Inspire

The Official Journal of The Association of Respiratory Technicians and Physiologists

Vol 1 No. 8 February 1997

Reg. Charity No. 2900907

FIRST WORD

Wishing all ARTP members a happy and prosperous 1997

1997 brings a new era for the ARTP. The Association is in a position to offer a number of substantial travel bursaries to attend national and international conferences courtesy of **DeVilbiss Healthcare (UK).** On behalf of the ARTP I would like to thank Roy McClements and Jill Smith of DeVilbiss Healthcare (UK) for their hardwork and commitment to this venture, and to ARTP Manufacturer's Liaison Officer Brendan Cooper for organisation and adjudication

Through forward thinking and an awareness of the vital role the technologist plays in the assessment, prescription and implementation of therapy, – whether it is nebulised inhalation therapy, oxygen therapy or assisted ventilation (CPAP or NIPPV) – DeVilbiss recognise how important it is for technicians to stay abreast of the latest technological innovations, measurement techniques and developments in the world of respiratory medicine.

DeVilbiss (UK) have awarded 4 bursaries toward the cost of travel and accommodation to the three major respiratory conferences – the ATS, BTS and ERS. Travel awards have already been made to ARTP members following the competition held in 1996. The winners names are given on page 9 and all the winning articles will appear in INSPIRE.

Keeping up to date with the latest thinking and developments in respiratory medicine is vitally important for all respiratory technologists. Attendance at scientific meetings and conferences is a pre-requisit for personal and professional development. It ensures that respiratory function services offered in hospitals throughout the UK offer the latest techniques in assessment, therapy and after-care service. As the Clinical Specialist technicians will be relied on to evaluate and advise on new techniques, measurements and equipment. Service management, development and the service buying power has shifted from the medical consultant to the head technician and budget holder (hopefully the same person!). The technologist no longer follows but leads and shapes the service provision.

Ensure your timetable is flexible enough to allow study leave to attend meetings and conferences. If it isn't then maybe you need challenge those with ingrained, out-moded ideas (especially the hospital hierarchy) about the status and professionalism of your department.

Successful Candidates in the ARTP/BTS National Assessment

Congratulations to the successful candidates in the 1996 ARTP/BTS National Assessment.

Gillian Boar
Pontefract General Infirmary *Merit*

Susan Easom
Kings Mill Centre for Health Services
Merit

Karen Dakin
Nottingham City Hospital
Merit – Sally Gough Award

Donna Knowles
Walsall Manor Hospital

Stuart Wragg
Stoke on Trent City General

Michael Hepple
Stoke on Trent City General

Joanna Harrison
Queen Elizabeth Hospital, Birmingham

Bronchial Challenge Testing – Dr Ian Pavord Coventry University Tuesday 15th April 2-5 pm

Sponsors P.K. Morgan Ltd

Setting up a service ? what protocol ? presentation of results ? which equipment ? health and safety ? sensitivity and specificity ? airway physiology ? or just want to know more ?? Then come to a special half day session convened at Coventry University on Tuesday 15th April 1997 where all of your questions will be answered.

Generously sponsored by **P.K. Morgan Ltd** this special session convened during the HTEC Advanced Specialist Option week will cover all aspects of bronchial challenge testing, including an appraisal of techniques and protocols, airway physiology and clinical application. If you have an established service or are thinking of starting a service this seminar is not to be missed. Specialist trainee registrars/ research doctors/ research technicians are also welcome – please show this advertisement to other interested parties

FEE: £12 per person

Please apply **quickly** before all of the places are filled. To reserve a place(s) **write** to me at the address below enclosing a cheque to cover the total cost of the places required, allocated on a first come first served basis. Applications and cheque to secure reservation should be sent to Sue Revill, Department of Respiratory Medicine, Glenfield Hospital, Leicester LE3 9QP. Confirmation and details of venue will be posted by return. Cheques made payable to Association of Respiratory Technicians and Physiologists or Assoc of Resp Tech and Physiol.

Closing date for applications April 5th 1997.

ARTP CHAIRMAN'S REPORT 1995/1996

Dr. Sue Hill, Lung Investigation Unit, Queen Elizabeth Hospital, Birmingham

This report was given at the winter meeting of the Association of Respiratory Technicians and Physiologists in Liverpool which was the second time in the history of ARTP that a meeting had been held in this city. This report will highlight some of the issues mentioned in the report.

MEETINGS

This year saw a healthy attendance at both ARTP meetings. The programme of the winter meeting was put together to provide information on a variety of topic from the confusion associated with the use of medical terminology from the distinguished physician Dr. Colin Olgvie (of transfer factor fame) to a talk on blood gas analysis from Niesje Verhey from the Academic Medical Institute in Amsterdam. All speakers are thanked for their excellent contributions to the programme which stimulated much lively discussion. Thanks are also conveyed to Pat Mitchell from Fazakerley Hospital in Liverpool who was responsible for the organisation and local arrangements. She arranged an excellent social event on the Friday evening, where many ARTP members and our industrial supporters thoroughly enjoyed themselves. As a result of this success, Pat Mitchell will now be taking on the role of ARTP Meetings Organiser.

We held a successful summer meeting at the University of Warwick which preceded the BTS summer meeting. The meeting contained contributions on a wide variety of topics which included the newer technology of forced oscillimetry and an update on the use of oximeters in a variety of clinical settings and applications. We hope that we are now getting the format of the meetings correct, given the increase in attendance seen at meetings during 1996.

FORTHCOMING MEETINGS

We will be once again linking the ARTP summer meeting with the British Thoracic Society summer meeting which is taking place at Loughborough University on 3rd and 4th July, 1997. Arrangements therefore will be made for an ARTP meeting on the afternoon of 2nd July, 1997. If you feel that you would like to contribute to this meeting by giving a short presentation on a topic of interest or an area that you have been researching please contact Pat Mitchell at Fazakerley Hospital in Liverpool. On Thursday, 3rd July, 1997 the first day of the BTS meeting, the ARTP/BTS combined symposium will be held.

We will also be celebrating the 25th Anniversary of the formation of the ARTP during this year. We are therefore planning a 2 day extravaganza and a conference venue is currently being investigated. The date will certainly be in November but you will be circulated with dates and booking details well in advance. We hope to invite all key people who have been involved in the association over its 25 year history plus other important individuals. We plan to make this a very special event, so keep your diary free.

INDUSTRIAL SUPPORT

The Association has noticed the general economic recovery in the support that we have seen from industry over the past year. It is now back to levels that we have observed in the past and as a result we are able to offer both a comprehensive manufacturers exhibition and meetings at a relatively low registration cost. In both the summer and winter meetings we have had in excess of 10 companies present and have had to turn away more. We hope that this trend continues and that we see major support from industry for the 25th anniversary meeting. The appointment of Brendan Cooper as the ARTP manufacturers liaison representative has greatly enhanced our communication with companies and on behalf of the ARTP I would like to express our thanks to Brendan. We will be exploring with the companies in more detail how we can be of help to each other in January.

BTS/ARTP LIAISON COMMITTEE

The support from the BTS continues for ARTP activities. Over the last year our progress has not been as great as before but we hope that during 1997 there will be a very busy agenda for the liaison committee. There are a number of courses in progress being prepared under the BTS/ARTP umbrella including a repeat of the very successful practical aspects of setting up a sleep laboratory in Stoke on Trent, and interpretation of lung function test results in Birmingham, and two new courses on invasive and non invasive blood gas analysis and clinical exercise testing. We will be exploring with our BTS colleagues ways in which we can encourage clinicians to support the lung function staff to attend meetings. One comment received from the floor which occurred during this report was the suggestion of CME type registration for technical/scientific staff to make some attendance at educational course/seminars during the year. This suggestion will be explored both through the BTS/ARTP Liaison committee and through other relevant national bodies.

CLINICAL SCIENTISTS

As mentioned in previous reports the ARTP is a founder member of the Conference of Clinical Science Organisations (CCSO). Early in November both clinical scientists and the fields within which they work in the NHS was launched to the media. Within this launch was information about the ARTP and clinical scientists working in respiratory medicine. The profile of clinical scientists is increasing because of the directive from the NHS Executive and the Department of Health and currently clearer guidelines are being prepared for their appointment and education requirements. We continue to work on the development of a supporting MSc for newly qualified graduates who enter this grade or for technicians who booth wish and are supported to transfer to the clinical scientist scale.

MEMBERSHIP

For the next financial year, membership fees will remain the same. We currently have 250 members which is nowhere near the total people working in lung function laboratories in the UK. We hope that we can increase the number of members joining by working with industry to advertise the benefits. We will be revamping both the membership application form and preparing a membership welcome pack to help us in our endeavours.

Continued on Page 4

Continued from Page 3

Our grateful thanks to Steve Scholey and staff in Pontefract who are responsible for all membership issues and for circulating information.

BURSARIES

It is planned to extend the number of bursaries offered by the ARTP and to produce much clearer guidelines for eligibility. From the BTS we annually receive £500 for attendance at either the summer or winter meeting. We were delighted to receive from DeVilbiss £500 for bursaries for attendance at the ERS over the next 3 years and £1000 for a bursary for attendance at the 1997 ATS conference in San Francisco. Can I please encourage you all to apply for these bursaries to increase the competitive element. We will be trying to extend the bursaries offered and to make funds available for attendance at ARTP meetings and other courses through exploring our contacts with industry.

