

# **Causes and Treatment of Chronic Respiratory Failure Experience of a National Register**

av

**Torbjörn Gustafson**

Akademisk avhandling

som med vederbörligt tillstånd av rektorsämbetet vid Umeå universitet för  
avläggande av medicine doktorsexamen  
framläggs till offentligt försvar i Sal B, byggnad 1D, 9 trappor, Norrlands universitetssjukhus  
fredagen den 11 januari 2008, klockan 09.00

Fakultetsopponent: Professor Leif Bjermer, Institutionen för kliniska vetenskaper,  
Lunds universitet



Department of Public Health and Clinical Medicine, Respiratory Medicine and Allergy  
Umeå University  
Umeå 2008

# Causes and Treatment of Chronic Respiratory Failure – Experience of a National Register

Torbjörn Gustafson

Department of Public Health and Clinical Medicine, Respiratory Medicine and Allergy  
Umeå University, SE-90187 Umeå, Sweden

New series No 1142 ISSN 0346-6612 ISBN 987-91-7264-455-7

## Abstract

Long-term oxygen therapy (LTOT) or home mechanical ventilation (HMV) can improve survival time in chronic respiratory failure. A national quality register could be an aid to identifying risk markers and optimizing therapy for respiratory failure.

**Aims:** •To identify risk markers for chronic respiratory failure, especially when triggered by chronic obstructive pulmonary disease (COPD) and idiopathic pulmonary fibrosis (IPF). •To predict sex-related differences in the future need of LTOT for COPD and to study sex related survival rate in COPD patients starting LTOT. •To investigate if HMV is more effective than LTOT alone in treating chronic respiratory failure caused by kyphoscoliosis. •To evaluate the use of quality indicators in LTOT.

**Methods:** Swedish national registers for LTOT and HMV were established in 1987 and 1996 respectively. They were reconstructed in 2004 to form the web-based register Swedevox. Indications for LTOT were based on the guidelines from the Swedish Society for Respiratory Medicine. The incidence and prevalence of LTOT for COPD were measured annually from 1987 to 2000, and the future need for LTOT was estimated on the basis of the frequency of ever smoking in Sweden in 2001 in different age groups. A postal questionnaire on occupational exposures was completed by 181 patients with severe pulmonary fibrosis who started LTOT between 1997 and 2000, and by 757 controls. Odds ratios (ORs) were calculated. Time to death was evaluated in kyphoscoliotic patients starting HMV or LTOT alone in 1996-2004. Ten quality indicators were defined and evaluated based on data from patients starting LTOT in 1987-2005.

**Results:** The incidence each year of LTOT in COPD patients increased more rapidly in women than in men (from 2.0 and 2.8/100,000 in 1987 to 7.6 and 7.1/100,000 in 2000 respectively, ( $p < 0.001$ )). Women ran a 1.9 times higher risk than men to develop chronic hypoxemia from COPD and had a higher survival rate during LTOT. In men, IPF was associated with exposure to birch dust with an OR 2.7, (95% confidence interval (CI) 1.30–5.65) and with hardwood dust, OR 2.7 (95% CI 1.14–6.52). Patients with kyphoscoliosis showed a better survival rate with HMV than with LTOT alone with a hazard ratio of 0.30 (95%CI 0.18–0.51), adjusted for age, sex, concomitant respiratory diseases, and blood gas levels. There were improvements in the following eight quality indicators for LTOT: access to LTOT,  $\text{PaO}_2 < 7.3$  kPa without oxygen, no current smoking, low number of thoracic deformity patients without concomitant HMV, LTOT > 16 hours of oxygen/day, mobile oxygen equipment, reassessment of hypoxemia when LTOT was not started in a stable state COPD, and avoidance of continuous oral steroids in COPD. There was a decline in the indicator  $\text{PaO}_2 > 8$  kPa on oxygen. First-year survival rate in COPD was unchanged.

**Conclusions:** The incidence and prevalence of LTOT increase more rapidly in women than in men. Survival rate during LTOT in COPD is better in women than in men. Exposure to birch and hardwood dust may contribute to the risk of IPF in men. Survival rate in patients with kyphoscoliosis was three times better with HMV than with LTOT alone. The national quality register for LTOT showed improvements in eight out of ten quality indicators. Levels for excellent quality in the indicators are suggested.

**Key words:** Chronic obstructive pulmonary disease; pulmonary fibrosis; kyphoscoliosis; respiratory failure; sex; smoking; occupation; survival; long-term oxygen therapy; mechanical ventilation.