing for NIMV start in patients with NMDs is an open question, there is a trend toward early indication. Invasive ventilation, is increasingly being postponed for use as rescue therapy in specific cases of advanced disease or acute illness.[1] In our sample, we found that, the number of patients on NIMV is increasing gradually.

An important topic for the successful maintenance of patients with NMDs on home NIMV is proper management of airway secretions. Insufflation/exsufflation techniques have proved capable of increasing vital capacity and specific MIE devices are available to facilitate these maneuvers.[2,6,7] The progressive increase in their use over a short period of time in our sample (20% in 2015 versus 41% in 2017) suggests their use and indication will grow even further in the coming years.

Conclusion: HMV plays an essential role in maintaining the quality of life of patients with NMDs, reducing respiratory discomfort and hospital admissions and prolonging survival.
In developing countries, tracheostomy is still the most prevalent route for delivery of HMV. However, in recent years, we have observed an increase in the use of non-invasive ventilation and mechanical insufflation-exsufflation.

References:

[1] Boentert M., Wenninger S., and Sansone V.A. Respiratory involvement in neuromuscular disorders. Curr Opin Neurol 2017; 30:000.

[2] Bach J.R. Noninvasive respiratory management of patients with neuromuscular disease. Ann Rehabil Med 2017; 41:519-538.

[3] Dreyer P., Lorenzen C.H., Schou L., et al. Survival in ALS with home mechanical ventilation non-invasively and invasively: a 15-year cohort study in West Denmark. Amyotroph Lateral Scler 2014; 15: 62-67.

[4] Dohna-Schwake C, Podlewski P, Voit T, Mellies U. Non-invasive ventilation reduces respiratory tract infections in children with neuromuscular disorders. Pediatr Pulmonol. 2008; 43:67-71.

[5] Vitacca M, Montini A, Lunetta C, et al. Impact of an early respiratory care program with NIV adaptation in patients with ALS. Eur J Neurol. 2017; Dec 20.

[6] Moran F.C., Splittle A., Delany C., et al. Effect of home mechanical in-exsufflation on hospitalisation and lifestyle in neuromuscular disease: a pilot study. J Pediatr Child Helath 2013; 49:233-237.

[7] Stehling F., Bouikidis A., Schara U., et al. Mechanical insufflation/exsufflation improves vital capacity in neuromuscular disorders. Chron Respir Dis 2015; 12:31-35.

Home Care - NIV - Paediatrics

Poster 108

EFFECTS OF CPAP ON RESPIRATORY DRIVE IN PATIENTS WITH OSA

Rizzi M, Radovanovic D, Frassanito F, Gaboardi P, Cristiano A, Airoldi A, Santus P.

Pulmonary Unit, L. Sacco University Hospital, Milan, Italy.
University of Milan, Department of Biomedical and Clinical Sciences.

BACKGROUND: Patients with obstructive sleep apnoea (OSA) experience an increased ventilatory drive (VDr). The effect of continuous positive airway pressure (CPAP) on the control of breathing is still poorly understood. The aim of the study was to determine the long term effects of CPAP on VDr in patients with OSA.

METHODS: We performed an observational prospective study in a cohort of 62 consecutive non obese normocapnic outpatients with OSA referring to the sleep clinic of our University Hospital and 48 aged matched healthy subjects. Participants underwent polysomnography (PSG) and physiological measurements at rest before and after CPAP titration and 1, 3, 6 and 12 months of CPAP therapy. Measurements included: inspiratory (Ti) and expiratory time (Te), tidal volume (Vt), duty cycle (Ti/Ttot), mean inspiratory flow (Vt/Ti), minute ventilation (Ve), mouth occlusion pressure ($P_{0.1}$), ventilatory response to normocapnic hypoxemia (Ve/SaO_2) and normoxic hypercapnia ($Ve/PETCO_2$). The influence of good (≥6 hours) and poor (<6 hours) compliance to CPAP was also assessed.

RESULTS: 52 OSA patients completed the follow-up and 12 had a poor compliance. Baseline anthropometric characteristics were similar between groups. Compared to healthy controls, OSA patients had an increased VDr at baseline, expressed as $P_{0.1}$ (mean±SD, 2.29±0.9 and 2.99±0.8 cmH2O) or Vt/Ti (0.40±0.11 and 0.60±0.14 L/s, $p<0.05$ in all instances). In OSA patients Vt/Ti and $P_{0.1}$ progressively decreased from the night of CPAP titration ($P<0.01$, ANOVA), without reaching control values. At baseline OSA patients had lower $Ve/P_{0.1}$ (2.31±0.9 vs 3.38±0.8 L/min/cmH2O) and Vt/Ti (0.19±0.8 vs 0.36±0.7 L/s; $p<0.05$ in both instances) compared to controls. Both indexes improved with CPAP therapy (3.19±0.7 and 0.32±0.6 after 12 months for $Ve/P_{0.1}$ and Vt/Ti, respectively; $P<0.001$).
Baseline Ve/PETCO2 was not different between groups while Ve/SaO2 was higher in patients with OSA (slope, 1.18±0.15 and 0.73±0.3 $p<0.05$). The latter was progressively reduced during CPAP treatment (0.73±0.4 after 12 months, $P<0.001$; ANOVA). After 12 months, patients with good compliance to CPAP showed better improvements in all respiratory parameters compared with those with poor compliance.

CONCLUSION: In patients with OSA the inspiratory impedance and the mechanics of breathing are inefficient, due to an imbalance of the respiratory drive in relation to the respiratory output. Regular treatment with CPAP appears to improve the efficiency of the respiratory system, paralleled by a normalization of the hypoxemic stimulus. We speculate that the persistence of an increased respiratory drive may be caused by upper airway inflammation secondary to exposure to CPAP airflow.

Poster 109

NASAL VERSUS ORONASAL MASKS FOR OBSTRUCTIVE SLEEP APNEA: LEAK, P95 AND RESIDUAL AHI

Luana Souto Barros[1], Renalli Alves[7], Gustavo Freitas Grad[2] Rui Correia[3], Rita Guedes[4], Marta Drummond[5] and Renato Jorge[6]

1- INEGI, Faculty of Engineering, University of Porto, Porto, Portugal and Sales Consult Philips Respironics, Belo Horizonte, Minas Gerais; Brazil
2- Pulmonologist in NGA Santa Cruz, Sao Paulo; Brazil
3- LABIOMEP, Faculty of Engineering, University of Porto, Porto, Portugal
4- Ventilar, Hospital Infantil João Paulo II, Belo Horizonte ; Brasil
5- Pulmonology Department Hospital São João, Faculty of Engineering, University of Porto, Porto, Portugal
6- INEGI, Faculty of Engineering, University of Porto, Porto, Portugal
7- Donen Association, Pernambuco and Otavio de Freitas Hospital, Recife, Brasil

Introduction: Obstructive sleep apnea (OSA) is the most frequent sleep disorder related to being currently recognized as a public health problem, affecting 9-24% of middle-aged adults, female and male sex respectively. Auto-titration positive airway pressure (APAP) is commonly performed using a nasal mask but some patients may prefer oronasal mask.

Objective: To investigate residual apnea hypopnea index (AHI), leak and 95thpercentile pressure (P95) differences between nasal and oronasal masks on obstructive sleep apnea (OSA) treatment.

Methods: The study included 8 patients diagnosed with OSA at Hospital São João (Porto, Portugal) who met the criteria for APAP therapy. All the data (residual AHI, leak and P95) concerning treatment modalities were collected during the 2 follow-up visit: F1(during the first consultation group, session teaching, performed by the hospital) = 21,1±4,5 days and F2(during the follow-up)=56,9±2,3 days. Patients started the study (F1) with the nasal mask, but due to oral leakage these patients changed to an oronasal mask (F2). These data were acquired through each ventilator specific software. Only p-values 0.05 were considered statistically significant.

Results: No statistical differences were found between the nasal and oronasal mask when we analyzed therapy adherence (320,3±105,4 vs 356±114,8 min. p=0,674), leak (22,6±14 vs 10,0±6,7 L/min p=0,059), AHI (2,8±2,4 vs 3,4±3,0 p=0,833) and P95 (12,8±2,0 vs12,7±1,7 cmH2O p=0,833).

Conclusions: The findings of the current study shows that there in not significant differences between nasal and oral-nasal masks on leak, P95 and residual IAH. Also, the mask exchange (nasal to oronasal mask) did not significantly affect adherence.

Poster 110

CHARACTERISTICS OF PATIENTS FITTED WITH NON-INVASIVE VENTILATION IN PNEUMOLOGY DEPARTMENT OF TOULOUSE UNIVERSITY HOSPITAL

K. Sedkaoui - Oumerzouk, S. Pontier-Marchandise, M.Dupuis, F. Laborde, M. Lescouzeres, A.Didier

OBJECTIVE: The main objective of this study was to characterize patients with respiratory insufficiency admitted in the pneumology department with the implementation of non-invasive ventilation (NIV).

METHODS: 175 patients with respiratory insufficiency were fitted with NIV in a ventilation unit of pneumology day hospital between April 2015 and October 2017, characteristics relating to the demographic data, main diagnosis, initiation circumstances, and results of the functional respiratory explorations and blood gases were collected.

RESULTS: 175 patients were included. Patients were 61.6 ±16 years old with a male predominance (55%), Body Mass Index (BMI) was 26.3 ± 8.6 kg/m². 66.5% of ventilated patients had a neuromuscular disease including 45.5% of Amyotrophic lateral sclerosis (ALS). Chronic Obstructive Pulmonary Disease (COPD) was the most frequent parenchymal disease (14.2%) and Obesity Hypoventilation Syndrome (OHS) represented 8.5% of cases of parietal disease. 46% of patients included had an obstructive sleep apnea syndrome. Average FVC was 2196.4 ±1108 ml, PaCO2 was 48.4 ±10 mmHg, and SNIP average was 31.7 cm H2O. 53% of our patients had cardiovascular (34.7%) and metabolic (29.7%) comorbidities. 56.8% were ventilated in stable respiratory condition and 43.2% in acute condition. All the patients were ventilated with barometric mode and with a bi-level ventilator (63.6% of cases) or with a support of life ventilator (2.3% of cases). Respiratory symptoms were the main criteria to introduce NIV in 63% of cases.

CONCLUSION: The majority of ventilated patients have a neuromuscular disease because of the recruitment of our unit and our activity in connection with the ALS center and the reference center for neuromuscular diseases. Most of patients (72%) were treated in the ventilation unit of pneumology day hospital, which appears to be the most suitable structure for the care of patients.

Poster 111

IS THE TREATMENT OF EXCESSIVE DYNAMIC AIRWAY COMPLIANCE WITH CPAP EFFECTIVE? EVALUATION OF AIRWAY PATENCY WITH 4D CT

M Quint [1,2] , P McParland [3], A Gangia [3], M W Ibrahim[1], K Adeniji [1,2]

[1] *Dept Respiratory Medicine,*
[2] *Dept Critical Care,*
[3] *Dept of Radiology Portsmouth Hospitals NHS Trust*

EDAC is a term that refers to the pathological collapse of respiratory airways during expiration as a result of posterior wall muscle laxity leading to a >50% loss of airway cross-sectional area. This muscle laxity leads to a loss of airway patency which results in symptomatic dyspnoea. CPAP has been suggested as a method to treat these symptoms.

Demonstrating its effectiveness is difficult. Patient reporting is subjective and unreliable. There is built in software in CPAP machines, but this has not been validated for this purpose. Spiral CT scanning does not demonstrate the full respiratory cycle and is unhelpful in these patients. Bronchoscopy does achieve this but is an invasive procedure. An alternative strategy would be to use 4D CT scanning which enables full visual recording of the respiratory cycle and coughing.

Aim: To evaluate the airway patency of patients with EDAC supported by CPAP throughout the respiratory cycle using 4D CT.

Methods: Four patients established on ResMed S9 auto titrating CPAP for EDAC were scanned on a Toshiba Aquilion 1, 320 detector. Imaging parameters were z axis 16 cm, kv 100, mAs 50, rotation speed 0.5 s and scanning time was up to 10 seconds. The patient was asked to breath in, out and cough. Scanning was from proximal trachea to the bifurcation. Imaging was performed with no CPAP and then, with the exception of the first patient at fixed pressure using 95th centile as a guide. The cross sectional area at specific sites was measured on all data sets for each patient. The radiation dose was noted for all patients.

Results: The radiation dose range was from 253-442 mGy.cm. All patients had less airway collapse on expiration and coughing at all levels of respiratory support. The duration of inspiration was prolonged with CPAP by up to 3 seconds and there was an improvement in mean cross-sectional area ranging from 27-87% through-out the respiratory cycle.