EUROPEAN RESPIRATORY SOCIETY

The section on Respiratory Health Care and Technology, which was initially formed following the involvement of the ARTP, the Dutch and the Spanish lung function technicians has now become a fully fledged assembly within the ERS structure. There are 3 active scientific groups representing respiratory measurement and technology, physiotherapy and nursing. At each ERS annual congress the assembly organises a number of symposia and postgraduate courses and over the past 3 conferences we have seen active participation in ERS activities from members of the ARTP. We hope that this will continue and that support for the development of this assembly will be given by all professionals working in the areas highlighted above. Can I encourage you to submit an abstract for presentation at the 1997 congress in Berlin - it is a beautiful city and the science should be great. Abstract forms are available from myself.

GRADING GUIDELINES

The information which has been received following circulation of these guidelines is now being reviewed and a final document will be produced in the near future. Furthermore the survey relating to the performance of lung function tests by different grades of staff will also be put into a final report and a decision made on where this should be published. This is really important data which needs to be brought to the attention of the BTS and the DOH. A big thank you to all ARTP staff involved in this initiative particularly Brendan Cooper and Steve Scholey.

INSPIRE

Inspire continues to be produced at two issues per year and with the editor looking at the production of an extra issue during 1997 due to increasing manufacturers support in the form of advertising revenue. Copy is always required so please any contribution, whether small or large would be gratefully received. Our thanks to Sue Revill who continues in her role as editor and produces what most people find a very interesting and informative publication.

TREASURER

Our financial accounts look much healthier this year largely because of the increase in support we have received from the financial sector. Julie Lloyd was elected as treasurer following the 1995 AGM and can I express our grateful thanks to Julie for keeping us on the financial straight and narrow. I would like to thank all members of Executive for their continued help, support and commitment to the Association.

Finally the 25th Anniversary gives us all the opportunity to go back and review the contribution that ARTP has made to the practice of respiratory measurement in the UK and Europe and hopefully is a time for us to set targets and strategies to take us to the millennium and future. We all hope you will be at the celebrations and play an integral part in the future of the Association.

EDUCATION REPORT

This will be a very brief summary of the events.

ARTP National Assessment – Once again there were a number of successful candidates in this year's national assessment which will be detailed separately in Inspire. We would like to express thanks to all candidates, workbased supervisors and assessors for their continued support of this professional examination. Please remember to register your candidates early and that this qualification can be used as part of NVQ level 3 supporting evidence.

Academic Courses – The BTEC HNC specialist option in respiratory physiology continues to be offered at Coventry University and is running successfully. This venue may change in future years but we will keep you updated.

1996 saw the launch of the BSc in clinical science respiratory physiology option. All of the core units are taken from a course that was validated 2 years ago when audiology and cardiology options were available. Currently two students have started the 4 year part time course which leads to a BSc honours degree. The time for completion of the degree course is reduced to 2 years if people already hold a HNC. A number of people were involved in the development and validation of this course including Sue Revill, Brendan Cooper, Evelyn Smith and Derek Cramer and can I express the Association's thanks to these people. We continue to explore avenues for an MSc in respiratory science and we hope to have further news over the next few months. We will be aiming this course at both an entry qualification for clinical scientists and if organised into a modular form suitability for MTOs who wish to obtain a higher qualification or even to pursue single modules only.

ARTP Short Course – A short course to support the national assessment was held in Birmingham which was extremely successful. We hope to repeat this again for 1997 candidates. As mentioned in the main Chairman's report there are a number of ARTP/BTS courses in the planning stages.

NVQs – The NVQ level 3 standard have been reviewed and revised and are currently in the system which will lead to changes in validation over the next 12 months. We will keep you informed of all developments.

Practical Guide – This should be completed early in the New Year and all members will be circulated regarding its availability.

Finally grateful thanks to all members of the ARTP involved in this committee, but particularly to Clare Thomas from Walsall who is both the secretary of the committee and the examination secretary and to Evelyn Smith who took over the chair of this committee during the year.

CHARITY NEWS

NATIONAL ASTHMA CAMPAIGN

Information packs for runners in the London Marathon who wish to raise money for the NAC may be obtained from Debra or Lorna at the London H/Q on 0171 226 2260, ext 342 or 346.

BRITISH LUNG FOUNDATION

Sow a Little Hope – Embroidery of patient wishes is still travelling the country and will call at the following locations:- Nottingham from 17/Feb, London BLF H/Q 21 – 22/Feb (Open day), Truro from 8/April, Longleat from 23/April, Birmingham Cathedral June, Ragley Hall (Warks) July, Norwich Cathedral August.

Information pack and goodie bag for London Marathon runners who would like to raise money for the BLF contact London head office (0171 831 5831). Charity parachute jumps for the BLF with Skyline Promotions contact Midland branch of BLF (0121 627 2260).

Names and Tel nos of Regional BLF Officers:-

Scotland	Allan Hogarth	Tel: 0141 204 4110
N West	Mrs Barton	Tel: 0151 228 4723
N East	Mrs B Wears	Tel: 0191 263 0276
Midlands	Miss Helen Tuite	Tel: 0121 627 2260
S West	Mrs D Kirkham	Tel: 01242 257942
S East	Mrs A Perry	Tel: 0171 831 5831 (H/Q)

Membership Update

From Membership Secretary *Steve Scholey*

Total number of members as at December 1996: **268**

This figure includes 54 departmental members, 27 associated members, 7 affiliated members, 161 full members, 12 students, 2 honorary members and 5 corporate members.

FEES: Full: £17.50,
Student: £10 (student grade MTO only)

Overseas fees have an additional portion for higher postal rates (price on application) and must be paid in Sterling only.

Renewal of membership due May 31st 1997. All enquires concerning **membership** and **circulation of job list** to Mr Steve Scholey, Chest Unit, General Hospital, Pontefract, West Yorkshire,WF8 1PL.

VARIATION OF BRONCHODILATOR RESPONSE WITH AGE

Evelyn C Smith
Respiratory Function Department
Bristol Royal Infirmary

Adrenergic responses have been shown to be reduced in the elderly (Kelly J et al, Clin Sci 1984: 66; 509-515. Vestal RE et. Al. Clin Pharm Thera 1979: 26: 181-186). Salbutamol has been shown to have less bronchodilator effect in older asthmatic patients while Ipratropium bromide did not show this effect of age (Ullah MI et al, Thorax 1981: 36; 523-529). The effects of a beta adrenergic agonist and an anticholinergic compound were investigated in normal adult subjects selected from different age groups. Active drugs were compared with placebo. On each of three study days one drug was given in doubling doses every 35 minutes to a cumulative maximum of 15 puffs. Change in specific airway conductance (sGaw) and change in maximum expiratory flow (MEF) at low lung volumes (measured from partial flow volume curves) were used to measure bronchodilator effect. Specific airway conductance mainly reflects the calibre of the large airways whereas MEF mainly reflects the calibre of the small airways. Pulse rates were also counted. The area under the dose response curves for each subject were derived and the percentage changes from baseline were calculated. Thirty subjects, 6 from each of 5 age groups (under 35, 35-44, 45-54, 55-64), over 65 years) and 18 subjects, 6 from each of 3 age groups (under 35, 45-54, over 65 years) were recruited for measurement of airway resistance and maximum expiratory flow respectively.

Measurement of sGaw (large airway function) indicated that terbutaline sulphate had a strong bronchodilator effect in the young subjects but its effect was increasingly reduced with advancing age ($y = 63.1\text{-}1.01$ age, $r2 = 0.500$). The bronchodilator action of Ipratropium bromide was weaker and and was independent of age ($y = 14.72 + 0.04$ age, $r2 = -0.001$). Placebo did not have any significant effect on either measurement. The bronchodilator effect of both active drugs on the small airways was not affected by age (MEF at 25% VC: $y = 43.65\text{-}0.46$ age, $r2 = 0.083$; $y = 33.89\text{-}0.21$age, $r2 = 0.066$ for Ipratropium bromide and terbutaline sulphate respectively). After terbutaline the pulse rate was higher than after Ipratropium, the increase being highest in the younger subjects ($y = 11.64\text{-}0.14$ age, $r2 = 0.10$).

Distribution of adrenergic and muscarinic receptors and their function may vary throughout the bronchial tree. The effect of the two drugs on specific airway conductance could be explained by the decrease in number and/or activity of adrenergic receptors in large airways in older subjects. The lack of an age effect in the small airways could be due to a sufficient number of receptors remaining active in the older subjects. These results suggest that, for elderly patients to obtain maximum benefit from their medication, the bronchodilator effect of adrenergic and muscarinic agents should be carefully assessed.

"ON THE BLOWER" – Manufacturers News

I write this article from a remote tax haven somewhere in South America . . . O.K., I'm still here, and many of the manufacturers are still talking to me! Seriously, relations with the healthcare industry are very healthy – one of co-operation rather than conflict.

1. THE DEVILBISS/ARTP TRAVELLING BURSARIES

The 1996 **DeVilbiss/ARTP Bursary** of £500 for the ERS meeting in Stockholm was won by Mr. Ian Cliff (MTO2) Respiratory Medicine Department, North Staffs hospital, Stoke on Trent.

