HelmholtzZentrum münchen
German Research Center for Environmental Health

Scientific Highlight April 2016

☒ co-ordinated with the Director of the Institute / Research Unit

## *Institute of Health Economics and Health Care Management (IGM)*

**PSP-Element:**
G-505300-001

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**Title of the highlight:**
Lung transplantation in the spotlight: Reasons for high-cost procedures

**Keywords:**
DRG; costs; economic evaluation; lung transplantation; resource utilization

**Central statement of the highlight in one sentence:**
Analyzing almost half of the lung transplantation volume in Germany, this study is the first to identify the cost levels by major diagnosis as well as main cost drivers, indicating the need to better adapt current reimbursement especially for complex cases.

**Text of the highlight:**

BACKGROUND:
Hospital treatment costs of lung transplantation are insufficiently analyzed. Accordingly, it remains unknown, whether current Diagnosis Related Groups, merely accounting for 3 ventilation time intervals and length of hospital stay, reproduce costs properly, even when an increasing number of complex recipients are treated. Therefore, in this cost determination study, actual costs were calculated and cost drivers identified.
METHODS:
A standardized microcosting approach allowed for individual cost calculations in 780 lung transplant patients taken care of at Hannover Medical School and University of Munich from 2009 to 2013. A generalized linear model facilitated the determination of characteristics predictive for inpatient costs.
RESULTS:
Lung transplantation costs varied substantially by major diagnosis, with a mean of €85,946 (median €52,938 ± 3,081). Length of stay and ventilation time properly reproduced costs in many cases. However, complications requiring prolonged ventilation or reinterventions were identified as additional significant cost drivers, responsible for high costs.

CONCLUSIONS:
Diagnosis Related Groups properly reproduce actual lung transplantation costs in straightforward cases, but costs in complex cases may remain underestimated. Improved grouping should consider major diagnosis, a higher gradation of ventilation time, and the number of reinterventions to allow for more reasonable reimbursement.

**Publication:**
Vogl M, Warnecke G, Haverich A, Gottlieb J, Welte T, Hatz R, Hunger M, Leidl R, Lingner H, Behr J, Winter H, Schramm R, Zwissler B, Hagl C, Strobl N, Jaeger C, Preissler G. Lung transplantation in the spotlight: Reasons for high-cost procedures. J Heart Lung Transplant. 2016 Jun 7. pii: S1053-2498(16)30165-6. [Epub ahead of print]

**Taking account of the HMGU mission:**
Chronic lung diseases such as COPD are a main focus of the HMGU as a member of the German Center for Lung Research. This study provides evidence on the costs of lung transplantation in Germany, showing both differences by underlying major diagnosis and identifying the most important cost drivers. Results are of interest internationally as this is the first large scale, detailed cost analysis, and results indicate starting points for possible improvements in the German reimbursement system and beyond.

**The internal HMGU co-operation partners with whom the highlight was compiled, if appropriate:**
Intensive co-operation within the DZL, in CPC-M including LMU Depts. for Thoratic Surgery and for Internal Medicine.

# Inpatient cost of lung transplantation by major diagnosis, activity-based microcosting, in Euro

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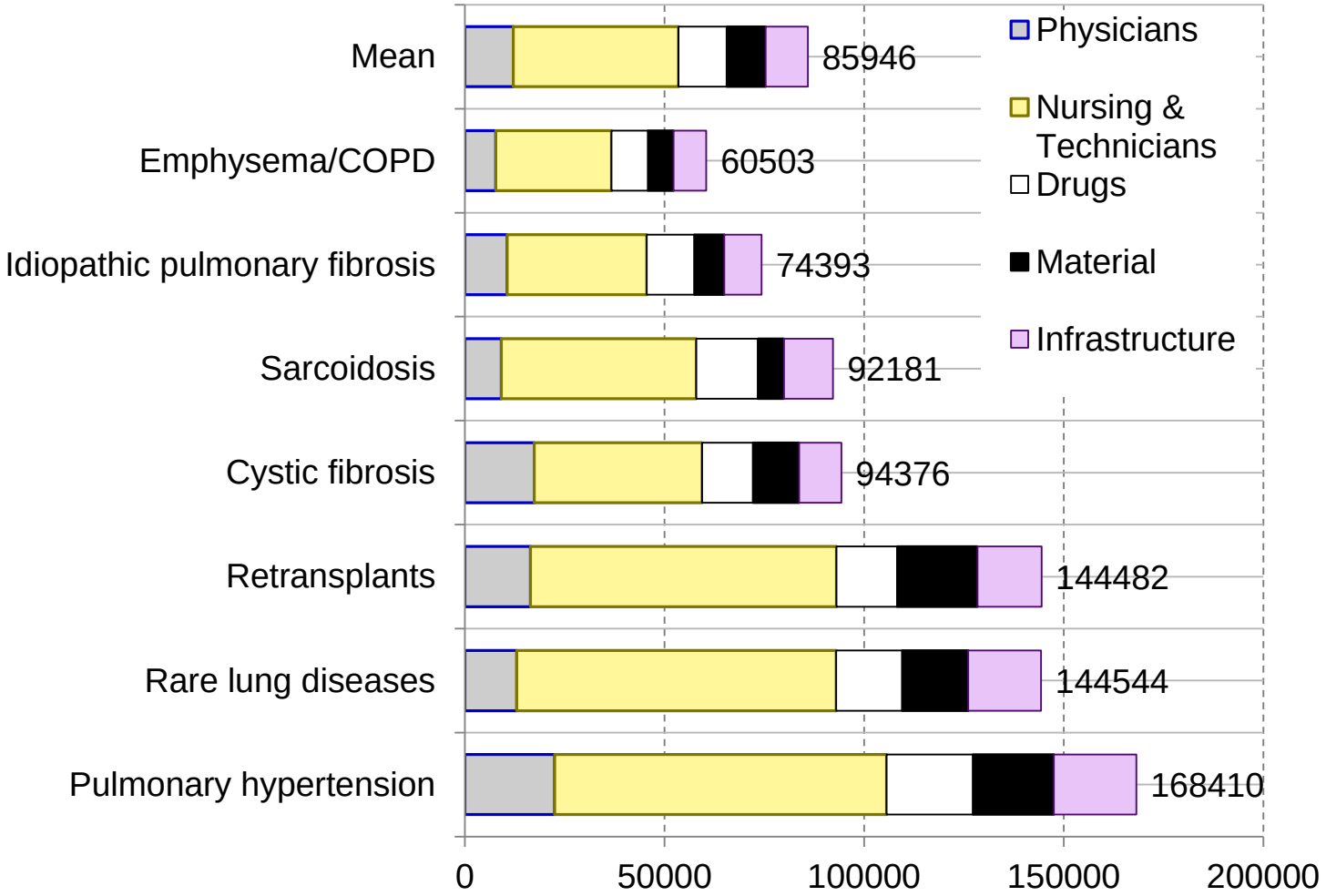