Conclusion: In this small population, 4D CT appears to provide evidence of the efficacy of CPAP treatment for EDAC.

Poster 112

INTRODUCTION OF A NON-INVASIVE VENTILATION RETRIEVAL TEAM IN A DISTRICT GENERAL HOSPITAL

H. Jones Cardiff, UK

Introduction: Acute Non-Invasive Ventilation (NIV) is an effective treatment for Type II Respiratory Failure (TIIRF) in patients with COPD, neuromuscular deficits and obesity hypoventilation syndromes [1]. The British Thoracic Society (BTS) has established recommendations for the provision of effective ward based NIV [1,2].

The Royal Gwent Hospital (RGH) serves a population of over 600,000. NIV has previously been provided in Accident and Emergency, intensive care (ICU) and the respiratory wards. In 2017 the RGH introduced an NIV retrieval service in line with BTS Guidelines. The NIV retrieval team consists of a clinical fellow and a nurse specialist who review patients in conjunction with an ICU doctor. Patients accepted onto the NIV unit receive review by a respiratory specialist within 24 hours. Four beds on the respiratory ward are ring fenced for NIV provision; those beds have a nurse trained in NIV provision available at all times.

Intervention: The retrieval team attend patients with TIIRF and determine appropriateness for admission to the NIV unit and facilitate management of these patients. The aim of this service was to increase the effectiveness of NIV provision by optimising patient identification and subsequent management.

Method: Data was collected retrospectively. Patients were identified from a ward NIV database. Outcome measures used were; time to initiate treatment; time to preferred place of care; time to normalisation of pH and length of stay. The study compared a seven week pre-pilot period with a seven week pilot period; the pilot compared in hours service provision with out of hours.

15 patients were identified in the pre-pilot period. The pilot identified 9 patients in hours and 10 patients out of hours.

Conclusions: We demonstrated a 79% decrease in the time required to initiate treatment in the pilot period compared with the pre-pilot. There was a 36.6% reduction in the time to reach the preferred place of care. We noted a clinically significant increase in pH in the pilot compared with the pre-pilot; the pilot period demonstrated an increase in pH by 1.38% compared with 0.9%.

1. *Royal College of Physicians, British Thoracic Society, Intensive Care Society Chronic obstructive pulmonary disease: non-invasive ventilation with bi-phasic positive airways pressure in the management of patients with acute type 2 respiratory failure. Concise Guidance to Good Practice series, No 11. London RCP, 2008*
2. *Davidson AC, Banham S, Elliott M, et al. BTS/ICS guideline for the ventilatory management of acute hypercapnic respiratory failure in adults. Thorax 2016;71:ii1–ii35*

Poster 113

WHAT NOT TO DO IN NIV

SD Lobato[1] ; AA Albisu[2] ; M Gonçalves[3] ; MJ Guimarães[4] ; ML Alonso-Álvarez[5] ; S Correia[6]

[1] *Hospital Universitario Ramón y Cajal, Madrid, Spain*
[2] *Hospital Santa Creu I Sant Pau, Barcelona, Spain*
[3] *Hospital São João, Porto, Portugal*
[4] *Hospitalar de Guimarães, Portugal*
[5] *Hospital Universitario de Burgos, CIBERES, Burgos, Spain*
[6] *ResMed Portugal*

Aim: There have been no data on real-world practice relating What not to do in Non Invasive Ventilation (NIV) practice.
During an experts meeting, Spanish and Portuguese Pulmonologists and respiratory Therapists debated this particular point and decided to elaborate a "in local" survey.

Methods: In February 2017, during the Advanced Course of the NIV Icare® Iberian meeting program, for healthcare professionals, a real time questionnaire was made with the intention to debate what not to do in NIV, to improve patient management, and summarize it in a consensus proposal.
The questions were asked to the 46 participants from Spain & Portugal, and each participant had to choose the most important things not to do in NIV practice.
The questionnaire included items regarding: the patient, NIV implementation, setup and monitoring, the interface and discharge.
The results were collected and analyzed using the widows® Excel program.

Results: We collected the answers from 37 of the 46 participants of which 87% were physicians (Pulmonologist and a Physiatrist) and 13% respiratory therapists. 27 were Spanish and the rest (19) Portuguese, with a good geographic representation of both countries.
Not consulting the patient and the carers in decisions was the most common answer for what not to do in NIV regarding the patient, (33% of the participants).
Considering NIV implementation, incorrect use or use without clinical indication was the most common reply (28%).
For the NIV setup, answers were: to ventilate without knowledge, experience, and a trained team, equipment or infrastructure (24%) and for NIV monitoring, the titration of pressure with no monitoring (50%).
In regards to the interface, the main concern for what not to do in NIV was very different for each of the healthcare professionals; the most frequent answers were: Tracheostomy in neuromuscular patients either too early without family support or competent carer (4 participants) and not assuring interface rotation for >14h ventilation (3 participants).
Responders highlighted that the wrong thing to do in NIV patient discharge is to send a ventilated patient, hospitalized for an exacerbation, home without considering the need for long term treatment: this was consensual (100 % agreed)

Conclusions: Better understanding of clinical practices in NIV is crucial and considering what not to do in VNI support should be debated more frequently among experts to improve patient care.

Poster 114

LONG TERM NON-INVASIVE VENTILATION (NIV) IN WALES: CURRENT NUMBERS AND WORKFORCE ALLOCATION

A. Richards, J. Annandale, C. Subbe, F. Thaivalappil, J. Woolley, L. Brohan, A. Lewis, S. Packham, S. Barry, S. Fairbairn

Welsh Respiratory Health Implementation Group NIV Workstream

Introduction: The Respiratory Health Implementation Group is a national programme in Wales that seeks to look at variation in healthcare provision and outcomes, and to underpin this with relevant data. As of December 2017 there was a sum total of 1,455 patients in Wales on long term NIV. This data was collected from local units in all Health Boards (HB) along with the underlying disease process causing ventilatory failure and the workforce dedicated specifically to managing these patients.

Results: 1,455 patients were on long term NIV. Obesity and overlap syndrome (obesity and COPD) together accounted for 46% of all patients. COPD and neuromuscular disease were also common indications, but chest wall abnormalities and bronchiectasis were relatively infrequent.

Chart 1: Numbers of patients on long term NIV by disease category, all Wales, November 2017

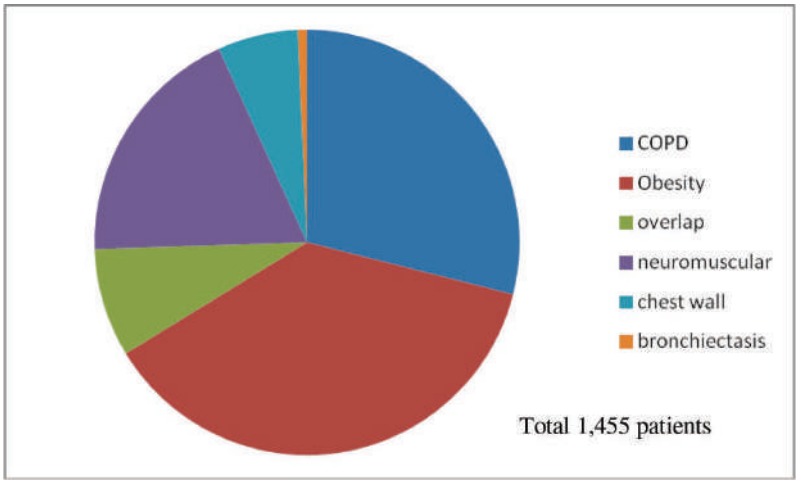
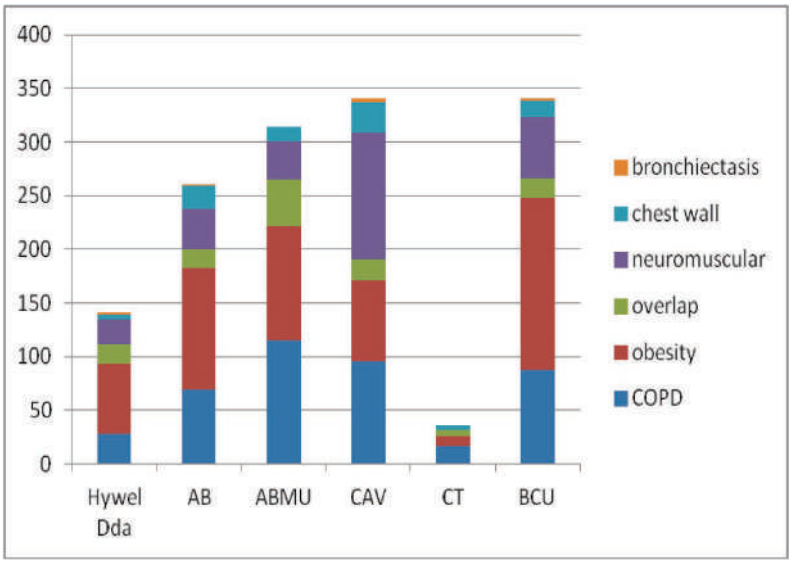
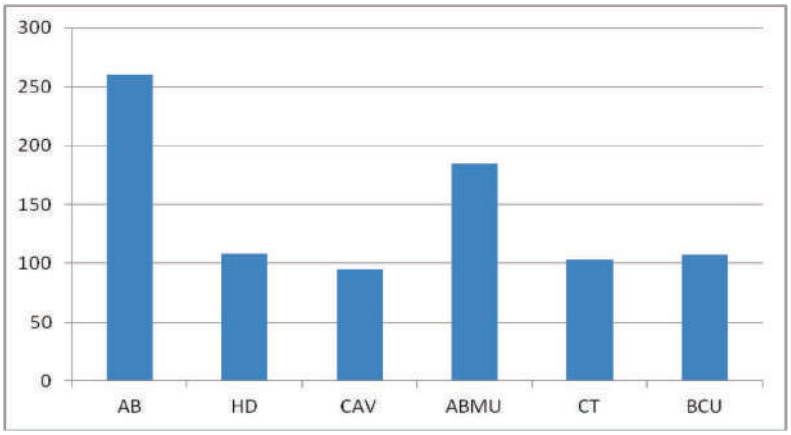


Chart 2: Numbers of long term NIV patients by disease category and Health Board, November 2017



There were significant variations in the numbers of patients on long term NIV in different HBs. No patients were recorded for Powys as their patients are managed in other HBs. The populations of each HB vary significantly from 132,000 in Powys to 696,000 in Betsi Cadwalladr. Cwm Taf had generally lower number of patients on NIV for its population and the reasons for this are not clear. The disease categories were broadly similar across the HBs, with Cardiff and Vale having significantly more neuromuscular patients, reflecting its status as a large teaching hospital.

Chart 3: Staff to patient ratios for long term ventilated patients by Health Board, Wales, November 2017



Data was collected on the dedicated nurse, physiotherpaist or physiologist time specifically dedicated to domicilary NIV. This was expressed as whole time equivalents (WTE) or proportions thereof. This data excluded physiotherapists (0.5 WTE in AB and 1.1 WTE in CAV) who deal specifically with cough in neuromuscular patients. Staff:patient ratios were calculated for each HB and this shows significant variation from 1:95 in Cardiff and Vale to 1:260 in Aneurin Bevan.

Discussion: The allocation of an adequate workforce specifically dedicated towards NIV is crucial to provide a high quality service. Importantly, this allows domicilary NIV setup and monitoring and prevents hospital admissions. It therefore is supports the concept of high value healthcare. Clearly there is work to be done to reduce variation by improving allocation in those HBs with the highest ratios. We are not aware of another national workstream programme that has analysed demand and workforce variation in this manner.

Poster 115

QUESTIONNAIRE SURVEY FOR COMMUNICATION AND COGNITIVE STATUS IN MECHANICALLY VENTILATED ALS PATIENTS IN JAPAN

Hattori N[1,2], Mihara M[1,2,3], Hirai Y[4], Nomasa K[4], Kashiyama Y[4], Sawada J[4], Hazama T[4], Mochizuki H[2], Yoshimine T[1], Hirata M[1]

1, Endowed Research Department of Clinical Neuroengineering, Global Center for Medical Engineering and Informatics, Osaka University, Japan
2, Department of Neurology, Osaka University Graduate School of Medicine, Japan
3, Department of Neurology, Kawasaki Medical School, Japan
4, Osaka Intractable Diseases Medical Information Center, Osaka General Medical Center, Japan

Background: Patients with mechanically ventilated Amyotrophic Lateral Sclerosis (MV-ALS) have difficulties in communication because of severe muscle weakness. Recent advancements in Brain Machine Interfaces (BMI) is expected to provide more effective communication although in order to control these interfaces, cognitive function needs to be preserved.