Ian's article appears in this issue of Inspire – congratulations! Close runner-up was Clare Newall from Queen Elizabeth Hospital, Birmingham – who won a travel bursary to the BTS.

Heartiest congratulations for winning the fabulous £1000 **DeVilbiss/ARTP Bursary** for the 1997 ATS meeting in San Francisco go to:

Mr Steve Wimpress (MTO3), Respiratory Physiology Department, Glenfield Hospital, Leicester.

Close runner-up was Louise Phillips, from Queen's Medical Centre, Nottingham – who won a travel bursary to the BTS. Many thanks again to **DeVilbiss.**

The Executive Committee are reconsidering all bursaries in the New Year but the **DeVilbiss/ARTP ERS Bursary 1997 for the Berlin Meeting** (£500) is now open to all grades up to MTO3 top increment (without enhancements) is now open. Details of all bursaries will be circulated with the jobs bulletin later in the year.

2. TRADE STAND

Pharmaceuticals

Evans Medical Ltd. Have just launched their new dry powder inhaler (seen at the Winter BTS) which is aimed directly as an MDI competitor. Having promoted their first MDI as reducing the speed of drug from 70 mph to 40 mph this new product allegedly comes with a man carrying a red flag in front of the powder!

BOC Gases presented some very interesting products at their Winter BTS stand. Although there is a lot of legislative restriction on using compressed gases in Britain, they have some innovative new products in the pipeline. The BOC Walkabout liquid oxygen offers an increased degree of freedom for patients on oxygen (Rental : £63/month). They also offer a demand oxygen controller (DOC 2000, imported from the USA) for use with small oxygen cylinders, as well as lighter non-metal cylinders. There's more to BOC than gas cylinders these days. (Tel: 0800 111 333 Freefone).

Lung function equipment.

Vitalograph are offering the Compact spirometer. Although it looks like a hair dryer – it doesn't actually dry hair very effectively (so Sue Revill tells me!).

CaSE (mass spectrometer people) announced a take-over by Ferraris Group Plc just before the last Inspire went to press. I am led to believe their servicing will be provided by P.K. Morgan staff.

Pari are now marketing the American-made DX Portable spirometer (made by MultiSpiro Global Medical Innovation, USA). This Fleisch Pneumotachograph/Flow Sensor system fulfils all ATS criteria from clinical testing, and the machine certainly looks well designed. Prices weren't available to me, but we'd all be interested to see results of any trials/experience. (Tel: 0181 332 6513).

Medix (recently acquired by Clement Clarke) are gradually moving their orders and general enquiries to the **Clement Clarke** headquarters in Harlow, whilst for the short term servicing and repairs will remain at Catthorpe, Contact information: Clement Clarke International Ltd., Edinburgh Way, Harlow, Essex CM20 2TT, Tel: 01279 414969, Fax: 01279 635232.

Sleep study and associated equipment.

CardioKinetics chose the Winter BTS as the launch site for their new Compumedics Sleep Monitoring system. This is a full polysomnography system, which consists of an £11K monitoring system, with an £11K Reader Station. There are a variety of optional extras which take the cost up a few thousand more. I viewed the system at the stand but have no feel for its performance yet. The company offer leasing deals as well as purchase. Watch this space!. (Tel: 0161 872 8287).

ResMed are promoting the use of humidifiers for use with CPAP machines and are marketing a Fisher and Paykel upgradeable system starting at £32 and going up to £265. Whilst they are not the first to offer humidifiers for CPAP (Medic Aid have offered one for over 3 years) they are backing their promotion with scientific reference (Hayes et al, Thorax 1995: 50; 1179-1182). (Tel: 0123 586 2997)

Nellcor Puritan Bennett are now offering a full range (child, small adult, medium, large wide, large deep) of nasal masks as well as the Adams Systems for assisted ventilation. They are certainly worth considering given the marketing game played by other suppliers. Tel: 0186 932 2700)

Miscellaneous

Respironics, famous for nasal CPAP masks, etc. Have recently bought out Lifecare, the makers of breathing circuits and connectors for ventilators. This presumably gives them a large share of the assisted ventilation accessories market.

Also, Quatron who supply parts and equipment to Drager (the ventilator manufacturers) have been acquired by **Nellcor-Puritan-Bennett**.

Breas Medical from Sweden, (marketed by **Deva Medical**) launched their PV401 pressure support ventilator in Britain at the ARTP Meeting in Liverpool. First inspection shows the machine to be versatile, adaptable and ideal for acute use of NIPPV treatment. The price is somewhere around the £3000 range. (Friday Medical - look out!). A further review will appear in a later edition of Inspire. Tel: Deva Medical 0192 856 5836.

Continued on Page 7

Continued from Page 6

3. COMPLAINTS DATABASE AND WATCHDOG

The only problems I have to report this issue are problems I have come across myself. I discovered a major problem with the ATPS to BTPS correction factor in all **P.K. Morgan MDAS software** programmes (affecting **all BenchMark & AutoLink systems**).

The basic ATPS to BTPS equation contains errors which mean that if you inject a 3 litre syringe into the rolling seal spirometer and enter the pressure and temperature as 760 mmHg and 310 K respectively, the PC calculates a value of 3.50 litres instead of 3.00 litres (an error of 17%). (NB. *This is a useful quick check, to simulate a "ghost" patient*). The error is caused because of a misunderstanding over water vapour pressure values varying with temperature which appears in J E Cotes 4th Edition. Whilst a solution has been found, I am assured by Kevin Hogben that a software correction will be available soon. I hope customers are informed about this quickly, as this will be proof of the improved quality drive at PKM instigated by Ferrari's take-over. I'm sure you will all write and tell me if you have any problems! (*Is our department really the only PKM user to compare values obtained on two different machines since MDAS was launched?*).

I also discovered that users of **Instrumentation Laboratory** blood gas machine service contracts, although you receive a weekend Engineer Helpline, after hours during the week there is no such cover. Do you know of any other unusual service arrangements for essential medical equipment?

When writing to the Complaints Database and WatchDog, please state **(I) exact dates, (ii) names of people you dealt with and (iii) state clearly your grievance.** Also, give a **summary account** of the history of your complaint (a maximum of one page of A4). There is no need to send photocopies of correspondence at this stage.

4. TOP GEAR?

After a particularly stressful week just before Christmas, the Lung Function Team at Nottingham City hospital were discussing both cars and manufacturers, when the idea of matching cars to companies products sprang to mind. Here is the definitive. (*Tongue in cheek*) list:–

P.K. MORGAN *Morgan 4/4 sportscar*
English, can come in kit form, don't always run, good second hand parts, enthusiasts love them!

AVL UK LTD. *BMW 5 series*
German, predictable, up-market, great engineering provided you, don't have to understand it!

SENSOR MEDICS *Cadillac*
American, can be difficult to manoeuvre (on price), bigger than you think.

SSI *TVR Griffin*
English/Welsh, well designed, hand built, niche market, popular with those who know what it takes!

RESCARE(UK) LTD *Land Rover*
Good in the outback, durable, popular, no frills, but a mould breaker

ERICH JAEGER *Audi A4 Quattro*
German, functional, "Vol-thing for technics?"

RADIOMETER *Volvo 400*
Danish, predictable, reliable, lights never go out!

CARDIOKINETICS *Winnebago Camper*
Big over there, brash, flash and where's your cash?

DEVILBISS (UK) LTD *Vauxhall Cavalier*
Ubiquitous workhorse, much loved by owners, same model often gets a new body job.

DEVA MEDICAL *Skoda Favorit*
Really a Volkswagen underneath - but they don't make them themselves, open top to enjoy the Breas!

FRIDAY MEDICAL *London Cab*
Reliable but ageing technology, always cost more than you think, used night and day

MEDIC AID *Reliant Robin*
Weird plastic shape, held together with straps, not attractive to be seen with, gets up customers nose!

(Thanks to all the manufacturers for being good sports!)

5. ARTP WINTER 1996 MEETING - LIVERPOOL

We are grateful to the following companies for generously supporting this very successful meeting:–

AVL Medical Instruments UK Ltd	Cardiokinetics
DeVilbiss Healthcare(UK) Ltd	Erich Jaeger (UK) Ltd
Pari Medical	Synectics
Deva Medical	Rescare (UK) Ltd
Stowood Scientific Medical (SSI)	Sensor Medics
Radiometer Copenhagen	P.K. Morgan Ltd
Boehringer Ingelheim	

Once again, ARTP members and manufacturers – please continue to send me your news and views. Best wishes for 1997.

Dr. Brendan Cooper
(ARTP Manufacturer's Liaison Officer)
Lung Function Department
City Hospital
Nottingham NG5 1PB

Fax: 0115 960 2140
Tel: 0115 969 1169 ext. 46194

ASSESSMENT OF SEVERITY OF IMPAIRMENT IN LUNG FUNCTION TESTING – COMPARISON OF STANDARDISED RESIDUALS AND PERCENT PREDICTED.

L Phillips, L Watson, WJM Kinear
Lung Function Laboratory, University Hospital QMC Nottingham

INTRODUCTION

Percent predicted is the most common form in which lung function test results are expressed, but doubts have been expressed about the validity of this approach (1). The BTS/ARTP recommend use of Standardised Residuals (SRs) rather than percent predicted (2) but no guidelines are available on how to use them to assess the severity of any impairment.

