# Work Productivity and Impairment Among Patients With Light Chain Amyloidosis

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## INTRODUCTION

- Amyloid light chain (AL) amyloidosis is a rare, progressive, and typically fatal disease caused by the deposition of misfolded immunoglobulin light chains, which in turn form soluble toxic aggregates and deposited fibrils (amyloid)[1-3]
  - AL amyloidosis leads to progressive failure of critical organs and systems (eg, heart, kidneys, nervous system), causing significant morbidity and mortality[1-3]
- The progressive and chronic nature of AL amyloidosis significantly impacts patients' work-related outcomes (WROs)[4]

## PURPOSE

- To examine whether 3 aspects of health-related quality of life (HRQoL)—physical and mental well-being and sleep quality—are associated with aspects of WROs such as productivity and impairment in patients with AL amyloidosis

## METHODS

### Data and Surveys

- An online survey was administered to patients with AL amyloidosis (N = 341) from multiple regions, including North America, Europe, and Australia, to assess WROs and HRQoL
- Employment status was assessed through a single question that asked whether patients were currently working for pay
- Approximately one-third of surveyed patients (n = 108) reported that they were working for pay at the time of the initial survey and provided responses to the WRO and HRQoL items

#### *WPAI:SHP*

- The Work Productivity and Activity Impairment Specific Health Problem (WPAI:SHP) questionnaire is a 6-item, self-report WRO survey that uses a 7-day recall period[5]
- The WPAI:SHP measures 4 domains of disease-related impact on work
  - Presenteeism (percentage of time impaired while at work)
  - Absenteeism (percentage of time missed from work)
  - Productivity loss (percentage of overall work impairment resulting from presenteeism and absenteeism)
  - Activity impairment (percentage of activity impairment outside work)
- Higher percentages indicate worse WROs
- 3 domains—presenteeism, absenteeism, and productivity loss—were used in this study
- For each of the 3 domains, working patients' scores were used to classify them into 1 of 2 groups: those who reported any impact on presenteeism/absenteeism/productivity (>0%) and those who reported no impact (0%)

#### *HRQoL: SF-36v2 and MOS-Sleep-6R*

- The SF-36v2 Health Survey® (SF-36v2) is a 36-item, self-reported HRQoL measure that allows for the calculation of 8 domains and 2 summary scores of physical and mental well-being.[6] Results based on the 2 summary component scores are presented here
  - Physical Component Summary (PCS)
  - Mental Component Summary (MCS)
- The Medical Outcomes Study Sleep Scale–6R (MOS-Sleep-6R) is a 6-item, self-report measure that assesses quality and quantity of sleep through a single summary score[7]
  - MOS-Sleep Global Index
- PCS, MCS, and MOS-Sleep Global Index scores are standardized to 50 ± 10 (mean ± standard deviation [SD]).[6,7] A score of 50 represents the average score of a general population; higher scores represent better HRQoL

### Statistical Analyses

- Demographics, disease characteristics, and HRQoL scores (PCS, MCS, and MOS-Sleep Global Index) were assessed as a function of employment status (working vs not working) using chi-square tests and ANOVAs
- Cross-sectional analyses examined the associations between HRQoL and each of the 3 dichotomized WROs (impact vs no impact for presenteeism, absenteeism, and productivity loss)
  - Associations were analyzed using individual multivariable logistic models for each WRO
  - Potential confounders related to disease severity (cardiac dysfunction, hematologic response status, duration of disease, and time since last treatment) were considered when developing the models
  - The final models controlled for time since last treatment (last treatment received <1 year ago vs ≥1 year ago). The final models were selected based on Akaike information criteria,[8] 95% confidence intervals, and chi-square test statistics for best fit
  - Odds ratios were interpreted using 5-point deficits in HRQoL scores to facilitate understanding of meaningful associations between HRQoL and WROs. A 5-point interval was selected as the unit of interpretation based on the suggested minimally important difference threshold (±0.5 SD) for these HRQoL scores

## RESULTS

### Sample Characteristics and HRQoL Score Summary

- With the exception of age, demographic and disease characteristics were comparable when classifying patients by employment status. On average, patients who were not employed were older than patients who were employed ($P < 0.01$) (**Table 1**)
- Overall, patients who were employed reported more favorable PCS and MOS-Sleep Global Index scores than patients who were not employed ($P < 0.05$)

