

PILOT HOME OXYGEN ASSESSMENT SERVICE within NHS HULL

(Including the evaluation of the i-STAT portable gas analyser)



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INTRODUCTION

Specialist supplemental oxygen therapy is the only existing approach shown to modify the long-term decline in lung function associated with COPD. LTOT is associated with a variety of other benefits in patients with severe COPD including increased survival, reduced secondary polycythemia, increased cardiac function during rest and exercise and improved exercise tolerance.^{1,2}

Up until the first of February 2006 in England and Wales home oxygen could only be prescribed by primary care physicians. Unfortunately a lot of patients were prescribed oxygen for relief of symptoms of breathlessness without ever having had a formal oxygen assessment. Much of this oxygen was given in the form of cylinders for PRN usage (short burst oxygen therapy – SBOT) a costly provision without good evidence of efficacy of this treatment.

Historically patients within this locality requiring Long Term Oxygen Therapy (LTOT) were assessed within the acute Trust. These oxygen assessments were traditionally based upon availability of ward based beds or occasionally clinic based assessments. These assessment services were not funded as a separate service proving to be spasmodic and unstructured with poor or no follow up monitoring.

In addition there is no formal ambulatory oxygen service within this locality which has proven to be a costly and growing service with portable oxygen cylinders supplied to patients as a “want” rather than “need” service.

The implementation of the new oxygen contract has highlighted that appropriate assessment is essential so that patients are treated with home oxygen for the right period of time and with appropriate flow rates to obtain optimal benefits and reduce chances of adverse events.

An attempt to rationalise oxygen prescribing by reviewing oxygen assessments at home was explored within NHS Hull by introducing the i-STAT portable gas analyser for home based blood gas assessments, monitoring and treating patients at the point of care.

The hand held i-STAT enables respiratory nurses to monitor the status of respiratory patients within minutes when conducting home visits. This means informed decisions on accurate oxygen prescribing and the need to prevent hospital admission to undergo further assessment. It also means less anxiety and inconvenience for patients, who can find out test results on the spot.

Using advanced biosensor technology and as little as two drops of capillary blood from the ear can deliver accurate testing for blood gases.



THE BENEFITS

1. Reliable and laboratory standard test provided in the comfort of the patient's home.
2. No hospital or clinic waiting times
3. No travelling to hospital to undergo painful radial arterial stabs
4. Equipment is easy to use and portable
5. Hospital admission avoidance with unnecessary exposure to possible ward based infections to already compromised patients
6. No need for ambulance costs and clinic appointments
7. Efficient, cost effective and reassuring for patients
8. Provides better patient care and reduces anxiety for people with chronic respiratory conditions
9. Assessments are carried out by experienced respiratory specialist nurses
10. Easy referral process for long term condition teams
11. Immediate clinical decisions made based upon national guidelines.
12. Structured assessments carried out and Home Oxygen Order Form's (HOOF) and Home Oxygen Consent Forms (HOCF) processed correctly
13. Detailed results of assessments, clinical decisions, and copies of the HOOF given to the referrer, GP and Consultant

METHODS

The long term conditions team and the community physiotherapist were informed that an i-STAT machine would be available on a month's trial from 30.3.09 to 24.4.09. A referral form was given to the LTCT (See appendix 1) and patients who were identified as hypoxic (oxygen saturations < 92%), had suspected hypercapnia or already on oxygen who needed a check blood gas were referred.

A total of **50** patients were referred over a period of one month. It should be noted that we had to limit the number of referrals due to the limited number of "cartridges", short term loan of the gas analyser and other work commitments. Surprisingly within two weeks of disclosing that we had a portable gas machine we had 40 referrals. The total numbers of assessments completed were **41**.

All patients were assessed by two experienced respiratory specialist nurses. At the consultation the patient was clinically assessed and oxygen assessments only completed if the patient was 5-6 weeks free from exacerbation or chest infection. LTOT and ambulatory oxygen assessments were carried out as per BTS National guidelines.