METHODS I

Spirometry was performed on a Vitalograph bellows spirometer on 100 patients who attended the Lung Function laboratory.

25 had an FEV1 > 79% predicted	"Normal"
25 had an FEV1 61-79% predicted	"Mild"
25 had an FEV1 41-60% predicted	"Moderate"
25 had an FEV1 < 41% predicted	"Severe"

METHODS II

The Standardised Residuals (SR) was calculated for the 100 patients using the ERS prediction equation as follows. (3).

$$SR = \frac{\text{Measured value - Predicted value}}{\text{Residual Standard Deviation (RSD)}}$$

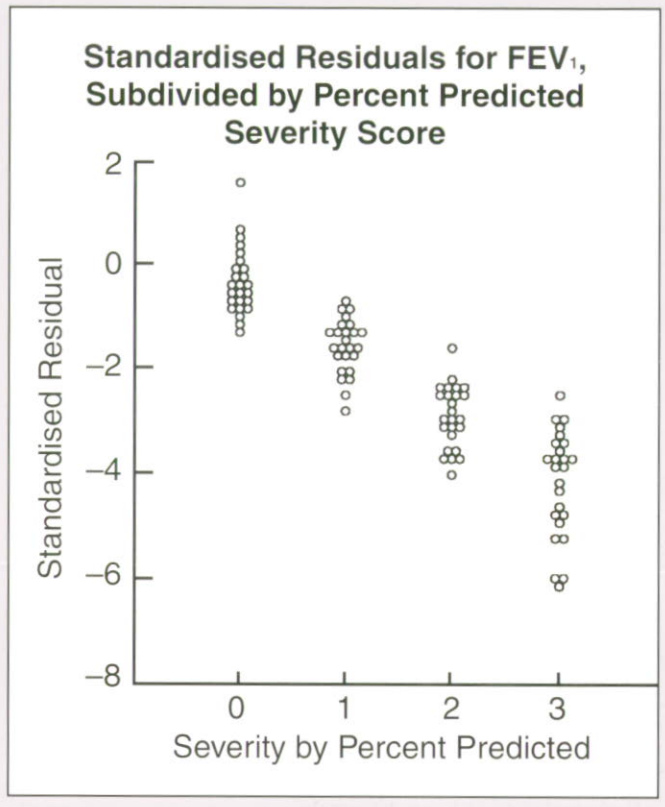
(RSD is a measure of the spread of the reference data, supplied with each regression equation).

SRs have the same scale and units for all indices. When the data is normally distributed an SR of -1.64 is at the lower 90% confidence limit.

RESULTS

% pred FEV1 grade	*Mean (SD) SR*	*Range*
Normal	+0.33 (0.63)	–1.36 to +1.49
Mild	–1.55 (0.54)	–0.60 to –2.85
Moderate	–2.89 (0.60)	–1.60 to –4.00
Severe	–3.89 (1.01)	–2.55 to –6.16

FIGURE 1



CONCLUSION

There is only a loose agreement between % predicted and SR.

The mean SR for the mild group was grater than –1.64 implying that many patients in this group would be classified as normal using SRs. There was considerable overlap in SRs between the groups, but we suggest that the severity scale for SRs could be :

Mild	<2.5
Moderate	2.5 - 3.5
Severe	> 3.5

REFERENCES

1. Miller MR, Pinock AC. Thorax 1988; 43: 265 -267
2. Lung Function Guidelines. Respiratory Medicine 1994; 88; 165 - 194
3. Standardisation of Lung Function Tests - 1993 Update. Ed Ph.H.Quanjer, Report Working Party for the European Community for Steel and Coal. Eur Respir J 1993; 6 Suppl 16.

First in series: Winner of DeVilbiss/ARTP Travel Bursary to ERS

LONGTERM OXYGEN THERAPY

Ian J Cliff, Department of Respiratory Medicine, City General Hospital, Stoke on Trent

Chronic respiratory failure is a terminal event for many types of chronic respiratory disorders. Supplemental oxygen forms a fundamental part of treatment but its application is not easy and it has to be conducted for long periods of time. Longterm oxygen will, of necessity, be given mostly in the home environment.

Long term oxygen therapy (LTOT) utilises low dose supplementation of the inspired air to achieve an inspired oxygen concentration of approximately 30%. This figure was determined by early studies in chronic obstructive pulmonary disease (COPD), the commonest cause of chronic respiratory failure. Substantial elevation of arterial carbon dioxide tension ($PaCO_2$) had to be avoided. Higher oxygen concentrations interfered adversely with ventilatory control and ventilation/perfusion relationships in the lung. Subsequently, low dose techniques have been applied to all causes of chronic respiratory failure although this may not be appropriate optimal treatment in respiratory conditions where hypercapnia is not a problem.

Initial investigations into the use of LTOT tended to be by small, uncontrolled studies in patients with advanced hypoxic COPD. Typical of these were studies by Neff and Petty[1] and Stark et al[2]. In the former, a reduction in haematocrit, pulmonary artery pressure (PAP) and oedema were found together with a reduced mortality compared with historical controls. In the latter, five patients with hypoxic COPD and pulmonary hypertension showed a significant reduction in PAP after 23-59 weeks of LTOT. This study also reported a reduction in residual volume, although other tests of lung function and arterial blood gases were unchanged. Morbidity was reduced as judged by a fall in number of acute admissions to hospital during the treatment period.

The results of these early studies suggested that the likely benefits of LTOT might include:

1. Reduced mortality
2. Reduced morbidity and improvement of quality of life
3. Improvement/stabilisation of abnormal physiological variables reflecting disease progression such as spirometry (FEV1, FVC), lung volumes, residual volume (RV), total lung capacity (TLC), arterial blood gases (PaO_2, $PaCO_2$), haematocrit, PAP, and pulmonary vascular resistance (PVR).

CRITERIA FOR LTOT

The criteria used to select patients suitable for LTOT are based on the two major trials, the British Medical Research Council trial (MRC trial)[3] and the Nocturnal Oxygen Therapy Trial (NOTT)[4] and can be summarised as follows. Non-smoking patients with stable, severe obstructive pulmonary disease (FEV1 < 1.51) and arterial hypoxaemia (PaO_2 < 7.3 kPa) with or without hypercapnia may benefit from the low flow domicillary oxygen used in excess of 15 hour/day. These criteria have been chosen for the following reasons.

Arterial hypoxaemia

The main indication for LTOT in patients with COPD is an arterial oxygen tension < 7.3 kPa. This figure was selected as it marks the point on the oxyhaemoglobin dissociation curve where a significant reduction in oxygen delivery to the tissues begins to occur and further small decreases in arterial PaO_2 result in significant increases in tissue hypoxia.

Spirometry

Spirometric analysis is an essential part of patient selection for several reasons, to confirm an obstructive disorder as the aetiology of the hypoxaemia rather than lung disease, and since LTOT does not halt the progressive decline in lung function or resting arterial hypoxaemia, it is unlikely that patients with a very low FEV1 (< 0.61) will benefit as much. An FEV1 < 1.51 and FVC < 2 indicate relatively severe COPD, but not severe enough to make the use of LTOT unlikely to improve survival.

Disease Stability

The importance of ensuring disease stability before prescribing domicillary oxygen has been shown by the NOTT study which found that over a three month stabilisation period following an acute exacerbation of COPD, approximately 30% of patients improved their arterial oxygen tensions merely by optimising medical management to the extent that they no longer fulfilled the selection criteria for LTOT. For this reason both arterial hypoxaemia and Spirometric values and a 0.6 kPa variation in arterial hypoxaemia suggests instability and the need for continued observation rather than immediate oxygen prescription.

Oedema formation

Oedema is an easily recognisable clinical marker of cor pulmonale and of a clearly defined stage in the evolution of COPD.

Non-smoking

Continued cigarette smoking in patients on domicillary oxygen not only poses a significant fire hazard but has also been shown to attenuate its benefits. In some countries carboxyhaemoglobin levels are measured to assess compliance with cessation of smoking before installation of an oxygen concentrator.

EQUIPMENT FOR LTOT

There are two basic ways of providing oxygen at the home in the UK. (1) compressed into a cylinder and (2) an oxygen concentrator.

Cylinders

The size most commonly used in England is "F" holding 1360 1 at 2000 psi, supplying 2 L/min oxygen for 10 hours from one cylinder. A regulator must be fitted to the cylinder.

The general practitioner may prescribe cylinders and a simple reducing valve and mask to give 2 L/min at the medium setting and 4 L/min at the high setting. No intermediates are possible. If the patient needs a more accurately controlled flowmeter or nasal cannulae, these must be supplied extra to the prescription.

Oxygen concentrators

These machines have been commercially available for domicillary use since 1974 and prescribable by general practitioners in the UK since 1985. Electrically powered, the concentrators takes oxygen from ambient air through two chambers containing a zeolite, a substance which

Continued on Page 10

Continued from page 9

allows oxygen to pass through when the gas in the chamber is compressed. Two molecular sieves are used cyclically, allowing an uninterrupted supply of oxygen from 0.5 to 4 L/min. In the UK the supplying company installs and maintains the machines, pays for the electricity used and provides mask or nasal cannulae as requested. They are relatively cheap to provide and maintain.