**Table 1.** Demographic Characteristics and HRQoL Scores of Patients With AL Amyloidosis by Employment Status

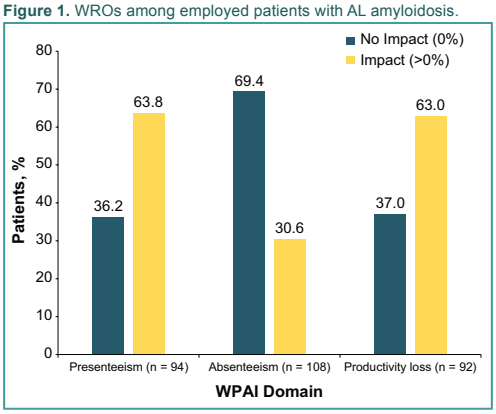
| Characteristic | Employed Patients With AL Amyloidosis n = 108 | Not Employed Patients With AL Amyloidosis n = 185 | *P* |
|---|---|---|---|
| **Age, years, mean (SD)** | 56.0 (9.4) | 62.4 (10.3) | <0.01 |
| Male,[a] % | 44.9 | 50.3 | 0.37 |
| White, % | 89.8 | 89.2 | 0.87 |
| **Currently married,[a] %** | 83.5 | 79.4 | 0.40 |
| **No. of organs involved, %** | | | 0.28 |
| 1 | 26.9 | 29.2 | |
| 2 | 30.6 | 22.2 | |
| ≥3 | 42.6 | 48.6 | |
| **Organs/systems impacted,[b] %** | | | |
| Heart | 45.4 | 55.7 | 0.09 |
| Kidney | 65.7 | 60.5 | 0.38 |
| Liver | 17.6 | 12.4 | 0.22 |
| Gastrointestinal | 43.5 | 45.4 | 0.75 |
| Nerves | 32.4 | 37.8 | 0.35 |
| Others | 29.6 | 34.6 | 0.38 |
| **Received treatment <1 year ago, %** | 58.3 | 64.3 | 0.31 |
| **Complete hematologic response/remission,[a] %** | 59.1 | 41.9 | <0.01 |
| **HRQoL scores, mean (SD)** | | | |
| PCS | 43.7 (10.1) | 38.6 (9.9) | <0.001 |
| MCS | 49.0 (9.9) | 46.7 (12.6) | 0.10 |
| MOS-Sleep Global Index | 47.7 (9.6) | 44.8 (10.5) | 0.02 |

HRQoL, health-related quality of life; MCS, Mental Component Summary; MOS, Medical Outcomes Study; PCS, Physical Component Summary; SD, standard deviation.
68 patients did not provide responses.
[a]Missing values; Percentages are based on available data.
[b]Multiple responses allowed.

### Summary of WROs

- Most employed patients reported AL amyloidosis–related impacts on their work in the form of presenteeism (64%) and overall productivity loss (63%). Approximately 31% of employed patients reported absences from work because of the disease (absenteeism) in the 7 days preceding the survey (**Figure 1**)

**Figure 1.** WROs among employed patients with AL amyloidosis.




WPAI, Work Productivity and Activity Impairment; WROs, work-related outcomes.
Patient numbers in presenteeism (n = 94) and productivity loss (n = 92) categories smaller than total sample size due to missing data.

### Associations Between HRQoL and WRO

- Physical well-being, mental well-being, and sleep were each associated with all 3 WROs ($P < 0.05$), even after adjusting for time since last treatment (**Table 2**)
  - Each 5-point deficit in PCS score was associated with 80% to 90% greater odds of reporting presenteeism, absenteeism, and overall productivity loss
  - Each 5-point deficit in MCS and MOS-Sleep Global Index scores more than doubled the odds of presenteeism and productivity loss

**Table 2.** Associations Between HRQoL and WRO Based on Multivariable Logistic Models

| WRO | HRQoL Measure | 5-Point Odds Ratio | 95% CI |
|---|---|---|---|
| **Presenteeism** | PCS | 1.80 | 1.35-2.40 |
| | MCS | 2.19 | 1.53-3.14 |
| | MOS-Sleep Global Index | 2.13 | 1.49-3.05 |
| **Absenteeism** | PCS | 1.90 | 1.43-2.52 |
| | MCS | 1.28 | 1.03-1.59 |
| | MOS-Sleep Global Index | 1.83 | 1.37-2.45 |
| **Productivity loss** | PCS | 1.85 | 1.37-2.49 |
| | MCS | 2.16 | 1.50-3.11 |
| | MOS-Sleep Global Index | 2.28 | 1.55-3.35 |

CI, confidence interval; HRQoL, health-related quality of life; MCS, Mental Component Summary; MOS, Medical Outcomes Study; PCS, Physical Component Summary; WROs, work-related outcomes.
All WROs are significantly associated with PCS, MCS, and MOS-Sleep Global Index ($P < 0.05$).
Each model controlled for time since last treatment (0, <1 year; 1, ≥1 year).

## CONCLUSIONS

- This study reports clear associations between WROs and multiple measures of HRQoL, including physical well-being, mental well-being, and sleep quality
- Differences in HRQoL scores by employment status suggest that patients with greater disease severity may not be currently employed
- Deficits in physical well-being appear to have a greater effect on work absences, whereas deficits in mental well-being and sleep quality affect patients' ability to be productive while at work (presenteeism)
- These data may underestimate HRQoL deficits and WROs in patients with AL amyloidosis because this sample included patients whose disease was generally more stable and who were well enough to complete the survey
- The proportion of patients with AL amyloidosis who reported work absences (31%) was comparable to the proportions previously reported for patients with other chronic diseases, such as asthma (36%) and diabetes (38%),[9] and exceeded the proportions reported for patients with relapsing multiple sclerosis (14%)[10] and for a general population of similar age (3.3%).[11] Greater proportions of patients with AL amyloidosis than with relapsing multiple sclerosis (64% vs 47%)[10] reported impairments while at work (presenteeism)
- Future studies should account for a broader set of WROs, including premature retirement and short- and long-term disability, and should also investigate changes in patients' and caregivers' employment status over time

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## DISCLOSURES OF INTEREST

KLM, MY, MSB, and MKW are or were full-time employees of Optum, Inc., which received funding from Prothena Biosciences Inc to complete the study. TPQ is a full-time employee of and stockholder in Prothena. SDG has nothing to disclose.

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