Objective: We investigated the relationship between daily communication status and cognitive function in MV-ALS patients.

Methods: Questionnaires regarding daily communication capacity (how much in detail the patient communicate with caregivers daily) and communication efficacy (assessed by the time required for expressing common phrases in daily living), as well as cognitive function, were answered by MV-ALS patients and their families registered under the Osaka Intractable Diseases Information Center, Japan. Cognitive function was assessed using a modification of the conflicting instructions and the Go-No Go subtests of Frontal Assessment Battery (maximum score is 6).

Results: 38 MV-ALS patients (24 M and 14 F, Age - 67.1±10.2 y, Disease duration - 6.4±3.6y) had participated. 30 patients stayed at home, 8 at hospitals or nursing-care facilities. 18 used electronic communication tools, 17 used transparent communication boards and 23 could communicate with oral movement, writing or gesture (multiple answers).
Communication efficacy was higher in patients with oral movement or gestures compared to those with electronic communication tools. This however was not related to the patient's communication capacity.
Cognitive assessment scores did not differ with the communication methods used. The scores were higher in patients with higher communication capacity ("capable of discussing social matters" - 5.7±0.8) than those with lower capacity ("capable of selection from only 2 or 3 choices" - 2.5±2.8). However, even in the latter group, the scores were equal or higher than 5 in half of the patients (5/11).

Conclusion/Discussion: The results showed that, in MV-ALS patients, communication efficacy depended on the communication tools, irrespective of their communication capacity. On the other hand, a preserved cognitive function correlated with a higher communication capacity. These results indicate that there are certain proportions of MV-ALS patients who would benefit from BMI technology.

Poster 116

DOMICILIARY ASSESSMENT OF HOME NON-INVASIVE VENTILATION EFFICACY

Katarzyna Mycroft[1], Jacek Nasiłowski[2], Joanna Klimiuk[2], Tadeusz Przybyłowski[2]

1. Students' Scientific Association „Alveolus", Department of Internal Medicine, Pulmonary Diseases and Allergy, Medical University of Warsaw, Poland
2. Department of Internal Medicine, Pulmonary Diseases and Allergy, Medical University of Warsaw, Poland

BACKGROUND: Home non-invasive ventilation (HNIV) during sleep is a standard treatment of chronic hypercapnic respiratory failure (CHRF), however efficacy monitoring of this treatment is still unsettled.

OBJECTIVES: The aim of the study was to assess the efficacy of HNIV in patients with established treatment, feasibility of transcutaneous CO_2 ($PtcCO_2$) performed at home and to reveal factors which could have influence on the efficacy of HNIV.

METHODS: Stable patients with CHRF on HNIV for more than 12 months were included. Every patient had simultaneous, unsupervised polygraphy and $PtcCO_2$ measurement at home during one night on NIV. Before starting NIV arterial blood gas analysis was done. The following criteria of NIV inefficacy were approved: 1. SpO_2<90% for >10% of analysis duration, 2. increase in $PtcCO_2$ >7.5 mmHg between baseline and average value at night, 3. apnea-hypopnea index (AHI) >5/h.

RESULTS: Eighteen subjects were included (mean age 65±12 years; 8 men (44%)); 6 (33%) with kyphoscoliosis, 6 (33%) with obesity hypoventilation syndrome (OHS), 5 (28%) with COPD, 1 with muscular dystrophy; 10 (56%) subjects used oxygen. Mean time of HNIV treatment was 41±23 months. Mean daily use of HNIV was 8.8±2.2 h. The treatment was considered fully effective in only 4 (22%) patients. Nine patients (50%) met the first condition of inefficacy, six (33%) the second and six (33%) the third. The quality of PtcCO2 measurement was not satisfactory in 4 (22%) patients. There were no significant differences in efficacy between patients with COPD, OHS and kyphoscoliosis.

CONCLUSIONS: In most of the patients established on HNIV for more than 12 months the treatment was not effective based on the predefined criteria of inefficacy. Home-based monitoring using polygraphy and $PtcCO_2$ is a feasible and adequate tool to assess the efficacy of HNIV.

Poster 117

OXITONE 1000: A FIRST FDA CLEARED WRIST-SENSOR PULSE OXIMETER FOR CONTINUOUS PATIENT MONITORING

Alexander Guber[1,2], Gali Epstein Shochet[1], Sarah Kohn-Bouzaglou[3], David Shitrit[1,2]

[1] Pulmonary Department, Meir Medical Center, Kfar Saba, Israel
[2] Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel
[3] Oxitone Medical, Kfar Saba, Israel

Background: Chronic obstructive pulmonary disease (COPD) represents a growing global public health problem. Recent trials suggested that oxygen therapy in patients with severe COPD and persistent severe hypoxemia significantly reduced mortality rates. However, studies on mild and moderate hypoxia patients were far less conclusive. Moreover, the prolongation and variation of the oxygen desaturation especially before, during and after exacerbations was not fully recorded.
Pulse Oximetry (SpO_2) is an important diagnostic tool in monitoring and treating both in-patients and ambulatory patients. Modern pulse oximeters exploit different body sites (e.g. fingertip, forehead or earlobe). All those are bulky and uncomfortable that result in low patient compliance for continuous use. In order to address this issue, we evaluated a watch-like wrist-sensor pulse oximeter (i.e. Oxitone 1000, Oxitone Medical). Here we report its precision and accuracy when used in a continuous and spot prospective mode for non-invasive oxygen saturation measurements compared to other commercial devices.

Methods: 15 healthy volunteers and 23 patients were recruited. The patient group included both COPD (N=8) and other interstitial lung disease patients. Basic demographic data, skin tone type, smoking status and medical history were recorded.
SpO2 and pulse-rate values were determined by a non-invasive pulse oximeter (i.e. the Reference, a conventional FDA cleared fingertip pulse oximeter) and by the Oxitone 1000. All tests were performed in singleton and in a blinded fashion. The measurements were done at sitting and standing positions, as well as during a 6-minute walk test for each subject. The «Reference» device was set for an averaging mode of every 12 seconds.

Results: The average subject age was 60.4 (±9.83), of them 55% male. The mean SpO2 as measured by Oxitone 1000 was 96.45% vs. 97.18% of the reference. We found a statistically significant correlation between the devices, r=0.23635 (95% CI: [0.180618, 0.290374], p<0.0001, 1138 measurements). The mean pulse as measured by Oxitone 1000 was 74.64 vs. 74.6 bpm of the reference. We found a statistically significant correlation between the devices, r=0.98908 (95% CI: [0.987762, 0.990248], p<0.0001, 1182 measurements).

Conclusion: The Oxitone 1000 is both accurate and precise for SpO2 and pulse measurements during daily activities of pulmonary patients and is not inferior in comparison to standard devices for spot checking or short period examinations. Its wrist-sensor design is more comfortable and thus provides the advantage of 24/7 monitoring.

Poster 118

NON-INVASIVE VENTILATION FOR IDIOPATHIC AND POST-POLIO THORACIC SCOLIOSIS

SIMON BURROWS, LAURA WATSON, PETER SMITH, LINDA JOHNSON, LOUISE PEERS, PIKSAN IP, ARRUN KHANNA, MILIND SOVANI and WILLIAM KINNEAR

UNIVERSITY HOSPITAL NOTTINGHAM1 AND NOTTINGHAM NHS TREATMENT CENTRE2, QUEENS MEDICAL CENTRE CAMPUS, NOTTINGHAM, UK

Over the last 25 years, we have commenced 52 patients with thoracic scoliosis on non-invasive ventilation (NIV) at home, to control diurnal hypercapnic respiratory failure or symptomatic nocturnal hypoventilation. The scoliosis was idiopathic or congenital in 33 (IS) and secondary to poliomyelitis in 19 (PPS). We have compared the outcomes in these two groups.

All patients were commenced on intermittent positive pressure ventilation with an exhalation valve using NIPPY ventilators. Nine were unable to tolerate NIV; of these, five died within a year and subsequently recommenced NIV at a later date.

For those patients successfully established on NIV, the 5, 10, 15 and 20-year survival rates (YSR) are shown in the table below. There were no significant differences between the IS and PPS groups.

	Total	IS	PPS
5 YSR (%)	30 (88%)	15 (88%)	15 (88%)
10 YSR (%)	23 (82%)	10 (77%)	12 (86%)
15 YSR (%)	12 (55%)	5 (56%)	7 (54%)
20 YSR (%)	3 (25%)	1 (33%)	2 (25%)

Of the 12 patients commencing NIV between 1992 and 1997, 9 (75%) had PPS. For the period 2012-2017, the equivalent figures were one (11%) PPS out of 9 in total.

At the end of 2017, 20 patients with thoracic scoliosis were using NIV at home, of whom 5 (25%) had PPS. The mean (SD) duration of NIV was 6.5 (3.5) years, age 46 (28.3) years and vital capacity 0.48 (0.11) litres or 16.5 (6.4) % predicted.

Although PPS is becoming less important in home NIV services, a small number of patients continue to present in hypercapnic respiratory failure. The outcomes for PPS and IS on NIV are similar, which argues against the hypothesis that muscle weakness progresses in the PPS group.

Survival rates for patients with thoracic scoliosis on NIV are excellent. The reasons why patients with IS are still developing respiratory complications, despite more aggressive surgical intervention, remain unclear. For the moment, these patients remain a small but important part of home NIV services.

Poster 119

LIFE-THREATENING RESPIRATORY SUPPRESSION AS A PREDICTABLE SIDE-EFFECT OF INTRATHECAL MORPHINE INFUSION FOR COMPLEX REGIONAL PAIN SYNDROME; A VITAL ROLE FOR THE RESPIRATORY PHYSICIAN

Sarah Byrne[1], Janet James[1], Mat Blackshaw[2], Julian T Forton[3]

[1]Specialist Sleep and NIV Nurse,
[2]Sleep Physiologist,
[3]Consultant in Paediatric Respiratory Medicine and Honorary Senior Lecturer
The Children's Hospital for Wales, Cardiff, UK
Cardiff University

Background and Methods:

Complex regional pain syndrome (CRPS) is a syndrome that usually develops after an initiating noxious event, is not limited to the distribution of a single peripheral nerve, and is apparently disproportionate to the inciting event. Many modalities of treatment exist. Approaches to treatment are multifactorial including physiotherapy, psychological input and medication. Treatment of CRPS is challenging and subject to debate and discussion. Opioids are often ineffective. Intrathecal morphine is used as a last resort, but results are generally disappointing. Intensity of pain may be the wrong metric in the management of these patients. Recent evidence-based guidelines for CRPS recommend the WHO analgesia ladder with the exception of opiates.

We report the case of a 15 year old girl with CRPS, whose pain developed spontaneously with left flank, back and leg pain, paraesthesia, acute muscle spasm and later some skin changes on her left ankle. All investigations for pathology were negative. She received multidisciplinary care including intensive physiotherapy and psychology input, mental health assessment, referral to a specialist regional pain clinic and escalation of medical management. She remained incapacitated and unable to function. After approximately 14 months she underwent insertion of an intrathecal morphine pump (SyncroMed11 Medtronic). The respiratory team were consulted in the post-operative period because of night-time apnoea.
Here we report the effect of intrathecal morphine on sleep architecture while being delivered at a therapeutic dose (0.275 mgs/ day). We observe profound central apnoea across the night with normal breathing pattern while awake. Stopping the morphine infusion for 48 hours dramatically reduced the central

apnoea index but symptoms re-emerged. We managed this patient with home NIV and monitoring. She has benefitted from the intrathecal morphine infusion and regained significant functionality, but the side effect profile remains a concern.

In conclusion we highlight that life-threatening respiratory suppression can occur with intrathecal morphine infusion when used at therapeutic doses. We recommend that CRPS multidisciplinary teams include a respiratory/sleep physician from an early stage, that the possible need for home ventilation is taken into account when considering this treatment modality, and that patients are appropriately consented for this possible eventuality prior to neurosurgery.

Poster 120

FOCUSING ON THE PATIENT: EMBEDDING PAEDIATRIC PPI IN NON-INVASIVE VENTILATION INTERFACE DESIGN

Barker N, Mutten M and Elphick H.

Sheffield Children's NHS Foundation Trust, Sheffield, UK.