The unit cost of oxygen delivery by a concentrator have fallen relative to the use of cylinders and long term oxygen treatment for 16 hours a day costs £500 annually compared with £6000 when oxygen is delivered by cylinders.

There are several methods of connecting the patients to the equipment namely nasal cannulae and masks.

Nasal cannulae made from polyvinylchloride with twin prongs to introduce gas to the nostrils are the most commonly used. There are a few complications in practice and are capable of keeping a stable position when used. Nasal irritation and mucosal drying are the commonest complaints. Some patients prefer the mask, they are more beneficial if the patient suffers from congested or block nostrils or are known to be mouth breathers. They must be carefully selected to give 28-32% oxygen. Masks are cumbersome and do not allow for eating, talking or the wearing of spectacles.

PATIENT COMPLIANCE

The oxygen concentrator is the most practical and cost effective method of delivering LTOT in the UK to hypoxic patients with COPD[6]. However, the initial cost of LTOT remains high and in an attempt to improve prescribing practice in the North Staffordshire region we set up a program to assess suitability of patients for LTOT based in the Department of Respiratory Medicine. The DHSS guidelines were programmed into the departmental computer system and the issuing of oxygen concentrators was devolved to the respiratory technicians and nurses, following an initial review by the chest consultants. Since 1991, patients recommended for LTOT through such an assessment procedure attend a practical and educational teaching session run by the respiratory nurses. Emphasis is placed on the importance of using oxygen for at least 15 hours per day.

A study was performed consisting of two groups of patients receiving LTOT to evaluate the effectiveness of our new program. The first group included all patients who had received formal LTOT assessment in the Department of Respiratory Medicine whilst the second group (control) included patients who had been prescribed LTOT from outside the department without any formal training. In both groups of patients information was collated six months after starting LTOT by means of a questionnaire assessing patients understanding of both their need for oxygen and their disease process, the dangers of oxygen therapy and present smoking habit. Objective information about the usage of each concentrator was obtained from engineer reports.

The results were as follows, 82% of patients who had received formal training were using their concentrator for greater than 15 hours as opposed to only 44% of the controls. 93% of patients who had received training understood why they were using LTOT as compared to only 41% in the control group. Although both groups had a similar understanding of the dangers of smoking while on oxygen therapy, 15% of the control group were smoking as compared to only 2% of the trained group. One of the control patients had received significant burns as a direct result of smoking while on oxygen.

The conclusion was that all patients prescribed LTOT should have formal education to improve compliance and to obtain maximal benefit from such therapy.

RECENT TRENDS

Clinical opinion still differs as to whether the improvement in survival and psycosocial functioning outweighs the inconvenience, immobility and expenditure associated with LTOT. At the end of 1989, 6500 oxygen concentrators were in use in England and Wales and the number continues to increase by about 1200 annually. Many patients likely to benefit from LTOT who are eligible on the basis of the Department of Health and Social Security recommendations are not being treated or are being inappropriately supplied with cylinder oxygen. In England and Wales an estimated 60 000 hypoxaemic patients with COPD who are aged > 45 years fulfil the minimum criteria for the prescription of LTOT and approximately 13 000 patients satisfy the more stringent criteria of peripheral oedema and hypercapnia. Many of these patients are asymptomatic. Prescription of LTOT in the asymptomatic but active hypoxaemic patients is still a matter of considerable debate.

LTOT ASSESSMENT AT THE DEPARTMENT OF RESPIRATORY MEDICINE, CITY GENERAL HOSPITAL, STOKE ON TRENT

The criteria was produced using the guidelines for LTOT recommended in the British National Formulary. The physiological measurements must be made in a stable phase when all reversible factors have been treated so there is a three week interval between the first and second part of the assessment. There should be variation of no more than 20% in spirometry and +0.6 kPa in carbon dioxide tension.

VISIT ONE:
Spirometry and blood gases on air are carried out at this initial visit as well as the checking of carboxyhaemoglobin levels, also if the patient has a history of ankle oedema. The patient must not be smoking and must have a PaO_2 < 7.30 kPa to be considered for LTOT. If the patient smokes and their PaO_2 is < 7.30 kPa the patient must be encouraged to give up smoking. The second part of the assessment will be carried out but a letter to the general practitioner to prescribe an oxygen concentrator will not be sent.

If the patients PaO_2 > 7.30 kPa the patient should be booked in for an exercise test to see if the PaO_2 level drops when exercised. A period of three weeks should be left between appointments to ensure stability.

VISIT TWO (3 weeks after visit 1):
Spirometry and blood gases on air are performed and the results of these compared to those of the previous visit. If the FEV1 or FVC have increased by 20% or more (at the senior technical staffs discretion increases of > 20% may be acceptable), or the PaO_2 has risen above 7.30 kPa the patient is considered to be unstable so the assessment should be terminated, and referred back to the consultant.

If the patient is stable, they are then given 2 L/min of oxygen for one hour via a nasal cannulae and then blood gases are repeated. If the PaO_2 > 8.0 kPa the patient is left on this concentration for a further hour and blood

Continued on page 11

Continued from page 10

gases are repeated. If the $PaCO_2$ has risen above more than 0.6 kPa above the air baseline the patient should be booked into the chest ward as soon as a bed is available to have an overnight oxygen study performed. The results of the departments assessments should be placed on the referring consultants desk along with the expected admission date.

If 2 L/min oxygen has not increased the PaO_2 > 8.0 kPa after one hour, increase the oxygen flow to 3 L/min and leave patient for a further hour and repeat blood gases. If this raises the PaO_2 > 8.0 kPa leave on this concentration for another hour and recheck blood gases. If the $PaCO_2$ has risen more than 0.6 kPa above the air baseline the patient should be booked into the chest ward as soon as possible to have an overnight oxygen study performed. The results of the departments assessment should be placed on the referring consultants desk along with the expected admission date.

If 3 L/min of oxygen has not increased the PaO_2 > 8.0 kPa after one hour, increase the oxygen flow to 4 L/min and leave patient for a further hour and repeat blood gases. If this raises the PaO_2 > 8.0 kPa leave on this concentration for another hour and recheck blood gases. If the $PaCO_2$ has risen more than 0.6 kPa above the air baseline the patient should be booked into the chest ward as soon as a bed is available to have an overnight oxygen study performed. The results of the departments assessment should be placed on the referring consultants desk along with the expected admission date.

Once the amount of oxygen needed to raise the patients PaO_2 > 8.0 kPa is established the nursing staff are informed and they will come and demonstrate the concentrator, counsel and educate the patient of why they need the oxygen therapy and how to look after the concentrator.

If the patients PaO_2 has been raised to the correct level and the $PaCO_2$ has remained stable a letter can be produced recommending that an oxygen 1L/min be prescribed and stating the amount of oxygen required performance minute, making sure you include the leaflet on how to prescribe an oxygen concentrator with the letter.

Checks are made by the computer program at each stage and warning messages are displayed if the physiological variables fall outside the allotted range. If the criteria is not fulfilled failure reports can be generated, but if the patient passes all the criteria a letter is produced as well as a report of the whole oxygen assessment.

Within a period of one week the respiratory nurse specialist visits the patient in their home to ensure there are no problems.

REFERENCES

1. Neff TA, Petty TL. Long term continuous oxygen therapy in chronic airway obstruction: mortality in relationship to cor pulmonale, hypoxia and hypercapnia. Ann Intern Med 1970; 72: 621-6.
2. Stark RD, Finnegan P, Bishop JM. Long term domicillary oxygen in chronic bronchitis with pulmonary hypertension. BMJ 1973:3:467-70.
3. Report of the Medical Research Council Oxygen Working Party. Long term domicillary therapy in chronic hypoxic cor pulmonale complicating chronic bronchitis and emphysema. Lancet 1981;I:681-5.
4. Nocturnal Oxygen Therapy Trial Group. Continuous or nocturnal oxygen therapy in hypoxic chronic obstructive lung disease. Ann Intern Med 1980;93:391-8.
5. Anonymous. Home oxygen-still room for improvement. Drug Ter Bull. 1990;28:99-100.
6. Dilwort JP, Higgs CMB, Jones PA, White RJ. Acceptability of oxygen concentrators: the patients view. Br J Gen Practice. 1990;40:414-417.
7. Williams BT, Nicholls JP. Prevalence of hypoxaemic chronic obstructive lung disease with reference to long term oxygen therapy. Lancet 1985;ii:369-72

Calendar of Forthcoming Events

5 - 7 MARCH
6th International Conference on Home Mechanical Ventilation
(ERS sponsored meeting)
Lyon, France
Information from Dr Leger
Tel: (33) 78390843
Fax: (33) 78395863

14 - 18 APRIL
Short Course in Advanced Respiratory Physiology
(incorporating the HTEC Specialist Option)
Coventry University
Topics:- Respiratory exercise testing and interpretation, sleep studies, CPAP and nasal ventilation. Inhalation therapy, ventilatory control, **bronchial challenge testing** (special session, see front page for more details).
FEE:- £125 for week (or £25/day)
Reduction for ARTP members £112.50/week, £22.50/day.
Quote ARTP membership number on application
Write to Sue Revill
Dept of Respiratory Medicine
Glenfield Hospital
Leicester LE3 9QP