An initial "Adult Home Oxygen Record Sheet" was completed (See appendix 2) and oxygen saturations recorded using a pulse oximeter. Capillary blood gases were taken and performed on room air and oxygen.

Patients were advised with regard to smoking cessation and their medication was reviewed. Patients who were identified as meeting the criteria for LTOT / ambulatory oxygen were commenced on this. Complex cases were referred on for medical review.

All assessments were completed by April 24th 2009.



BLOOD GAS ASSESSMENT OUTCOMES

The total number of referrals to the Respiratory Nurse Specialists for blood gas assessments were **50**.

41 patients were successfully assessed

9 patients were not assessed for the following reasons:

2 patients died before assessment could be completed

- 2 inappropriate referrals

- 1 patient had infective shingles

- 4 unable to complete due to time restraints (The gas analyser had to be returned after 4 weeks)

Source of referrals

Long Term Conditions Team	37
Physiotherapist	8
Pulmonary Rehabilitation	5

Current medical condition

COPD	46
Pulmonary Hypertension	1
Fibrosing Alveolitis	2
Lung Cancer	1

Reasons / concerns for referral:

Hypoxia	11
Suspected hypercapnia	3
Recent oxygen changes by secondary care	4
Ambulatory de-saturation	11
Over oxygenation	7
Suspected inappropriate oxygen provision	5



Patients oxygen provision **prior** to assessment:

Pts on LTOT	33
Pts on Ambulatory Oxygen	32
Pts on SBOT	4
Pts NOT receiving any form of oxygen	4

Patients oxygen provision **post** assessment:

Pts on LTOT	24
Pts on Ambulatory Oxygen	20
Pts on SBOT	1
Pts NOT receiving any form of oxygen	0

Outcomes:

LTOT commenced	8
LTOT Removed	9
Ambulatory oxygen commenced	4
Ambulatory oxygen removed	12
SBOT commenced	1
SBOT removed	3
Oxygen flow rate increased	11
Oxygen flow rate decreased	6
Liquid oxygen initiated	1
No alterations to oxygen provision	5



DISCUSSION

LTOT for hypoxemic COPD was firmly established as an effective treatment 25 years ago by two definitive trials which showed a survival benefit.^{1,2} Such treatment was greatly facilitated by development of the oxygen concentrator.

In November 1985 the prescription of home oxygen via concentrators became available. February 2006 saw new arrangements: all forms of home oxygen would be provided by a single supplier in each region of England and Wales after receipt of a home oxygen order form (HOOF) specifying the details of usage, such as flow rates and expected hours of usage. Ambulatory oxygen - including that supplied as liquid - would be generally available for the first time. Importantly, specialists based in the community can order home oxygen directly. It was envisaged that in the future community respiratory teams will probably become the main prescribers of LTOT.

Previous papers have highlighted the discrepancies in domiciliary home oxygen services and potential for more efficient resource allocation.^{3,4}

We demonstrated that by performing assessments and monitoring patients on existing oxygen delivery systems was efficient, effective and cost saving. Home oxygen assessments and monitoring can enable a full review of the patient's condition and therapy can be undertaken and treatment optimised in partnership with existing long term condition teams, consultants and GP's. A device such as the i-STAT means a patient's status can be monitored without sending them into hospital for sometimes lengthy painful arterial tests, risking potential ward based infections and proving costly in terms of transport, clinic and hospital bed costs.

We found that of the 41 patients assessed **90%** required treatment, either alterations to existing oxygen flow rates, initiating LTOT or ambulatory oxygen or complete removal of inappropriately prescribed oxygen therapy.

Only **2%** of the patients were under regular follow-up at a hospital respiratory clinic. **63%** had been discharged completely for any follow up, and **25%** had never been reviewed at all. **10%** of the oxygen given was in the form of cylinders for short burst oxygen therapy (SBOT) and all but one patient had these removed.

A recent evidence based review of SBOT in COPD suggested that the widespread prescribing of SBOT is not evidence based.⁵ Moreover patients prefer concentrators as they are more acceptable, more useful and less obtrusive.⁶ Financial imperatives and patient preference seem to indicate concentrators as the mode of administration of choice where appropriate.