Introduction:
Non-invasive ventilation (NIV) masks that fit well are difficult to find for children, especially those who are very small or have special requirements/atypical facial features. Poorly fitted masks create problems ranging from discomfort and non-adherence to treatment, to permanent facial deformity. We aim to design and produce masks that are well-fitted, comfortable and support paediatric patients. Children's voices are not often heard in these projects, but we believe we cannot achieve our aim without them.

Aims:
To meet our goal we constructed a patient and public involvement (PPI) program designed to:

1. Understand the problems children and their families experience, the improvements they want to see and how they want to achieve this
2. Provide an inclusive and creative environment for non-constrained thinking from patients and clinicians
3. Get actionable feedback and suggestions for improvements from a diverse patient group

Method:
To match our aims, we constructed a method focussed on planning, innovation and participation. We called this the PIP model. Session activities were designed to enable parents and children of all ages and abilities to participate. Examples of these activities include:

- Archery target activity - as a method for realising the relative importance of patient's requirement (prioritisation)
- Graphic scribe recording – to reflect back to the children that they had been heard/understood and stimulate creative ideas (as well as capturing the content and flow of the session)
- Use of technology – making short videos to help families understand concepts and using communication devices for those without speech to share opinions.

Outcomes:
Our assumptions for priorities changed as a result of the PPI. We thought appearance would be important, and that minimum visits were best. We were wrong and this is one example of how our design brief changed as a result.

The graphic scribe outputs formed part of the creative process whilst providing a unique and memorable record of the time we spent with the patients and a resource that can be referred to at any time.

We are confident we will produce a final product that is fit for real life purpose, that people want to trial and that we have built a relationship with a strong community that supports us (and vice versa).

Key messages:

- For research to be truly successful, PPI should be woven throughout a project, from concept to completion.
- It needs to be genuine and aligned with research aims, not a "box ticking" exercise for funders.
- Time and effort spent enabling participation and creatively planning for inclusivity is rewarded by generating much richer and more valuable information.
- Direct involvement of the designers and scientists with patients/parents results in greater insight and empathetic outcomes.

Poster 121

SEARCHING FOR THE IDEAL NON-INVASIVE INTERFACE IN PEDIATRIC PATIENTS

Freitas A.C.[1], Tinoco A.[2], Sousa R.[1], Morais L.[1]

[1] *Pediatric Pulmonology, Pediatric Department, Centro Materno-Infantil do Norte (Porto, Portugal);*
[2] *Linde Healthcare REMEO Home (Portugal)*

Introduction: Exponential non-invasive ventilation (NIV) use is accompanied by increasing diversity in available interfaces. However, its suitability to pediatric patients is still limited, compromising therapeutic success. This study aimed to determine the main difficulties in interface selection for children starting long-term NIV and the strategies developed to overcome it.

Methods: This was a cross-sectional study developed in 73 pediatric patients who started long-term NIV between January 2015 and December 2017 who were followed at Integrated Domiciliary Ventilation Outpatient Clinic. Patients with intentionally modified or non-validated interfaces to pediatric population were identified, as well as the reasons for those modifications.

Results: The sample included children aged between 7 months and 18 years, who started NIV between the first month of life and 15 years old (median 5,5 years old). The majority presented neuromuscular disease (26%), cerebral palsy (23,3%) or malformative syndrome (20,5%). Twenty patients (27,4%) used modified or non-validated interfaces for children. Harness adjustments were required for leak control due to the interface misaligned size of the interface or for optimizing comfort. Five patients used oronasal interfaces conceived as nasal mask for adults as a solution to the shortage of properly sized oronasal interfaces for children.

Conclusion: Our results translate the difficulty in the NIV interfaces selection in Pediatrics, aggravated by the high prevalence of dysmorphic factors and the wide age range of these patients. Interface manipulation is the last resource to avoid invasive ventilation use. Shortage of these kind of equipment should receive more attention from the manufacturing industry.

Poster 122

THE ROLE OF NON-INVASIVE VENTILATION IN CHILDREN WITH SEVERE CEREBRAL PALSY: CHALLENGES AND DILEMMAS

Grychtol R[1], Rendle G[2], Robinson V[2], Samuels M[2], Abel F[2], Laverty A[2], Chan EY[2]

[1] *Department of Paediatric Pneumology, Allergology and Neonatology, Hannover Medical School, Germany;*
[2] *Respiratory Unit, Great Ormond Street Hospital for Children, London.*

Background: Patients with cerebral palsy (CP), especially those at the severe end of the spectrum (Gross Motor Function Classification System (GMFCS) IV-V equivalent), suffer from increased sleep disturbance and sleep-disordered breathing (SDB), especially obstructive sleep apnoea (OSA)1. The reduced quality of life amongst these patients is often attributed to disturbed sleep and daytime tiredness. Non-invasive ventilation (NIV) is increasingly used in CP, albeit with little known about its effectiveness and potential risks in this patient group.

Methods: Retrospective review of patients with severe CP (GMFCS IV-V equivalent) initiated on NIV between Jan 2010 and Dec 2016 in Great Ormond Street Hospital for Children.

Results: Twenty patients (median age 11.1 years, range 1.7 - 16.1 years) with severe CP, constituting 5% of all patients started on NIV in the same period, were initiated on NIV following diagnosis of significant SDB on cardio-respiratory polygraphy, including: severe OSA (15/20), moderate OSA (1/20), type II respiratory failure (3/20) and central apnoea (1/20). Seven out of 15 patients with severe OSA had additional chronic lung disease and/or restrictive lung disease contributing to significant abnormal gas exchange, e.g. baseline hypoxaemia. Attempts to establish NIV was less successful in patients with severe CP compared to non-CP patients started on NIV in the same period. Failure rate of NIV in non-CP patient group was 8%. In contrast, 55% (11/20) of our patients with CP failed to establish onto NIV either due to intolerance of mask and/or ventilation pressure at the initial trial in hospital (5/11), or poor adherence (6/11) during follow-up. Patients who continued to use NIV showed good adherence (median usage on 88(range 55 – 100)% of nights; median usage of 7:36 hours/night). Nearly all our cohort suffered side effects e.g. pressure sores and abdominal bloating/ discomfort, which were rectified except one patient, who stopped using NIV due to increased secretion.

Conclusion: Patients with severe CP constitute a challenging group for NIV. Based on our experience, successful implementation of NIV in patients with severe CP is possible but less often achieved than in other children with SDB. The high burden of comorbidities may hinder NIV implementation as well as putting these patients at risk of side effects/complications. NIV remains a therapeutic option that needs individual considerations.

References: 1. Lelis AL et al. Sleep Med Reviews 30(2016)63-71.

Poster 123

HIGH FLOW NASAL CANNULA THERAPY IN PEDIATRIC PATIENTS AT THE HOME

Adel Bougatef, Lupe Martinez, Marilyn Oviedo, Rosie Briones, Pam Vela, Derrick Watson, Donna McPherson, Ashley Phillips, Shannon Hardy, Rodney Gray.

Wave Healthcare, San Antonio, Texas, USA.

Background: High Flow Nasal Cannula (HFNC) therapy is an frequently used modality for the hospitalized pediatric and neonatal populations, their length of stay at the hospital for technology-dependent raison remains very high. The use of HFNC in the home setting is challenging. The Trilogy 100® Ventilator (Phillips), heated and humidified breathing circuit in conjunction with the RAM cannula® (RC) has been used to address these challenges.

Methods: A retrospective medical records review of 30 pediatric patients placed on HFNC in the home by Wave Healthcare between May 2015 & November 2017 was completed. Prior to the clinical implementation in the home of the HFNC therapy, a bench evaluation of the inter-relationships among set CPAP level, delivered flow, and RC size was performed using Michigan Instrument 5601i lung simulator and TSI flow meter 4000 series, and an algorithm was developed and instituted. Flow is generated via set CPAP levels at the Trilogy 100 ventilator, three sizes of RC (preemie-newborn-infant) was used, and flow output was measured, results are illustrated in the Table below.

Results: We identified a total of 30 pediatric patients with chronic respiratory illness. Mean gestational age was 34.2 ± 5.5 weeks, 16 are male and 14 female, 57% have chronic lung disease, 43% have neuromuscular disorder, 60% are oxygen dependent. The median age at HFNC therapy initiation was 10 months (2 - 75). CPAP levels setting at the Trilogy 100 ventilator was 7.0 ± 3.0 cm H_2O. HFNC therapy failed in 6 patients (20%), the median duration of HFNC therapy was 9 weeks (1- 44).

Conclusion: HFNC therapy has been used due to its ability to deliver flows that meet the patient's inspiratory demand. Successful implementation of HFNC therapy at the home, using our developped algorithm, in pediatric patients with chronic respiratory illness, gived option for early discharge of hospitalized technology-dependant patients.

CPAP cmH2O	RC Preemie	RC Newborn	RC Infant
5	5.23	4.89	4.93
10	8.03	7.54	7.97
15	10.78	10.14	10.59
20	13.36	12.66	13.14

Measured Flow according to the set CPAP and RC size

Poster 124

INITIATION OF NON-INVASIVE VENTILATION IN CHILDREN: AT HOME OR IN THE HOSPITAL?

Van Amerongen M.H.[1,2], Taat-Krakeel G.A.[3], Wijkstra P.J.[2], de Weerd W.[1].

[1] *Center for Home Mechanical Ventilation and Beatrix Children's Hospital, University Medical Center of Groningen, The Netherlands.*
[2] *Department of Pulmonary Diseases, Center for Home Mechanical Ventilation, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands.*
[3] *Center of Home Ventilation and Breathing Disorders, Erasmus Medical Center-Sophia Children's Hospital, Rotterdam, The Netherlands.*

Introduction: The procedure to initiate home mechanical ventilation (HMV) in children differs between the University Medical Center Groningen (UMCG) and the Erasmus Medical Center Rotterdam (Erasmus MC) regarding the preparation and duration of admission.
Our hypothesis is that introducing home mechanical ventilation according to a protocol with education and preparation at home reduces days of admission

in the hospital afterwards, is safe and increases patient satisfaction and reduces costs.

Methods: In this observational and retrospective study data were collected by research of 24 patient files from children in Groningen and Rotterdam. The time to reach adequate ventilation (defined as using non invasive ventilation for 6 or more hours during the night with PaCO2 < 6.0 kPa) was compared between the 2 centers. Parents as representatives of the children had to fill in a questionnaire about their own and their children's satisfaction about the procedure [preparation of HMV, admission, discharge and aftercare].

Results: 24 children were included; 14 children in the UMCG and 10 children in the Erasmus MC. In Rotterdam, all children spent an average of 4.1 days (SD ± 0.3) in the hospital and in Groningen an average of 7.7 days (SD ±4,9), being significantly different p<0,05.
Parent's satisfaction at the Erasmus MC was significant better regarding the admission. Satisfaction about the preparation and care after discharge was equal in both hospitals.
An admission to the Special Care in the UMCG amounts to € 1511 per day per child, resulting in median costs per child of € 11,504 (range € 30,463). The admission to a Child-intensive Care (Erasmus MC) is € 2643 per day leading to a median of € 10,771 (range € 2660) per child. The average costs with regard to the time spent by the HMV nurse practioner on preparing and setting the child on NIV are € 187 in Groningen and € 194 in Rotterdam.

Conclusion: This small retrospective study shows that an extended preparation of children at home before starting HMV reduces the duration of admission and increase parents and patients satisfaction.

Poster 125

RESPIRATORY CULTURES IN CANADIAN CHILDREN WITH TRACHEOSTOMY TUBES: A COMPARISON OF ACUTE CARE AND LONG TERM CARE REHABILITATION ENVIRONMENTS

J Chiang MA MD[1,2,3], A Hoffman MD[1,2,3], E Kwolek[4], M Zaman[3], R Mawson[3], A Alawadi MD[1,3], A Almajed MD[1,3], J Polyviou RN NP[1], F Syed BHSC RRT[1,3], T Tran RRT[1], R Amin MD Msc[1,3]

1. Division of Respiratory Medicine, Hospital for Sick Children, Toronto, Canada
2. Holland Bloorview Kids Rehabilitation Hospital, Toronto, Canada
3. University of Toronto, Toronto, Canada
4. Alberta Children's Hospital, Calgary, Canada

Rationale: There is limited paediatric literature describing differences in tracheostomy tube culture microbiology between acute and long-term care institutions. Our aim was to describe differences in tracheostomy tube culture microbiology between acute care and long term care rehabilitation hospital settings to identify whether environment is a relevant factor to consider when prescribing antimicrobials based on tracheostomy tube culture results.