21 -23 APRIL 1997
Assisted Ventilation
Stoke on Trent
Organisers Mrs Sue Bradbury and Dr Martin Allen

16 - 21 MAY
American Thoracic Society
San Francisco
USA
Information from ATS Office
Tel: (1) 212 3158781
Fax: (1) 212 3156498

2ND JULY
(from 12.30 pm onwards)
ARTP Summer meeting
Loughborough University
Application form and scientific programme to be circulated

3 - 4 JULY
BTS Summer Meeting
Loughborough University
incorporating the ARTP/BTS Joint Symposium
Title: *New Technologies*
Information from BTS office
Tel: 0171 831 8778
Fax: 0171 831 8766

20 - 24 SEPTEMBER
ERS Annual Congress
Berlin, Germany
Information from ERS office
Tel: Switzerland 41 21 617 2868
Fax: Switzerland 41 21 617 2865

NOVEMBER
ARTP winter meeting
25th Anniversary celebrations
Venue: Stoke Rochford
Grantham (to be confirmed)
Details to be circulated

15 -17 DECEMBER
BTS Winter Meeting
QE II Conference Centre
London

Second in series: Runner-up for DeVilbiss/ARTP Travel Bursary

CPAP THE TRUTH

By Louise Phillips, Chief Lung Function Technician
Queens Medical Centre, Nottingham NG12 2UH

The treatment of sleep apnoea is usually nasal continuous positive airways pressure (CPAP) a device that blows out a steady stream of air at a pressure set by the lung function technician (occasionally the Doctor may suggest the odd pressure but well . . .).

As we all know, patients come from several walks of life and listens very carefully to us when we tell them about CPAP. Some of them, however, have very different ideas as to the use of the of the machine. Here are a few of them:

1) **The gardener:** Its amazing what you can grow in the mask or even the tubing.
2) **The hairdresser:** The steady stream of cold air is wonderful for setting the halr.
3) **The medical student:** Which end of the patient does the tube go?
4) **The DIYer:** So if I just take the lid off I'm sure that I could beef the pressure up and make it use less electricity and turn it into something the whole house could use.
5) **The vet:** Its great for getting fleas off the pets, they can't hang on at that pressure.
6) **The murder/mystery writer:** "The tube was found wrapped neatly around the girls throat stranger still the machine was still blowing the air out, just who could have done this sickening deed'
7) **The customs official:** Yes sir of course it just blows air but the bomb squad need to check it anyway.
8) **The computer expert:** This is great for clearing all the crumbs from my keyboard.
9) **The Photographer:** I could use that it the darkroom for drying the pictures quicker.
10) **The comedian:** I thought it said CRAP! (no we've never heard that before).

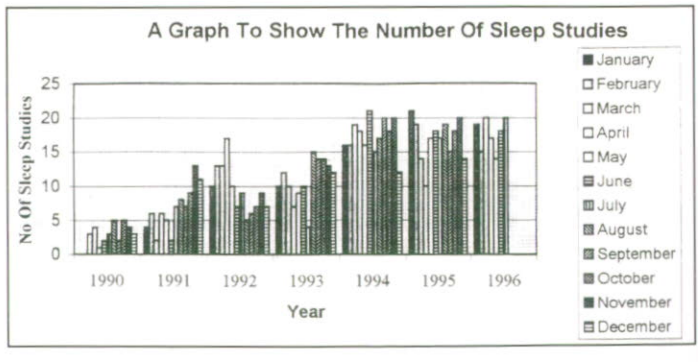
As you can see there are a lot of uses for this small yet increasingly popular machine. This is another one, the long distance lorry driver who falls asleep at the wheel crashes and kills someone else, its not particularly funny now is it. It is estimated that 25% of accidents on our roads are caused by people falling asleep whilst driving. Now, however, with more awareness among GP's the consultants life in the once quiet sleep clinic (if only because all the patients are asleep, you can spot the ones on CPAP they're awake) is now increasingly busy. In our clinic alone the service has increased by over 100% in only 6 years. This is partly because of the power of television and the media. There have been several programmes and articles that describe sleep apnoea and the symptoms, some even mention CPAP. The patients partner then realises that the sufferer has had this problem for a while. Originally the best advice from the GP was "its just snoring, put up with it or move into the spare bedroom." Well we say **MOVE BACK IN** there is a solution.

When it comes to the cost of a good CPAP service many departments argue that every patient needs full polysomnography which would be nice but some of these departments have long waiting lists and require a technician to work through the night watching a screen. Well if you can find a technician to work the graveyard shift and a hospital to fund the hours and the cost of the equipment then I wish you well, but here at the QMC we believe in the simple things in life. The technician can set the computer for the oximeter at any time during the day to record oxygen saturation. The video recorder with microphones to evaluate positions and snoring has the oximeter trace overlaid directly onto the video for correlating the data. Some people would argue that this is not enough, but ask our patients who have been picked up by our system and are having a good nights sleep if it is enough.

Some patients find it difficult to get a normal night's sleep in hospital which can lead to a false negative, if an experienced consultant sees them in clinic and obtains a history of classic symptoms the patient may well go on to have CPAP for a 3 month trial and see if their symptoms improve.

Once the patient has had a baseline sleep study and has had the diagnosis of sleep apnoea they are given another appointment for an overnight study whilst wearing the mask and connected to the machine. Here at the QMC we prefer the patient to have their first night on CPAP in the sleep lab if only so we can wake them up the next morning and listen to them tell us that they have not slept so late in years and are usually up at the crack of dawn. It never ceases to make me feel good about my job when a patient is grateful for the best night sleep they have had in a long time and they feel like a new person. Unfortunately for the partner the tact that they cannot hear their partner snoring means they wake up and check that they are actually breathing, but they soon get use to the quiet and have a good nights sleep along with their partner.

The following graphs show how much our service of sleep studies and the supplying of CPAP machines has increased since 1990.

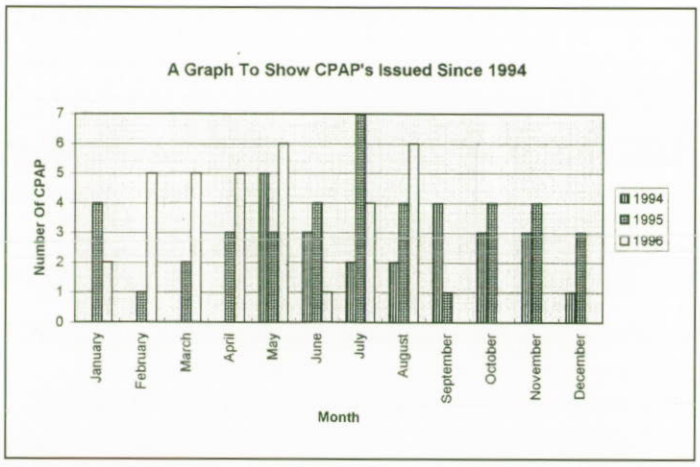


Continued on page 13

Continued from page12

We pride ourselves on knowing every one of our patients and are pleased to see them at least once a year for maintenance of the machines. They know that they can ring us up with even the smallest of problems and we are happy to spend time talking to them. The replacement service is also surprisingly fast, if a patient rings before 3:30pm for a new mask or headgear then we can send it out and a majority of the time it will reach them the next morning. We carry several battery operated spare machine for the caravaners in our group and also dual voltage machines that can be taken abroad so that no-one suffers relapses while on holiday.

This may all sound like an advert for the department but why not we have a good product, why not try and sell it?



REPORT OF THE ARTP WINTER SCIENTIFIC MEETING

THE PARK, LIVERPOOL, NOVEMBER 1996.

The meeting was held in The Park, Premier Lodge Hotel, Netherton, Liverpool. It began at lunch time on Friday 22nd November with a trade exhibition which was very well supported by many of the manufacturers. Each session was attended by approximately 60 people.

The afternoon session began with an introduction by Pat Mitchell who greeted all the attendees and gave thanks to the manufacturers with regard to their support for the meeting.

Dr Earis gave an informative talk on cough acoustics, concerning the signal and frequency distribution sound produced in the acoustic analysis of capsaicin induced cough in normal subjects. Dr Earis introduced the concept of a "cough signature" of an individual subject by showing that spectrographic analysis of the sound produced by coughing while similar for different individuals was unique in the fine detail of analysis for different subjects. Dr Earis suggested that it was only when this type of analysis had been performed in normal subjects that the technique could be applied to different disease states.

Evelyn Smith talked about her own research into the effect of ageing on the response to bronchodilators. Mrs Smith outlined the type of response that was analysed using body plethysmography to asses specific airways conductance and maximum expiratory flows on partial expiratory flow volume loops. The analysis showed that the bronchodilator response to a beta agonist decreased with increasing age but that this effect was much less marked after the patient was pre-treated with ipratropium bromide. The reasons for these findings was explained with respect to the distribution of the different receptors in "large" and "small" airways was discussed.