***Cost, PH ≅ 2,8 * Cost, COPD***

# Cost drivers and major diagnoses, lung transplantation in Germany

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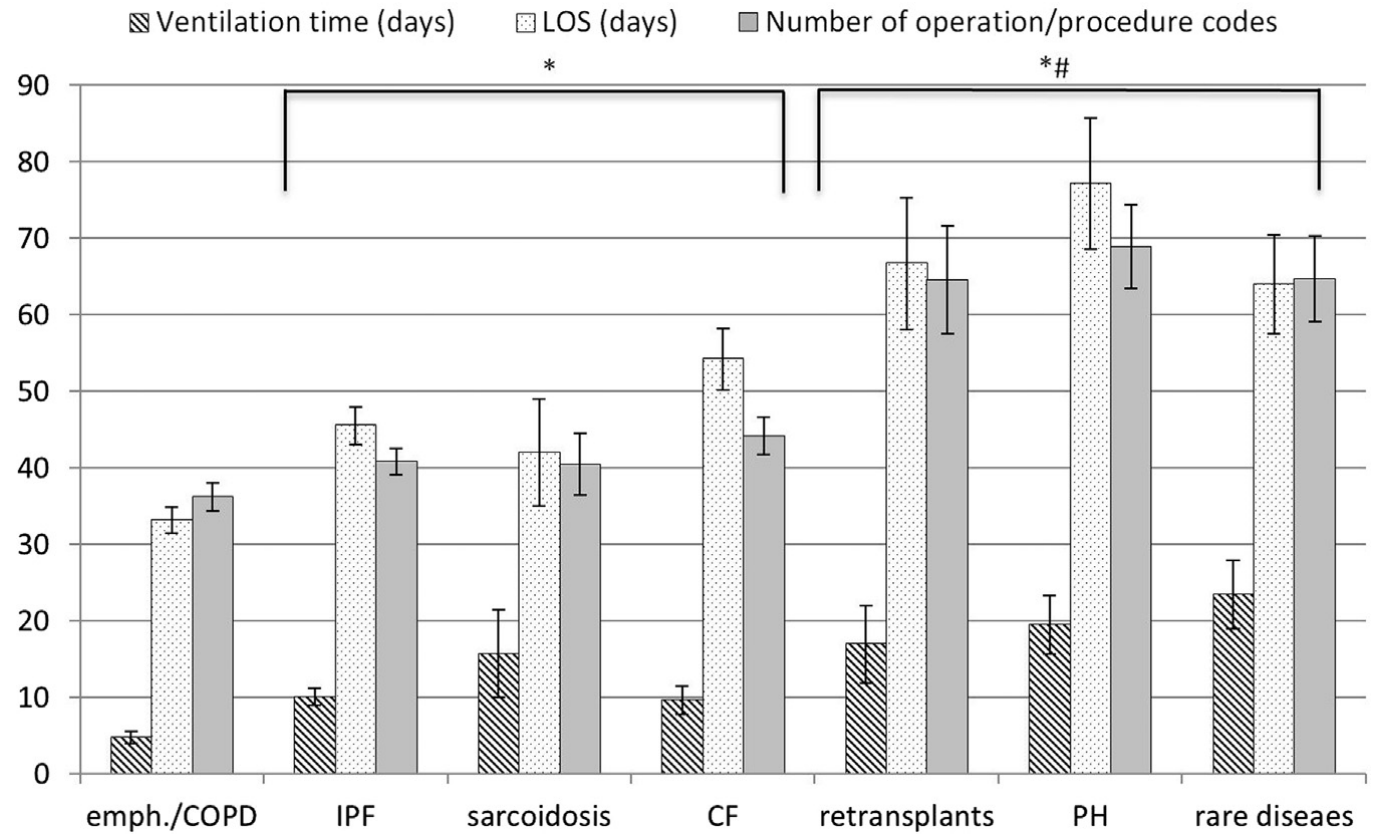


Ventilation time, length of stay (LOS), and number of operation/procedure codes classified by major diagnosis. Interestingly, emphysema/chronic obstructive pulmonary disease(COPD) reveals only as light, although significant, difference toward idiopathic pulmonary fibrosis (IPF), sarcoidosis, and cystic fibrosis (CF), whereas a larger difference was seen in comparison with retransplants, pulmonary hypertension (PH), and rare lung diseases. Data are shown as the mean and standard error of the mean (range bars). *p < 0.01 vs emphysema/COPD, #p < 0.01 vs. IPF, sarcoidosis, and CF by t-test.