Methods: A retrospective chart review was completed wherein the records of children with tracheostomy tubes followed at The Hospital for Sick Children (acute care) and Holland Bloorview Kids Rehabilitation hospital (long-term care) in Toronto, Canada between January 1, 2010 and August 31, 2015 were reviewed. The most recent culture samples were used for cross-sectional analyses. Chi squared analyses were used to compare categorical variables between environments.

Results: Sixty participants were identified across the 2 settings; 42 (70%) of participants had cultures taken in acute care, including hospital admissions and outpatient clinic visits. Thirty-three (55%) required invasive ventilation via tracheostomy either continuously or nocturnally. Mean age of participants was 9.2 years (range 2-18 years). Thirty-five (58%) were male. *Staphylococcus aureus* (X^2=5.714, p=0.017) and *Pseudomonas aeruginosa* (X^2=4.369, p=0.037) were more prevalent in cultures from acute care. In contrast, *Moraxella catarrhalis* (X^2=4.268, p=0.039) was more prevalent in tracheostomy tube cultures from long term care.

Conclusions: In our small cohort, tracheostomy tube cultures differed across paediatric acute care and long-term care environments. Further evaluation is required to examine predictors of these microbiological differences.

Miscellaneous

Poster 126

EVALUATION OF THE EFFECTS ON PHYSICAL AND PSYCHOLOGICAL PARAMETERS IN PATIENTS WITH CHRONIC DISEASES INVOLVED IN AN AMBULATORY CARDIO-RESPIRATORY REHABILITATION PROGRAM

HUPPI P (MD), CARON C (IDE), FROLICHMAN S (MD), GERMAIN M (MD)

Hôpital Croix Rousse, EFR, CHU Lyon, France

Chronic diseases (CD) represent a major cause of disease burden in the world. Intensive ambulatory cardio-respiratory rehabilitation programs could improve the quality of life of these patients, oxygen consumption and cardiovascular reserve.

Objective: to evaluate the effects of a cardio-respiratory rehabilitation program on quality of life, maximum oxygen consumption and exercise tolerance of patients with chronic disease.

Method: Analytical and longitudinal cut study.

Population: Patients with chronic diseases (cardiovascular, respiratory and gynecological neoplasms), according to criteria ICD-10 (n = 225) of the respiratory-cardiopulmonary test service at the Croix Rousse Hospital, Lyon, France.

To evaluate the effects of the cardio-respiratory rehabilitation program (PRC-R), quality of life was assessed through the SF36 test, maximal stress test on a cycloergometer, and the 6 minute walk test were performed at the beginning and at the end of the program. The t-test was used for paired samples and paired Wilcoxon test according to the distribution of the variables. The level of confidence used was 95%.

Results and Discussion: The mean age was 55 years (± 13.3) [range 17 to 87 years]. 59% were female. 34.6% had a diagnosis of some pathology of the group of diseases of the cardiovascular system, 26.2% diseases of the respiratory system, 24% gynecological diseases, 6.6% nutritional and 8.4% other chronic diseases. Patients who received PRC-R improved maximum VO2 parameters (p <0.0001), threshold heart rate (p <0.034), maximum heart rate (p<0.007), threshold potency (p<0.001. Regarding the walk test of 6 minutes, we noted an improvement of the distance traveled (p <0.001), dyspnea at the end of 6 minutes (p = 0.0001) and fatigue (p = 0.01). In terms of quality of life, perceived health (p = 0.0030), physical activity (<0.0001), pain (0.1634), physical limitations (0.0034), psychological health (p = 0.0810), vitality (p <0.001), life in relation (p = 0.026) and perceived health in relation to a year ago

(<0.0001). These results are apparently positive for patients with chronic diseases which have shown improvement not only in the quality of life but also their cardiopulmonary reserve. Subsequent analyzes will be performed in a stratified form according to the pathology received by the program. These results guide the need to perform a randomized clinical trial to test the effects of the intervention and generate evidence to corroborate that an adapted rehabilitation program should improve the quality of life of patients and reduce the burden of disease.

Poster 127

EFFECTS ON FUNCTIONAL RESIDUAL CAPACITY BY EXPIRATORY FLOW INCREASE IN CONTROLLED MECHANICALLY VENTILATED PATIENTS: A RANDOMIZED CROSSOVER STUDY

Gobaille Guillaume, Freynet Anne, Dewitte Antoine, Ouattara Alexandre.

Background: Impaired mucociliary clearance and reduced respiratory volumes in ventilated patients induce pulmonary disorders. Endotracheal suction (ETS) aimed at reducing bronchial obstruction, but induced alveolar de-recruitment mostly with opened suction system (1). Expiratory Flow Increase technique (EFI) is a respiratory physiotherapy technique that could reduce bronchial obstruction too.

Objectives: The objective of this study was to evaluate the effects of EFI on alveolar recruitment, thanks to Functional Residual Capacity (FRC) measures.

Method: This crossover study included patients under volume controlled mechanical ventilation and muscular blocker. ETS alone (ETS group) or immediately preceded by a respiratory physiotherapy session (EFI/ETS group) was successively and randomly applied on each patient respecting a 4 hour interval. FRC was measured before treatment (t0), immediately after (t1), 20 minutes later (t2), and one hour later (t3).

Results: Ten patients were included. The EFI technique allowed a significant increase of FRC between t0 and t1 (p=0.03). The ETS induced a significant decrease of FRC between t1 and t2 (p=0.01).

Conclusion: The EFI technique allowed an alveolar recruitment, and the ETS with opened system allowed de-recruitment. Closed system suction could reduce alveolar de-recruitment and extend beneficial effects of EFI on lungs. Finally, EFI can help recruitment maneuvers in mechanically ventilated patients.

(1) Maggiore S M, Lellouche F, et al. Prevention of Endotracheal Suctioning-induced Alveolar Derecruitment in Acute Lung Injury. Am J Respir Crit Care Med (2003) 167, 1215–1224.

Poster 128

EFFECTS OF EARLY MOBILIZATION IMMEDIATELY AFTER ELECTIVE ABDOMINAL SURGERY

Svensson-Raskh A[1], Fagevik-Olsén M[2], Schandl A[3], Ståhle A[1], M. Nygren-Bonnier[1].

1. *Department of Neurobiology, Care Sciences and Society, Division of Physiotherapy, Karolinska Institute and Functional Area Occupational therapy and Physiotherapy, Allied Health Professionals Function, Karolinska University Hospital, Huddinge, Sweden.*
2. *Department of Gastrosurgical Research and Education, Sahlgrenska Academy at Gothenburg University and Department of Physical Therapy, Sahlgrenska University Hospital and Sahlgrenska Academy at Gothenburg University, Sweden.*
3. *Department of Molecular Medicine and Surgery, Karolinska Institute, Stockholm, Sweden.*

Introduction: Abdominal surgery lasting more than a few hours means an increased risk of postoperative pulmonary complications. Although early mobilisation today is recommended after surgery (eg ERAS, **E**nhanced **R**ecovery **A**fter **S**urgery), the isolated effect of mobilisation on respiratory function and the incidence of pulmonary complications is not yet evaluated. The aim was to evaluate the effects of early mobilisation and breathing exercises and to investigate the feasibility of mobilising patients two hours after abdominal surgery.

Method: The study was performed at the postoperative recovery unit. Patients undergoing elective abdominal surgery, with an anesthetic time of >2 hours, over 18 years of age, were randomized to; 1: Mobilisation out of bed to sit in a chair as long as possible + breathing exercises with a PEP-device (at a measured pressure of 10cmH_2O) with 10 breaths x 3 per hour. 2: Mobilisation out of bed to sit in a chair as long as possible and 3: Control – bedrest, no breathing exercises and maximum 30 degrees sitting in bed. The interventions started within 2 hours after completed surgery and continued for a total of 6 hours or until the patients were discharged to the surgical ward. Every patient with an arterial line had a base-line blood-gas of PaO_2, $PaCO_2$ and SpO_2 (with oxygen discontinued for 15 minutes) when entering the postoperative recovery unit, and then a blood-gas every hour until discharge. For patients without arterial lines, a peripheral oxygenation was registered.

Preliminary results: In total 200 patients from 22 to 93 years of age were randomized and fulfilled the intention-to-treat study. Average sitting up time was 105 minutes, with a minimum sitting up time of 10 minutes and a maximum sitting up time of 240 minutes. The tendency is that the intervention "mobilisation and breathing exercises" is the most favorable for patients' respiratory outcome; however, data analysis is in progress.

Conclusions: Mobilisation in combination with breathing exercises seems to improve respiratory outcome; however, the data analysis has to be completed. It seems safe and feasible to mobilise patients within two hours after completed elective abdominal surgery.

Poster 129

THE CHALLENGES OF NURSE RECRUITMENT AND RETENTION

Freeman, M; Shailer, S; McGee, L.

REMEO Healthcare UK

There is significant evidence (Kings Fund 2016) that retaining skilled and competent staff improves patient experience, the overall quality of care of patient care and staff satisfaction.

REMEO Healthcare provides nursing care for specialist high dependency respiratory patients. The patient group have a wide range of complex conditions such as Duchenne muscular dystrophy, Guillain -Barre syndrome and spinal injury. By the nature of their clinical conditions the patient groups have multiple chronic long term needs requiring specialist knowledge and exceptional care.

The Issue:

In 2016 the service had a high number of senior specialist nurse vacancies and recruitment of these "Band 6" nurses who held a Critical Care nursing course was difficult. Even with the Critical Care course the nurses still did not necessarily have the theoretical knowledge and skill set in which to be able to effectively lead a shift in a specialist high dependency respiratory Centre.

Our junior staff nurse (Band 5) development pathway however was proving a success and we had a cohort of registered nurses who wanted to move onto

the next step of development. In essence we needed to create a career pathway for the registered nurses which would incentivise them to remain with REMEO.

Addressing the Issue:

The clinical team has a pool of internal expertise along with a significant bandwidth of resources. With this available REMEO Healthcare were able internally develop and deliver a six month Advanced Respiratory High Dependency Course, delivered in association with and validation from the University of Surrey.

Evaluating the Impact:

Band 6 posts have all now been filled and we now have a succession pathway from Band 5 to Band 6 enabling staff to move onto new opportunities.

The course has been made available to external applicants and has had a good uptake.

We have a better retention rate amongst staff who have internally progressed to a Band 6 post than those recruited externally to the team. Those who have developed along the internal pathway are requiring less supernumerary time and internal training to adjust to their new leadership role. We have seen an improved buy-in from Band 6 staff taking on specific activities such as rota management, student nurse support and link roles. The main benefit seen is an improved confidence in the nurses' clinical ability and problem solving.

Further learning and development opportunities have become available to other specialists who support the tutorials within the Respiratory Course and so it seems we have been able to create a culture of shared learning.

The course has also provided REMEO with recruitment incentive for nurse candidate attraction and acquisition.

Poster 130

HYPOVENTILATION AS A LATE COMPLICATION OF IRRADIATED NASOPHARYNGEAL CARCINOMA

Linda S.L. Cheng, Chung-Ming Chu

Division of Respiratory Medicine, United Christian Hospital, HONG KONG

Background: Nasopharygneal carcinoma (NPC) is a common malignancy in the Chinese race, and is typically treated with radiation therapy and/or adjuvant chemotherapy. With improvement in survival, late complications are increasingly seen, including hypoventilation and ventilator dependency. Although hypoventilation and chemoreceptor failure have been described with bilateral carotid tumour resection, its occurrence in irradiated head and neck cancers with carotid bodies included in the radiation fields is not reported. We review the clinical features of a collection of irradiated NPC patients with documented hypoventilation and ventilator dependency.

Method: We retrospectively analysed previously treated NPC patients, who required home mechanical ventilation (HMV) and were followed up in our home ventilator clinic between 2008 and 2017. Case notes were reviewed for type of ventilatory support (non-invasive or tracheostomised), potential contributing factors for hypoventilation, co-morbidities, and other late complications of NPC treatment.