Dr Ogilvie gave a very amusing talk on the use of jargon in the medical profession entitled "Medi-Babble". He pointed out that very often a polysyllabic word or long phrase was used when a simple monosyllabic "Anglo-Saxon" word or simple phrase was sufficient. The serious point of the talk was that the use of incomprehensible "gobbledygook" was barrier to efficient communication and that this type of language or the use of abbreviations can be used to obscure meaning rather than as an aid to understanding.

Mrs Verhey from the Academy of Medicine, University of Amsterdam, gave a talk on errors involve in blood gas analysis with particular emphasis on the pre-analytical phase in which, as she pointed out, 80% of errors occurred. Mrs Verhey went on to stress the importance of appropriate precautions being taken in sample collection and storage. The advantages and disadvantages of the use of glass or plastic syringes and of different storage methods prior to analysis were discussed. The relevance of metabolism and changes of gas partial pressures due to diffusion in glass and plastic syringes was reviewed under different storage methods and times and with samples of blood at high and low oxygen tensions.

After the Chairpersons, Education and Treasurers report. Dr Brendon Cooper then lead a lively open floor discussion on the updated findings of the ARTP Society Respiratory Survey. The survey was mainly concerned with the range of grades of staff and with the levels of academic qualifications within those grades as a precursor to producing guidelines from the society for an appropriate grading structure. Dr Cooper presented the latest results of the survey with the breakdown of the grades and qualifications which will be formally published in due course. His conclusions were that lung function staff within the UK have a generally poor career structure (too many staff remain at lower grades). Most staff have permanent posts (>90%) and most are female (>80%). Only a minority of staff in all grades have no formal qualifications.

A drinks reception with the manufacturers was followed by a very successful dinner in the Park Suite of the hotel. This included a cabaret with an Englebert Humperdink look-alike, the words of the songs seemed to be known by a surprisingly large proportion of the members present. In addition, there was a disco where, even at the advanced age of some of the delegates the dancing went on late into the night.

Saturdays session began with Professor Calverly outlining his experience with a programme of Pulmonary Rehabilitation. Professor Calverly explained why he feels pulmonary rehabilitation is very important for chronic respiratory disorders, stressing the importance of training the whole body, in conjunction with treatments which concentrate on the respiratory system in these groups of patients. The concepts involved in assessing the suitability of patients for this type of programme, the methods of training and of ways of assessing the response of individual patients to the programme were discussed. The conclusion was that improving the fitness of patients is beneficial in chronic respiratory disorders.

Continued on page 15

A METHOD FOR MEASURING SNIP (SNIFF NASAL INSPIRATORY PRESSURE) USING THE PK MORGAN Pmax MONITOR – "SNIPS FOR A SNIP".

Laura Watson, Lung Function Laboratory, QMC, Nottingham

Respiratory muscle strength was first measured in the mid 19th Century by John Hutchinson. His method had the subject perform forceful inspiratory and expiratory manoeuvres against column of mercury via a connection to the nostrils.[1] It is only since the 1970's that these measurements, along with MEP and MIP, have been routinely used in clinical practice. Tests of respiratory muscle strength were originally mainly laboratory based measurements, but now small portable devices are available which enable measurements to be made at the bedside and in Out Patient clinics.

The measurement of inspiratory and expiratory pressures are made at the mouth during a maximal effort against an occluded mouthpiece. The static mouth pressure, provided that the glottis is open, is equal to alveolar pressure. These manoeuvres are extremely effort dependent and rely heavily on the amount of subject cooperation, coordination and comprehension of test instructions. There is a considerable training effect and so several attempts may need to be made before maximal reproducible results are obtained, with a wide normal range. The results obtained are also dependent on the type of mouthpiece used during the measurement.[2]

An alternative method of measuring respiratory muscle function is the measurement of oesophageal (i.e. pleural) pressure during a maximal sniff. Inspiratory muscle strength is often better reflected by oesophageal pressure during a maximum sniff (sniff P_{OES}) than by PImaX.[3] The main disadvantage of this method is that it is invasive requiring an air filled balloon catheter system, or catheter mounted pressure transducers.[4] This method of measurement is not well tolerated by subjects. Less invasive positions of the balloon catheter or catheter mounted pressure transducer, such as nasopharynx or mouth, have been documented[5], but these may also be poorly tolerated by the subject and liable to movement artefact whilst positioned in the mouth. An attractive alternative which has recently been described is the sniff nasal inspiratory pressure (SNIP). This is measured through a plug occluding one nostril during a sniff performed through the contralateral nostril.[6]

The Laboratory had already purchased a portable mouth pressure meter (Pmax Monitor, PK Morgan, Rainham, Kent) which is routinely used to measure MEP and MIP. We have found that with the relatively inexpensive addition of a 10 ml plastic syringe (Becton Dickinson, Madrid, Spain) and one of a pair of ADAM Nasal Pillows (Puritan Bennett, Lexana, Kansas, USA) we were able to easily adapt the measuring system to record SNIPs.

Method

Remove the inner plunger portion of the syringe and discard. Attach the fine bore pressure connection tubing as supplied with the Pmax Monitor to the narrow neck of the syringe case. Fit the ADAM nasal pillow over the wide end of the syringe case. You may need to trim away any excess plastic in order to fit the nasal pillow over the body of the syringe case (Figure 1). Press test on the Pmax monitor. The nasal pillow is inserted into either nostril and with the mouth closed a maximal sniff is performed through contralateral nostril as previously described above. The SNIP value is displayed on the Pmax Monitor screen as the Peak Inspiratory Pressure. If using the PC computer programme provided with the Pmax Monitor use the value for the Peak Inspiratory Pressure displayed. We measured 100 different sniff manoeuvres of varying strengths ranging from –5 to –100 cm H_2O performed by normal subjects. These were recorded simultaneously using a T piece connected to a Validyne pressure transducer (PK Morgan, Rainham, Kent) with a conventional chart recorder, and the Pmax Monitor. The peak pressure displayed on the Pmax monitor was taken as the estimate of SNIP.

The criteria used to select viable SNIPs are as follows:

1. The pressure tracing on the chart recorder shows a smooth upstroke and a sharp peak.
2. The total sniff duration is less than 500 ms.
3. The sniff manoeuvre is performed from FRC.

Results

The SNIPs recorded by this method are similar to those using more conventional equipment. The mean (SD) difference in SNIP between the two measurement methods was 1.58 (2.03) cm H_2O over the full range of sniffs recorded with the Pmax Monitor being slightly lower than the Validyne. This discrepancy was more marked when the peak pressure was more negative than –50 cm H_2O, but the maximum difference was only 7 cm H_2O. The 95% Confidence Intervals for this difference were –8.24 cm H_2O to +5.08 cm H_2O.

Figures 2 and 3 show 100 SNIPs of varying strength (–5 to –100 cm H_2O). Figure 2 is a plot of SNIP measured through the Validyne pressure transducer against SNIP measured by the Pmax monitor (cm H_2O).(r=0.999). Figure 3 is a Bland and Altman[7] plot illustrating the mean SNIP plotted against the difference in SNIP (Validyne pressure minus Pmax monitor pressure)(cm H_2O).

The prediction equations for SNIP are as described by Uldry and Fitting[6] and are as follows:

Males: SNIP (cm H_2O) = age x (–0.42)+126.8
RSD = 23.8

Females: SNIP (cm H_2O) = age x (–0.22)+94.9
RSD = 17.1

Conclusion

SNIP is a simple way of measuring inspiratory muscle strength with less spurious results due to catheter movement artefact or recruitment of buccal musculature during sniffs. The PK Morgan Pmax Monitor can easily be adapted to record SNIP and is sufficiently accurate for clinical use when screening to detect respiratory muscle weakness.

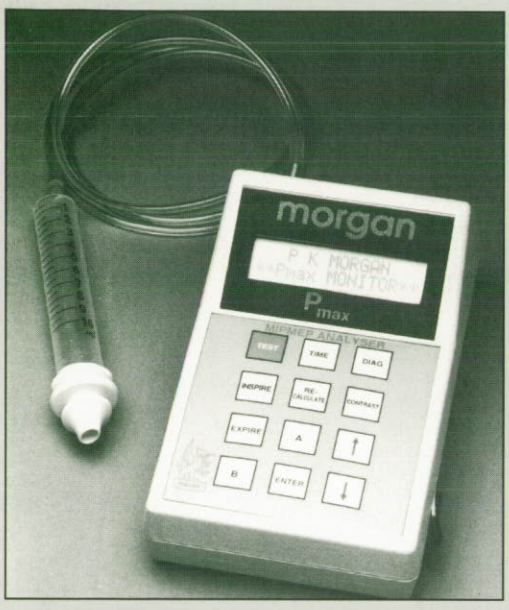
References

1. Hutchinson J. On the capacity of the lungs, and on the respiratory functions, with a view of establishing a precise and easy method of detecting disease by the spirometer. Med Chir Trans 1864;29:137-252
2. Laroche CM, Mier AK, Moxham J, Green M. The value of sniff oesophageal pressures in the assessment of global inspiratory muscle strength. Am Rev Respir Dis 1988;138:598-603