CONCLUSIONS

For the vast majority of PCT's reducing hospital admissions are not just about reducing costs. It's about providing better patient care, reducing anxiety for patients with chronic conditions and making the lives of sufferers, and those around them more manageable. With that in mind we are pleased to report that the home oxygen service pilot has done this. It has provided a structured, efficient, quality and cost effective service which has revolutionised the way patient receive oxygen at home, creating opportunity for them to improve their quality of life in and out of the home with specialised treatment and follow up care.

The i-STAT device has contributed to support this service with a total cost of **£4.50p** per patient for the consumables to assess the patient at home, compared to the higher financial impact of ward or hospital clinic based assessments which include transport and bed costs.



REFERENCES

1. Nocturnal Oxygen Therapy Trial Group. Continuous or nocturnal oxygen therapy in hypoxaemia chronic obstructive lung disease: a clinical trial. *Ann Intern Med* 1980;93:391-8.
2. Medical Research Council Working Party. Long-term domiciliary oxygen therapy in chronic hypoxic cor pulmonale complicating chronic bronchitis and emphysema. *Lancet* 1981;i:681-6.
3. Appropriateness of domiciliary oxygen delivery. Gordon H, Gyatt D et al. *Chest* 2000; 118:2303-08.
4. Survey on domiciliary oxygen by concentrator in England and Wales. Waterhouse JC, Nichol T & Howard P. *European Respiratory Journal* 1994;7:2021-25.
5. Short-burst oxygen therapy in chronic obstructive pulmonary disease. O'Neill B, Mac Mahon J, Bradley J. *Respiratory Medicine* 2006;100:1129-1138.
6. An evaluation of the use of concentrators for domiciliary oxygen supply for less than 8 h day. Jackson M, Sneerson J. *Respiratory Medicine* 1998;92:250-55.



Appendix 1
Community Adult Oxygen Assessment Referral Form

Title:		Patient's Address:	
Surname:		Patient Tel. No	
First Name:			
Date of Birth:			
NHS No:			
Clinical contact for enquires (GP practice or assessment team at longhill): 01482335465		Any special needs: (i.e. housebound)	
Name:		Carer's Name: (if applicable)	
GP:	Practice:	Carer's contact No.:	
Tel No:			
Please give details of reason for referral:			
Diagnosis:			
Pulse Oximetry Result:		Spirometry Results:	
Current Oxygen Prescription (if appropriate)			
Long Term Oxygen Therapy	Ambulatory	Short Burst Oxygen Therapy	
Litre/min: Hours/day:	Litre/min: Hours/day:	Litre/min: Hours/day:	
Numbers Of Cylinders Per Month:			
Medical History:			
Has patient been stable for the last 5 weeks? Yes <input type="checkbox"/> No <input type="checkbox"/> (please tick)			
Current Medications:			
Other relevant clinical/patient information/(including Lone Worker Info if problem):			
Referrer advised patient of referral? Yes <input type="checkbox"/> (please tick)			
Signature:		Date:	
Name of Referrer (Print):		Designation:	
Telephone Number:			

Please fax a copy to:



Appendix 2
Adult Home Oxygen Record

Name:	Date of Birth:
Address:	Hospital No:
Post code:	Tel No: Mobile:
GP Details:	PCT:
Consultant:	Hospital:
Diagnosis:	
Non invasive ventilation <input type="checkbox"/> CPAP <input type="checkbox"/> Vapotherm <input type="checkbox"/> None <input type="checkbox"/>	

LONG TERM OXYGEN THERAPY (LTOT) ASSESSMENT:

	Date	O2 l/Min	FEV1	FVC	ABG's	SpO2
Initial assessment (on air)						
2nd assessment (On air)						
2 nd assessment (On Oxygen)						

LONG TERM OXYGEN THERAPY FOLLOW UP:

	Date	O2 l/min	Oxygen device	Hours /day	SaO2 on air	SaO2 on O2	ABG's	Comments/change to LTOT
4 weeks								
3months								
6 months								
12 months								
18months								
24 months								
30months								
36 Months								