Results: We identified 5 NPC patients who required HMV for hypoventilation syndrome out of 349 HMV patients followed up in our HMV clinic in the past 10 years. All of them initially presented with hypercapnic respiratory failure, and were confirmed to have hypoventilation syndrome by polysomnography with transcutaneous carbon dioxide measurements. Their clinical features are described in the following chart:

Features / Case	1	2	3	4	5
Gender	M	F	M	M	M
Age (years)	69	66	75	53	65
Time from NPC treatment to hypoventilation (years)	38	18	27	3	21
Treatment (RT = radiotherapy; CT = chemotherapy)	RT	RT	RT	RT+CT	RT
$PaCO_2$ (kPa) on presentation	10.5	12.5	9.0	11.1	11.5
HMV type (NIV = non-invasive ventilation; IMV = invasive mechanical ventilation via tracheostomy)	NIV	NIV	IMV	NIV	IMV
Baroreceptor failure	-	-	+	+	-
Carotid stenosis	+	-	-	-	+
Hypothyroidism (Radiation thyroiditis)	-	+	-	-	+
Tube feeding	-	+	+	+	+
Ventilator setting (Peak pressure/PEEP; cmH_2O)	16/6	10-25/ 4-10	22/6	23/7	22/7
Aspiration pneumonia requiring mechanical ventilation (Number of episodes)	0	1	3	2	1
Other contributors to hypoventilation	COPD	Left phrenic nerve palsy	COPD	-	Upper thorax radiation fibrosis
Death after initiation of HMV (years)	2	1	1	Survives	1

Conclusions: This is the first report of hypoventilation syndrome requiring HMV in irradiated NPC survivors. Baroreceptor failure and carotid stenosis are frequently present, suggesting chemoreceptor failure may play a role in pathogenesis. Dysphagia is common, and patient frequently suffers from aspiration pneumonia due to vocal cord dysfunction. Prognosis is poor. There should be heightened awareness for hypoventilation syndrome as a late complication of irradiated head and neck malignancies. Further studies need to be conducted to define the mechanisms and various contributors to hypoventilation in this group of patients.

Poster 131

ANTIMICROBIAL RESISTANCE AND PATHOGENIC POTENTIAL OF KPC-3 CARBAPENEMASES BY *KLEBSIELLA PNEUMONIAE* AND *KLEBSIELLA OXYTOCA* IN PORTUGAL: A GREATEST THREAT TO HUMAN HEALTH

Caneiras, C.[1], Mayoralas-Alises, S.[2], Lito, L[3], Melo-Cristino, J [3,4] and Duarte, A.[5]

1 Healthcare Department, Praxair; Faculdade de Medicina da Universidade de Lisboa; Instituto de Saúde Ambiental (ISAMB), Faculdade de Medicina da Universidade de Lisboa, Lisboa, Portugal

2 Healthcare Department, Praxair; Hospital Universitario Moncloa, Respiratory Department, Madrid, Spain

3 Laboratory of Microbiology, Centro Hospitalar Lisboa Norte, Lisboa, Portugal

4 Institute of Microbiology, Institute of Molecular Medicine, Faculty of Medicine, University of Lisbon, Lisboa, Portugal

5 Centro de Investigação Interdisciplinar Egas Moniz (CiiEM), Departamento Microbiologia e Imunologia, Faculdade de Farmácia da Universidade de Lisboa, Portugal

Introduction: World Health Organization published in 2017 its first ever list of priority pathogens that pose the greatest threat to human health. The most critical includes multidrug resistant *Enterobacteriacea* that pose a particular threat in hospitals and among patients whose care requires devices as ventilators. This group includes *Klebsiella* spp. that can cause severe and often deadly infections as bloodstream infections and pneumonia.

Methods: 43 *Enterobacteriacea* clinical isolates (31 K. *pneumoniae*, 7 *K. oxytoca*, 2 *E. aerogenes*, 2 *E. coli* and 1 *C. freundii*) were collected from inpatients (91%) and outpatients (9%) in a Tertiary Hospital Centre in Lisboa, Portugal. Antimicrobial susceptibility testing was performed by disk diffusion and the results were interpreted according to EUCAST guidelines. Resistance (β-lactamases genes) and virulence markers *(K2A, fimH, mrkDV1, mrkDV2-4, khe, rmpA, magA, and iucC)* were identified by PCR and confirmed by sequencing. Plasmid replicons were determined using PCR-based replicon typing.

Results: The KPC-3 carbapenemase was detected in all isolates. The *Enterobacteriaceae* were resistant to a large number of antibiotics, including carbapenems and third generation cephalosporins – the best available antibiotics for treating multidrug resistant bacteria. Higher complexity was found in *K. pneumoniae* with additional extended-spectrum-β-lactamases (ESBL), including CTX-M-15. The most frequent virulence genes found were fimbrial adhesins. A high degree of variability in plasmid profile was found, including the presence of Inc F group in *K. pneumoniae*.

Conclusions: The uncommon and concerning overlapping of multidrug-resistance and accumulation of virulence genes found in *Klebsiella pneumoniae* can constitute a serious threat. Additionally, the identification of plasmid Inc F group indicates that the resistance genes can be readily transmitted indistinctly between isolates. Future studies are critical for the development of new therapeutic strategies and should include homecare environment.

Poster 132

TIME … NOT ONLY MONEY BUT ALSO HEALTH

Baer, G. A. MD, PhD

Department of Anaesthesiology, Medical School, University of Tampere, Finland

Patients with central apnea (CA) frequently have functioning phrenic nerves and diaphragm muscles. An implanted artificial respiratory centre, the phrenic nerve stimulator, utilizes the otherwise idle nerves and muscles to provide an almost natural way of artificial respiration [1]. Because of the low number of patients who might benefit from phrenic nerve stimulation, up-to-date evidence-based knowledge of this possibility is not wide-spread.

Since introduction of the inductively powered diaphragm pacer and publication of the first series in 1976 electro-neurophysiology has progressed. Conditioning the muscle to frequencies below 8Hz enables to provide full-time long-term phrenic nerve stimulation for all properly selected patients. The conditioning period with unipolar stimulation lasts about 5 months [2].

SCI impairs the immune system; the severity of impairment increases with higher levels of injury. Infection needs a source, an infection port, and time. Hospitals are famous infection sources. Inductive power supply to the implanted pacer avoids one infection port. However, conditioning frequently has to be done in a hospital or equal institution.

After introduction of four-pole sequential phrenic nerve stimulation (Atrostim-PNS) 1 the conditioning period has shrunken to weeks. It took 20 years to collect sufficient data to show that the short conditioning period resulted in reduced respiratory infection rates. The reduction of respiratory infections, of airway nursing and of airway equipment compared to mechanical ventilation (MV) pays off for the larger primary investment within two years of use [3].

Additionally, there are other benefits with PNS compared to MV: Atrostim-PNS improves the quality of speech, improves patients' quality of life, probably reduces mortality and prolongs life; patients prefer PNS. In comparison to other methods of artificial ventilation Atrostim-PNS has been named reliable and easy to use. The ease of use obviously improves safety: In studies comparing MV to PNS in SCI-RDD fatalities due to disconnection of MV appeared 1 in 13, 2 in 36 but fatalities due to PNS/DP have not been published.

Reference List

1. *Talonen PP, Baer GA, Hakkinen V, Ojala JK: Neurophysiological and technical considerations for the design of an implantable phrenic nerve stimulator. Medical & Biological Engineering & Computing 1990; 28: 31-7*
2. *Glenn WWL, Hogan JF, Loke JSO, Ciesielski TE, Phelps ML, Rowedder R: Ventilatory support by pacing of the conditioned diaphragm in quadriplegia. N Engl J Med 1984; 310: 1150-5*
3. *Hirschfeld S, Exner G, Luukkaala T, Baer GA: Mechanical ventilation or phrenic nerve stimulation for treatment of spinal cord injury-induced respiratory insufficiency. Spinal Cord 2008; 46: 738-42*

Poster 133

ADDRESSING DIAPHRAGM DYSFUNCTION IN CARDIAC SURGERY PATIENTS: SUCCESSFUL THERAPEUTIC USE WITH CURRENT TECHNOLOGY AND FUTURE PROPHYLACTIC USE OF TEMPORARY DIAPHRAGM PACING UTILIZING INTRAMUSCULAR ELECTRODES

Onders R, Markowitz A, Elmo M, Kaplan C, Schilz R, Sabik J.

University Hospitals Cleveland Medical Center

Purpose: 1.6 to 60% of cardiac surgery patients experience phrenic nerve injury and diaphragm dysfunction (DD). Up to 5% require prolonged ventilator support. Invasive or non-invasive mechanical ventilation carries significant morbidity and potential mortality. We describe therapeutic intramuscular Diaphragm Pacing (DP) in 11 patients and feasibility trial of prophylactic capability in 4 patients.

Methods: A retrospective review of compassionate off label use of an FDA approved device under IRB approval (#02-10-18). In this group, an electrical stimulus was delivered to the diaphragm via laparoscopically placed intramuscular electrodes to facilitate diaphragm strengthening and subsequent weaning from mechanical ventilation. A second group prospectively received two temporary DP electrodes placed intramuscularly in each diaphragm at the motor point of where the phrenic nerve enters the muscle at the end of their primary cardiac procedure. (FDA IDE #G150040 and clinicaltrials.gov listing NCT 02410798). Serial diaphragmatic EMG's were obtained. Safety and efficacy parameters for pacing and implantation are reported.

Results: Eleven post cardiac surgery patients with prolonged ventilator support from DD were implanted. Ages ranged from 57-81 years old (average 68). Mean duration of positive pressure ventilation prior to DP was 20 days. All patients were successfully weaned with DP. (8 patients received invasive and 3 received noninvasive mechanical ventilation). The average survival is 32.6 months (1.67 to 76.8 months). There was 1 non DP related early death. Serial EMG's of the diaphragms measured through DP electrodes showed improved burst activity and was used to guide DP therapy. In the next phase, temporary DP electrodes were implanted in 4 patients who underwent median sternotomy. Subject ages ranged from 46-84 years (72 average). The temporary electrodes were successful in achieving ideal tidal volumes and exceeded ideal tidal volumes by 47%. Temporary electrodes successfully measured dEMG. There were no complications. There was complete intact removal of all electrodes at the bedside.

Conclusions: DP can be used successfully to treat DD from phrenic nerve injury. This trial also demonstrates safe placement, removal and functionality of temporary DP electrodes. Routine use of temporary DP electrodes at cardiac surgery followed by early DP use may mitigate prolonged mechanical ventilation and the need for tracheostomy.

↘ INDEX OF AUTHORS IN ABSTRACTS ↘ LISTE ALPHABÉTIQUE DES AUTEURS

NAME	ABSTRACT N°	PAGES
AARRESTAD, S.	FC4-P4	21
ABEL, F.	FC36-P36, P122	38, 81
ADAM, V.	P88	64
ADDISON-JONES, R.	FC29-P29	34
ADENIJI, K.	P111	75
ADLER, D.	FC22-P22, FC23-P23, FC24-P24	30, 31, 32
AGRAFIOTIS, M.	FC9-P9	23
AGUADO IBANEZ, S.	FC15-P15	26
AGUIAR, F.	P46, P56	46, 50
AIROLDI, A.	P108	74
ALAMAJED, A.	P125	82
ALAWADI, A.	P53, P125	49, 82
ALBAQAMI, M.	P81	61
ALBISU, A.A.	P113	76
ALEXANDER, N.	FC27-P27, P106	33, 73
ALMAJED, A.	P53	49
AL-NUFORNOY	FC27-P27	33
ALONSO-ALVAREZ, M.L.	FC20-P20, P113	29, 76
ALVES, R.	P109	74
AMATTO, B.	FC34-P34	37
AMBROSANIO, R.	P47	46
AMICO, F.	P57	51
AMIN, R.	FC37-P37, FC38-P38, P53, P66, P82, P95, P125	39, 40, 49, 55, 62, 68, 82
AMORIM, P.	FC18-P18	28
ANDERSEN, T.	FC39-P39	40
ANDREWS, J.	FC28-P28	34
ANNANDALE, J.	P114	76
ANSALONI, L.	FC15-P15	26
ANTON, A.	FC20-P20	29
ANURA, P.	P58	51
ARAUJO, M.J.	P46, P56	46, 50
ARELLANO-MARIC, M.P.	FC6-P6	22
ARMSTRONG, A.	FC16-P16, FC21-P21, FC26-P26, FC42-P42, P84, P87, P102	27, 29, 33, 42, 63, 64, 71
ARNAL, J.M.	FC27bis-P27bis	44
AVENDANO, M.	P82	62
BAER, G.	P132	85
BAI, Y-Q.	P66	55
BAILEY, A.	P103	71
BALBI, B.	P70, P71	57
BARKER, N.	P120	80
BARROS POBLETE, M.	FC11-P11, P93	24, 67
BARROS, L.S.	P109	74
BARROWMAN, N.	P52, P54	48, 49
BARRY, S.	P114	76
BAUDOUIN, S.	P62, P87, P102	53, 64, 71
BEGHAL, G.	FC17-P17, FC43-P43	27, 42
BELLI, S.	P70, P71	57
BENDITT, J.O.	P64	54
BENJAFIELD, A.	FC5-P5	21
BERLOWITZ, D.J.	FC7-P7, P48, P49, P90	22, 46, 47, 66