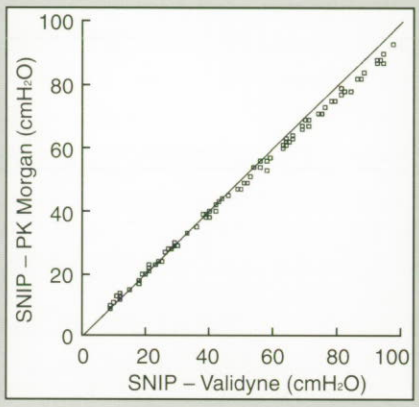
Continued on page 15

Continued from page 14

3. Evans SA, Watson L, Cowley AJ, Johnston IDA, Kinnear WJM. Normal range for transdiaphragmatic pressures during sniffs with catheter mounted transducers. Thorax 1993;48:750-753
4. Koulouris N, Mulvey DA, Laroche CM, Green M, Moxham J. Comparison of two different mouthpieces for the measurement of P1max and Pemax in normal and weak subjects. Eur. Respir. J. 1988;1:863-867
5. Koulouris N, Mulvey DA, Laroche CM, Sawicka EH, Green M, Moxham J. The measurement of inspiratory muscle strength by sniff oesophageal, nasopharyngeal, and mouth pressures. Am Rev Respir Dis 1988;138:598-603
6. Heritier F, Rahm F, Pasche P, Fitting JW. Sniff nasal inspiratory pressure: a noninvasive assessment of inspiratory muscle strength. Am J Respir Crit Care Med 1994;150:1678-83.
7. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. The Lancet 1986;February 8th:307-310



▲ FIGURE 1
PK Morgan Pmax monitor modified to measure Sniff Nasal Inspiratory Pressure.



◀ FIGURE 2
Plot of Sniff Nasal Pressure measured through the Validyne pressure transducer (cm H_2O) against Sniff Nasal Inspiratory Pressure measured by the PK Morgan Pmax monitor (cm H_2O). (r=0.999). The line of identity is shown.

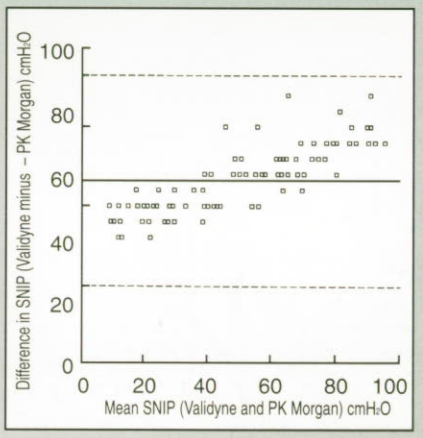


FIGURE 3 ▶
Bland and Altman plot of mean Sniff Nasal Pressure (cm H_2O) against the difference in Sniff Nasal InspiratorY Pressure (Validyne pressure minus PK Morgan Pmax monitor pressure) (cm H_2O). Dashed horizontal lines indicate plus and minus 2 SDs.

Continued from page 13

Miss C Newall, from Birmingham, gave a comprehensive review of inspiratory muscle training in respiratory disease concentrating on the methods of training used in patients with chronic obstructive airways disease. Miss Newall suggested that the training of the inspiratory muscles is an important feature in any pulmonary rehabilitation programme in this group of patients.

Dr Pearson from Liverpool gave an interesting talk on Medico-Legal issues in Respiratory Medicine. Dr Pearson stressed the difficulties in diagnosing a range of respiratory diseases which are claimed to be occupational in origin. The role that the pulmonary function laboratory, together with the evidence taken from the site of work and the previous medical history of the patient in identifying the link between a specific disease and occupation was examined.

Dr Davies of Liverpool gave an informative talk on the reasons for the increase in the incidence of tuberculosis; the worlds biggest killer. He explained the reasons for the increase in different world regions in Africa, where there is a link to HIV, and in Asia. Dr Davies suggested that this was due to the export of TB to these areas of the world with the migration of Europeans in the earlier part of this century from the developed to the developing countries . The increase in TB seen in Europe is now a consequence of the re-importation of the disease among immigrant populations. Dr Pearson discussed the implications of this increase on the future health of areas of the world and the projected mortality rates and how the disease is to be managed in the light of the development of multiple resistant strains of TB.

Dr Karen Rees from Edinburgh gave a talk on the measurement of sleep disordered breathing. Dr Rees compared the results obtained by full polysomnography to those obtained with screening systems, in particular, the five channel Nelcorr and the Sullivan Autoset. The findings showed that the screening systems will give reliable results in moderate and severe sleep apnoea with the recommendation that a Respiratory Index of above 15 events per hour was significant of sleep apnoea. In addition, Dr Rees showed data concerning the lack of sensitivity of airflow thermistors in picking up significant hypopnoeic events with the consequence that the Edinburgh group use respiratory effort rather than airflow to diagnose hypopnoeic events. Dr Rees stressed the importance of performing full polysomnography in patients who do not show a significant degree of respiratory events on screening but in whom the symptoms of sleep disturbance persist as this will pick up other causes of disturbed sleep architecture with frequent arousals leading to poor quality sleep (i.e. periodic leg movement) . Some new work was presented on the shape of the tidal flow pattern derived from the Autoset which suggests that a flattening of this flow pattern may suggest the development of increased upper airways obstruction but not full closure of the upper airway. Dr Rees reported that the clinical significance of these findings was under investigation.

RECENT ARTICLES

The following summarise recently published articles appearing in medical journals which may be of interest to ARTP members

KRESCH MJ et al, Thorax 1996: 51; 1137-1154

SURFACTANT REPLACEMENT THERAPY.

This is a comprehensive review. Firstly, the pulmonary surfactant system is reviewed. This is followed by a description of some animal and human studies which investigate the use of surfactant replacement therapy in various disease. However, there still needs to be a lot more research in this area.

SHERWOOD BURGE P. Thorax 1996: 51; 969

CALIBRATING THE CALIBRATORS.

This editorial emphasises the problems of quality control when measuring lung function in long term studies. In the same issue of Thorax (Drisken et al. Thorax 1996: 51; 973-6) the long term performance of a hand held spirometer (Micromedical Diary card) is investigated.

CLARK DJ, LIPWORTH BJ. Thorax 1996: 51; 981-984

EFFECT OF MULTIPLE ACTUATIONS, DELAYED INHALATION AND ANTISTATIC TREATMENT IN LUNG BIOAVAILABILITY OF SALBUTAMOL VIA A SPACER DEVICE.

Ten healthy volunteers were studies, 1200 mcg Salbutamol was given by four different methods, all using a large volume spacer. Lung BIOAVAILABILITY was made at 5, 10 and 15 minutes after inhalation. Single puffs from the spacer produced higher plasma Salbutamol levels than either multiple puffs or single puffs with delayed inhalation for a 1200 mcg dose. Washing the spacer was found to be as effective as an antistatic lining in reducing the effects of static charge on Salbutamol delivery in vivo.

WILDHABER JH et al. Thorax 1996: 51; 985-988

EFFECT OF ELECTROSTATIC CHARGE, FLOW, DELAY AND MULTIPLE ACTUATIONS ON IN VITRO DELIVERY OF SALBUTAMOL FROM SMALL VOLUME SPACERS FOR INFANTS.

This is another interesting article where the effects of electrostatic charge, flow, delay and multiple actuations on small volume spacers used for infants was investigated.

GUDSCHALK I et al. Respiratory Medicine 1996: 90; 619-622

ASSESSMENT OF ACCURACY AND APPLICABILITY OF A PORTABLE ELECTRONIC DIARY CARD SPIROMETER FOR ASTHMA TREATMENT.

A turbine flowmeter and spirometer device integrated with an electronic diary card (Micromedical) was tested. Patients were found to prefer the electronic diary card spirometer and no differences were found in diurnal variation of PEF when compared with a mini-Wright peak flow meter.

CASSEL W, PLOCH T, BECKER C, et al. Eur Respir J, 1997: 9; 2606 -2611

RISK OF TRAFFIC ACCIDENTS IN PATIENTS WITH SLEEP-DISORDERED BREATHING: REDUCTION WITH NASAL CPAP

A large cohort of patients (78 recruited, 59 finished) requiring nCPAP completed a battery of tests concerned with daytime alertness and sleep latency prior to the initiation of nCPAP treatment. The tests were repeated after one year of treatment with nCPAP. There was a significant reduction the motor vehicle accident rate (0.8 per 100,000 km (untreated) vs 0.15 performance 100,000 km with nCPAP), and improvement in daytime sleeping spells, fatigue, vigilance test reaction time and daytime sleep latency.

GUENARD H, MARTHAN R. Eur Respir J 1997: 9; 2573 - 2577

PULMONARY GAS EXCHANGE IN ELDERLY SUBJECTS

A range of blood gas measurements and steady state transfer factor were assessed in a group of healthy, elderly subjects (> 68 yr) and a control group consisting of healthy, young subjects. Only transfer factor (ss) was found to correlate with age, and there was no decrease in arterial oxygen tension. Two useful regression equations are given, for steady state transfer factor and the transfer factor/minute ventilation ratio, for elderly subjects with a wide age range (69 - 104 yr).

GERSHAM NH et al. Eur Respir J 1997: 9; 2448 - 2453

COMPARISON OF TWO METHODS OF COLLECTING INDUCED SPUTUM IN ASTHMATIC SUBJECTS

The authors compare 2 methods for collecting induced sputum in 11 patients with asthma. In one method sputum and saliva were collected separately which the authors conclude is a better method.