NAME	ABSTRACT N°	PAGES
BERNARDES, S.	FC34-P34	37
BERTONI, M.	P72	58
BIJELIC, V.	P52, P54	48, 49
BLACKSHAW, M.	P119	79
BLAKEMORE, J.	FC27-P27	33
BLARDONE, C.	P72	58
BLEKSLEY, J.	FC14-P14	25
BLINDER, H.	P52, P54	48, 49
BORGES DIAS, M.B.	P78	60
BOUGATEF, A.	P123	81
BOUSSAÏD, G.	FC8-P8, P65	23, 55
BREEN-REID, K.	FC38-P38	40
BRIONES, R.	P123	81
BROHAN, L.	P114	76
BROOKE, J.	P64	54
BULLOCK, R.E.	P63	53
BURROWS, S.	P85, P118	63, 79
BUSAM, D.	FC13-P13	25
BUYSE, B.	P59	52
BYRNE, S.	P119	79
CAIRNS, C.	P98	69
CALDEIRA, P.B.	P107	73
CALLAGHER, P.	FC28-P28	34
CALLEGARI, J.	FC6-P6	22
CALVO, J.R.	P79	60
CAMPBELL, C.	P52, P54	48, 49
CAMPBELL, L.	FC16-P16, P50, P63, P76	27, 47, 53, 59
CANEIRAS, C.	FC1-P1, P79, P131	20, 60, 85
CANTERO, C.	FC22-P22, FC23-P23, FC24-P24	30, 31, 32
CARON, C.	P126	82
CARVALHAES, S.R.F.	P78, P83	60, 62
CASTANO, A.	FC1-P1	20
CATTANEO, D.	P70, P71	57
CATTONI, M.	P73	58
CAVANNA, L.	P72, P73	58
CHAN, E.	FC36-P36	38
CHAN, E.Y.	P122	81
CHAN, Y.	P58, P104	51, 72
CHAO, C.	P49, P90	47, 66
CHENG, H.	P58, P104	51, 72
CHENG, L.S.L.	P130	84
CHIANG, J.	FC37-P37, P53, P68, P125	39, 49, 56, 82
CHILVERS, E.	P92	67
CHLOROS, D.	FC9-P9	23
CHOI, P.	FC30-P30	35
CHU, C-M.	P130	84
CHU, S.	FC38-P38	40
CHUA, J.	P58, P104	51, 72
CIFUENTES, T.	P78, P83	60, 62
CIRNE, H.	P65	55
CLARK, C.	FC37-P37, FC38-P38	39, 40
CLIVATI, E.	P47	46

NAME	ABSTRACT N°	PAGES
COBBEN, N.A.M.	P105	72
CODECO, V.	P65	55
COLEMAN, J.	FC5-P5, FC10-P10	21, 23
COLT, J.	FC33-P33, P85, P86	36, 63, 64
CONNOLLY, B.	P69	56
CONTI, C.	P57	51
CONTI, S.	P90	66
CONWAY, J.H.	P89	65
CORREIA, R.	P109	74
CORREIA, S.	FC20-P20, P113	29, 76
COYTE, P.C.	P82	62
COZENS, S.	P63, P89	53, 65
CRINER, G.	FC5-P5	21
CRISTIANO, A.	P108	74
CROCKER, M.	FC5-P5	21
CULL, F.	P63	53
CUNHA, J.	P46, P56	46, 50
DA SILVA, Z.	FC37-P37	39
D'ABROSCA, F.	P71	57
D'AMANZIO, E.	P73	58
D'ANDRIA, M.	P73	58
DAVIDSON, J.	FC14-P14	25
DE MARIA, B.	FC41-P41	41
DE MATTIA, E.	P57	51
DE WEERD, W.	P124	81
DEVEREUX, H.	P92	67
DEWITTE, A.	P127	83
DEWSBURY, E.	FC33-P33	36
DeYOUNG, P.	FC5-P5	21
DIAZ-LOBATO, S.	FC1-P1	20
DIDIER, A.	P110	75
DJILLALI, A.	FC8-P8	23
DOMINIONI, L.	P73	58
DONIZETTI, V.	FC12-P12	24
DORIS, T.	FC26-P26, P87	33, 64
DREHER, M.	FC13-P13	25
DREYER, P.	P61	52
DRUMMOND, M.	FC18-P18, FC19-P19, P109	28, 29, 74
DUARTE, A.	P131	85
DUIVERMAN, M.	FC6-P6	22
DUPUIS, M.	P110	75
EBDON, A.M.	P97	68
EDEL, L.	FC36-P36	38
EDWARDS, A.	P95	68
ELMO, M.	FC31-P31, FC32-P32, FC35-P35, P133	35, 36, 38, 85
ELPHICK, H.	P120	80
ESCARRABILL, J.	P79	60
EVANS, H.	P98	69
EWINGS, S.	P89	65
EWLES, S.	P63, P89	53, 65
FABER, C.G.	P105	72
FAGEVIK-OLSEN, M.	P128	83
FAIRBAIRN, S.	P114	76

NAME	ABSTRACT N°	PAGES
FALCIER, E.	P57	51
FAULL, C.	P60, P101	52, 70
FLEMING-CARROLL, B.	FC38-P38	40
FOCARACCIO, L.	P47	46
FONDENES, O.	FC39-P39	40
FORTON, J.T.	P119	79
FRASSANITO, F.	P108	74
FREEMAN, M.	P129	83
FREITAS GRAD, G.	P109	74
FREITAS, A.C.	FC3-P3, P121	20, 80
FREYNET, A.	P127	83
FROLICHMAN, S.	P126	82
GABOARDI, P.	P108	74
GALARZA JIMENEZ, M.A.	FC15-P15	26
GALERON, L.	P100	70
GALETKE, W.	FC6-P6	22
GANGIA, A.	P111	75
GARAVAGLIA, A.	FC41-P41	41
GARNERO, A.	FC27bis-P27bis	44
GARUTI, G.	P77	60
GASCHE, P.	FC22-P22, FC23-P23, FC24-P24	30, 31, 32
GASPAR, H.A.	P107	73
GERMAIN, M.	P126	82
GERSHON, A.	P66	55
GNANASABESAN, C.	P68	56
GOBAILLE, G.	P127	83
GOLDSTEIN, R.	P66, P82	55, 62
GONCALVES, C.R.	P78	60
GONCALVES, M.R.	FC18-P18, FC19-P19, FC20-P20, P51, P113	28, 29, 48, 76
GONZALEZ BERMEJO, J.	FC15-P15	26
GOODIN, C.	P85	63
GRAML, A.	FC13-P13	25
GRANDE, A.	P73	58
GRANDI, M.	FC12-P12	24
GRAY, R.	P123	81
GRIME, C.	FC36-P36	38
GRÖSCHEL, A.	FC13-P13	25
GRYCHTOL, R.	P122	81
GUBER, A.	P117	78
GUEDES, R.	FC34-P34, P109	37, 74
GUERRIERE, D.	P82	62
GUIMARAES, M.J.	FC20-P20, P78, P113	29, 60, 76
GUISEPPE, T.	P47	46
GUTHRIE, N.	FC33-P33	36
HALTER, V.	FC27bis-P27bis	44
HAMADA, A.S.P.	P78, P83	60, 62
HAMM, C.	FC6-P6	22
HANNAN, L.M.	P90	66
HARDY, S.	P123	81
HARRISON, L.	P97	68
HART, N.	FC17-P17, FC43-P43, P69	27, 42, 56
HATTORI, N.	P115	78
HAZAMA, T.	P115	78

NAME	ABSTRACT N°	PAGES
HESKETH, R.	FC29-P29	34
HIJAZI, M.	P81	61
HIRAI, Y.	P115	78
HIRATA, M.	P115	78
HISCUTT, J.	P98	69
HIXON, J.	FC10-P10	23
HOEY, L.	P52, P54	48, 49
HOFFMAN, A.	P125	82
HOHEISEL, G.	FC13-P13	25
HOV, B.	FC39-P39	40
HOVLAND, V.	FC39-P39	40
HOWARD, M.E.	P48, P49, P90	46, 47, 66
HSE YIN SOON, L.	P104	72
HUGHES, P.D.	FC14-P14	25
HUPPI, P.	P126	82
HURST, J.	P103	71
IBRAHIM, M.W.	P111	75
IMPERATORI, A.	P73	58
IP, P.	P118	79
IQBAL, M.	P85	63
ISENSEE, R.	FC34-P34	37
ISHIKAWA, Y.	P75	59
ISOBE, K.	FC40-P40	41
JAMES, J.	P119	79
JAMES, M.W.	FC45-P45	43
JAMIL, M.	P81	61
JANSSENS, J.P.	FC22-P22, FC23-P23, FC24-P34	30, 31, 32
JOHNSON, L.	P118	79
JONES, H.	P112	75
JOOSTEN, I.B.P.	P105	72
JORGE, R.	P109	74
KALTSAKAS, G.	FC17-P17, FC43-P43	27, 42
KAM, K.	P99	70
KAMINSKA, M.	P69, P88	56, 64
KAPLAN, C.	FC31-P31, FC32-P32, FC35-P35, P133	35,36, 38, 85
KARACHRISTOS, C.	FC9-P9	23
KARDESH, K.	P81	61
KASHIYAMA, Y.	P115	78
KATHIRESAN, B.	FC14-P14, FC42-P42	25, 42
KATIRJI, B.	FC32-P32	36
KATZ, S.L.	P52, P54, P66, P82	48, 49, 55, 62
KERR, J.	P98	69
KHANNA, A.	FC33-P33, P85, P118	36, 63, 79
KINNEAR, W.	P85, P118	63, 79
KLEIVEN, A.L.	FC4-P4	21
KLEPACKI, V.	P100	70
KLIMIUK, J.	P80, P116	61, 78
KOHN-BOUZAGLOU, S.	P117	78
KÖHNLEIN, T.	FC13-P13	25
KONDO, Y.	FC40-P40	41
KOR, A.C.	P58	51
KOUSTA, A.	FC9-P9	23
KSEIBI, E.	P81	61

NAME	ABSTRACT N°	PAGES
KWOLEK, E.	P125	82
LABORDE, F.	P110	75
LAGES, J.	P46, P56	46, 50
LANDONI, C.V.	FC12-P12	24
LANGRISH, K.	FC38-P38	40
LATHAM, M.	FC42-P42	42
LAVERTY, A.	P122	81
LE, C.	FC38-P38	40
LEASA, D.	P66, P69	55, 56
LEHMANN, S.	FC25-P25	33
LESCOUZERES, M.	P110	75
LEWIS, A.	P114	76
LITO, L.	P131	85
LIZIO, A.	P57	51
LOBATO, S.D.	FC20-P20, P113	29, 76
LOEWEN, A.	P69	56
LOFASO, F.	FC8-P8	23
LORENZEN, C.	P61	52
LYNN, D.	P92	67
MACKIE, M.	FC17-P17, FC43-P43	27, 42
MACLUSKY, I.B.	P52, P54	48, 49
MAH, J.K.	P52, P54	48, 49
MAILHAT, C.	P100	70
MAISONOBE, J.	FC15-P15	26
MALHOTRA, A.	FC5-P5	21
MANDAL, S.	P103	71
MANSELL, S.K.	P103	71
MANTELLINI, E.	P74	58
MARCHISIO, S.	P47	46
MARINHO, A.	FC18-P18, P51	28, 48
MARINO, P.	FC17-P17, FC43-P43	27, 42
MARINOU, K.	FC41-P41	41
MARKOWITZ, A.	P133	85
MARKUSSEN, H.	FC25-P25	33
MARTINEZ, L.	P123	81
MASOCCO, F.	P70	57
MATTEI, A.	P47	46
MAURO, L.	P57	51
MAWSON, R.	P125	82
MAYNARD, L.	P92	67
MAYORALAS-ALISES, S.	FC1-P1, P79, P131	20, 60, 85
McEWAN, S.	FC38-P38	40
McGEE, L.	P129	83
McKAY, L.	P97	68
MCKIM, D.A.	P52, P54, P66, P69, P82	48, 49, 55, 56, 62
MCMILLAN, H.	P52, P54	48, 49
McPARLAND, P.	P111	75
McPHERSON, D.	P123	81
MEGAS, D.	P90	66
MEHDIAN, Y.	P95	68
MELNIK, P.T.	P107	73
MELO-CRISTINO, J.	P131	85
MESSER, B.	FC21-P21, FC26-P26, P50, P62, P87	29, 33, 47, 53, 64

NAME	ABSTRACT N°	PAGES
MIHARA, M.	P115	78
MITCHELL, I.	P99	70
MITCHINSON, V.	P67, P97	55, 68
MIURA, T.	P75	59
MOCHIZUKI, H.	P115	78
MOMOLI, F.	P52, P54	48, 49
MORA, G.	FC41-P41	41
MORAIS, L.	FC3-P3, P121	20, 80
MORLEY, S.	P94	67
MORRIS, J.	P106	73
MOSCOSO, G.	P55	49
MOSES, R.	FC27-P27, FC28-P28, FC29-P29, FC42-P42, P63, P106	33, 34, 42, 53, 73
MOURA, M.C.	P65	55
MURN, M.	FC30-P30	35
MURPHY, P.	FC17-P17, FC43-P43, P69	27, 42, 56
MUTTEN, M.	P120	80
MYCROFT, K.	P80, P116	61, 78
NASILOWSKI, J.	P80, P116	61, 78
NATVIG, G.K.	FC25-P25	33
NAUGHTON, P.	P48	46
NETTEN, K.	P95	68
NEUZERET, P.C.	FC13-P13	25
NI, B.	P58, P104	51, 72
NICHOLLS, C.	P49	47
NICOLINI, A.	P73	58
NILSEN, R.M.	FC25-P25	33
NOBILI, L.	P57	51
NOMASA, K.	P115	78
NONOYAMA, M.	P66, P69, P82	55, 56, 62
NYGREN-BONNIER, M.	P128	83
O'CONNELL, C.	P69	56
OLIVEIRA, C.F.	P107	73
ONDERS, R.	FC31-P31, FC32-P32, FC35-P35, P133	35, 36, 38, 85
ORKIN, J.	FC38-P38, P95	40, 68
ORLIKOWSKI, D.	FC8-P8	23
ORR, J.	FC5-P5	21
ORTNER, K.	FC13-P13	25
OTTE, A.A.B.	P105	72
OUATTARA, A.	P127	83
OVIEDO, M.	P123	81
OWENS, R.	FC5 - P5	21
PACHECO, C.	P46, P56	46, 50
PACKHAM, S.	P114	76
PAIVA REINERO, R.	FC2-P2, FC11-P11, P55, P93	20, 24, 49, 67
PALMER, J.	FC14-P14, FC42-P42, FC44-P44, P60, P101	25, 42, 43, 52, 70
PASCHONI, E.	FC9-P9	23
PASQUINA, P.	FC22-P22, FC23-P23, FC24-P24	30, 31, 32
PATRIZIO, G.	P73	58
PATTANI, H.	FC17-P17, FC43-P43	27, 42
PEERS, L.	P118	79
PEREIRA, R.	P46, P56	46, 50
PHILIPPS, A.	P123	81

NAME	ABSTRACT N°	PAGES
PINTO, T.	FC18-P18, FC19-P19, P51	28, 29, 48
PIPE, C.	P92	67
PIRES, F.	FC18-P18, P51	28, 48
PIZARRO, N.	FC1 - P1	20
PIZZORNO, M.	P74	58
POLYVIOU, J.	FC37-P37, FC38-P38, P53, P95, P125	39, 40, 49, 68, 82
PONTIER-MARCHANDISE, S.	P110	75
PONTONI, P.	FC2-P2, FC11-P11, P55, P93	20, 24, 49, 67
PRELLA, M.	FC22-P22, FC23-P23, FC24-P24	30, 31, 32
PRICKETT, M.	FC10-P10	23
PRIGENT, H.	FC8-P8	23
PRINCE, I.	P71	57
PRITCHARD, R.	FC14-P14	25
PROSERPIO, P.	P57	51
PRZYBYLOWSKI, T.	P80, P116	61, 78
QUADERI, S.	P103	71
QUINT, M.	P111	75
RADOVANOVIC, D.	P108	74
RAJWANI, F.	FC37-P37	39
RAMOS, A.	FC3-P3	20
RAMSAY, M.	FC17-P17, FC43-P43	27, 42
RAO, F.	P57	51
RAUTELA, L.	P49	47
REIS, S.	P83	62
RENDLE, G.	FC36-P36, P122	38, 81
RICHARDS, A.	P114	76
RIDOUT, J.	P92	67
RINDONE, E.	P47	46
RIZZI, M.	P108	74
ROAD, J.	P69, P82	56, 62
ROBINSON, V.	P122	81
ROBINSONS, V.	FC36-P36	38
ROCHFORD, P.D.	P48, P49	46, 47
RODRIGUES, D.	P51	48
RODRIGUES, D.L.G.	P78, P82	60, 62
RODRIGUES, S.L.	P65	55
ROGES-BREDAS, V.	Scientific Sessions *"Be competent..." and "Aging..."*, P135	19
ROSALES, J.	FC11-P11, P55, P93	24, 49, 67
ROSE, L.	P66, P69, P82	55, 56, 62
ROSS, J.S.	P86	64
ROTOLO, N.	P73	58
ROVERE, G.	P47	46
RUEHLAND, W.	P48	46
SABIK, J.	P133	85
SAKS, F.H.	P78	60
SALA, A.D.	P78, P83	60, 62
SALAHUDDIN, N.	P81	61
SAMPIETRO, C.	P73	58
SAMUELS, M.	P122	81
SANNICOLO, G.	P57	51
SANSONE, V.A.	P57	51
SANTOS, G.C.S.D.	P83	62
SANTOS, D.B.	P65, P83	55, 62

NAME	ABSTRACT N°	PAGES
SANTOS, V.	FC19-P19	29
SANTUS, P	P108	74
SAVIO, G.	P70, P71	57
SAWADA, J.	P115	78
SCHANDL, A.	P128	83
SCHILZ, D.O.		
SCHILZ, R.	FC31-P31, FC32-P32, P133	35, 36, 85
SCHMOOR, C.	FC6-P6	22
SCHWARZ, S.B.	FC6-P6	22
SEDKAOUI-OUMERZOUK, K.	P110	75
SERASLI, E.	FC9-P9	23
SERVERGNINI, P.	P72	58
SESANA, M.	FC12-P12	24
SHAHIDULLAH, S.	P95	68
SHAILER, S.	P129	83
SHARMA, R.	FC5-P5, FC10-P10	21, 23
SHEERS, N.	P48, P49, P90	46, 47, 66
SHITRIT, D.	P117	78
SHOCHET, G.E.	P117	78
SIDERI, R.	FC41-P41	41
SLINGER, C.	FC27-P27	33
SMITH, P.	P118	79
SOON, L.	P58	51
SOUSA, R.	FC3-P3, P121	20, 80
SOUZA, N.C.	P78, P83	60, 62
SOVANI, M.	FC33-P33, P85, P118	36, 63, 79
SPERLING, C.	FC38-P38	40
SPIELMANNS, M.	FC6-P6	22
STAHLE, A.	P128	83
STEIER, J.	FC17-P17, FC43-P43	27, 42
STORRE, J.H.	FC6-P6	22
SU, Y.	P91	66
SUBBE, C.	P114	76
SUH, E-S.	FC17-P17, FC43-P43	27, 42
SULLIVAN, J.	P99	70
SUN, T.	P58? P104	51, 72
SUNDAR, K.	FC5-P5	21
SURANYI GONZALEZ, C.	P93	67
SVENSSON-RASKH, A.	P128	83
SYED, F.	FC37-P37, FC38-P38, P53, P125	39, 40, 49, 82
TAAT-KRAKEEL, G.A.	P124	81
TAN, A.	P58	51
TAN, G.P.	P58	51
TANDON, A.	P66, P69	55, 56
TAYLOR, C.	P106	73
TAYLOR, J.A.	FC45-P45	43
TAYTARD, J.	P100	70
TESTELMANS, D.	P59	52
THAIVALAPPIL, F.	P114	76
TINOCO, A.	FC3-P3, P121	20, 80
TOCHE, S.	FC27bis-P27bis	44
TORRES-CASTRO, R.	FC2-P2, FC11-P11, P55, P93	20, 24, 49, 67
TOUSSAINT, M.	FC39-P39	40
TRAN, T.	P53, P125	49, 82

NAME	ABSTRACT N°	PAGES
TRINDADE, G.	FC34-P34	37
TROJEL, D.	P61	52
TSAI, S.	FC5-P5	21
TYSON, F.	P94	67
VALENZUELA, R.	FC2-P2, FC11-P11, P55, P93	20, 24, 49, 67
VAN AMERONGEN, M.H.	P124	81
VAN DEN BRINK-BUDGEN, R.	P92	67
VASCONCELLO, L.	FC11-P11, P55, P93	24, 49, 67
VELA, P.	P123	81
VELDHOEN, E.	P96	68
VERA URIBE, R.	FC2-P2, FC11-P11, P55, P93	20, 24, 49, 67
VERDI, D.S.	P83	62
VERWEIJ, L.	P96	68
VIANA MACHADO, F.	FC18-P18, FC19-P19	28, 29
VICENTINI, L.	FC12-P12	24
VIDIGAL-LOPES, M.	FC34-P34	37
VIEIRA, A.L.	P46, P56	46, 50
VIENNE, F.	FC22-P22, FC23-P23, FC24-P24	30, 31, 32
VIGANO, R.	FC12-P12	24
VILLARROEL, G.	FC11-P11, P55, P93	24, 49, 67
VINCENT, H.	P64	54
VINETTE, J.	P95	68
VIVODTZEV, I.	FC45-P45	43
VOSSE, B.A.H.	P105	72
VRIJSEN, B.	P59	52
VYAS, A.	FC27-P27, FC28-P28, FC29-P29, P106	33, 34, 73
WARD, N.R.	FC14-P14	25
WASILEWSKI, M.	P82	62
WATSON, D.	P123	81
WATSON, L.	P118	79
WEST, S.	P62	53
WIJKSTRA, P.J.	P124	81
WILLES, L.	FC5-P5	21
WILLIAMS, T.	FC26-P26	33
WILLS, A.	P85	63
WINCK, J.C.	P79	60
WINDISCH, W.	FC6-P6, FC13-P13	22, 25
WINTHER, D.	P61	52
WITHERS, J.	FC38-P38	40
WOLFE, L.	FC5-P5, FC10-P10, FC32-P32	21, 23, 36
WOOD, S.	FC28-P28, FC29-P29, P106	34, 73
WOEHRLE, H.	FC13-P13	25
WOOLER, L.	P67	55
WOOLLEY, J.	P114	76
WORSLEY, P.	P89	65
WOUTERS, E.F.M.	P105	72
WOZNIAK, E.	FC15-P15	26
YOSHIMINE, T.	P115	78
YOUNOSSIAN, A.B.	FC22-P22, FC23-P23, FC24-P24	30, 31, 32
ZAGORSKI, B.	P82	62
ZAMAN, M.	P125	82
ZANOLINI, A.	P57	51
ZIELINSKI, D.	P88	64

NOTES

Join our Symposium at JIVD 2018 in Lyon

Evidence for transcutaneous CO2-monitoring in home mechanical ventilation

March 16th 2018 | 12.15pm – 1.45pm | Salon Pasteur

English-french simultaneous interpretation

Evidence in COPD

Dr. F. S. Magnet

Department of Pneumology, Cologne Merheim Hospital
Witten/Herdecke University; Faculty of Health/School of Medicine

Evidence in restrictive disorders/ Neuromuscular Disease

Dr. M. L. Duiverman

Department of Pulmonary Diseases/Home Mechanical Ventilation
University of Groningen, University Medical Center Groningen

Dr. A. Hazenberg

Department of Home Mechanical Ventilation
University of Groningen, University Medical Center Groningen

Evidence for transcutaneous CO2-monitoring in home mechanical ventilation for children

Pr B. Fauroux

Pediatric Noninvasive Ventilation and Sleep Unit
Necker University Hospital, Paris

sentec

BREAS.COM

WELCOME TO OUR BOOTH NO 18 AT THE JIVD!

Breas Medical was founded in 1991 in Gothenburg, Sweden and has become a global leader in the ventilation and sleep therapy. From our centers of excellence in Sweden, UK, US, and China, we have developed a complete and comprehensive line of respiratory medical devices, from home care life support ventilation, airway clearance devices to CPAP. Our products are sold in more than 40 countries.

Current product offering

Coming soon

BREAS SYMPOSIA AT THE JIVD:

INNOVATIONS IN MECHANICAL IN-EXSUFFLATION: PAST, PRESENT & FUTURE

Friday, 16th March 2018, 12:15-13:45pm

IMPROVING THE QUALITY OF HOME MECHANICAL VENTILATION

Friday, 16th March 2018, 17:45-19:15PM

+46 31 86 88 00
breas.com

BREAS