

Objective Measurement of Hourly and Annual Productivity While at Work in Employees With Gastroesophageal Reflux Disease (GERD) Compared With Employees Without GERD

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CONCLUSIONS

- Objective measurements of hourly and annual at-work productivity indicate that GERD impacts productivity while at work.
- The observed link between GERD and at-work productivity supports findings from other studies using self-report productivity instruments.
- These results indicate an opportunity for improved management of patients with GERD that may, in turn, reduce costs from an employer or society perspective.

INTRODUCTION

- Estimates suggest that around 60% of the total cost of gastroesophageal reflux disease (GERD) is accounted for by absence from work and reduced at-work productivity.¹ Studies in working populations (using patient-reported data) have shown that GERD causes a reduction in at-work productivity of around 10%.²⁻⁴ Significantly higher levels of impairment have been observed in patients with more troublesome symptoms,⁵⁻⁷ such as those with GERD-related sleep disturbance.⁸
- To date, however, the effect of GERD on at-work productivity has not been assessed using objective measures, given practical and methodologic difficulties with this approach.⁹

AIM

- To determine if a relationship exists between GERD and reduced at-work productivity, on the basis of objective measurements of hourly and annual productivity while at work.

METHODS

- An analysis was performed on data from the Human Capital Management Services (HCMS) medical records' database consisting of approximately 350 000 employee records representing the retail, service, manufacturing, and financial industries. Anonymity of person-level data was maintained according to the Health Insurance Portability and Accountability Act guidelines.
- From the database, ICD-9 codes were used to identify employees with a primary, secondary, or tertiary diagnosis of GERD (251.5x, 530.1, 530.10, 530.11, 530.12, 530.19, 530.81, 787.1x and 787.2x). Employees without GERD were defined as the control group.
- The index date for each employee with GERD was the date of diagnosis associated with the disease. For controls, the index date was the average index date of subjects with GERD.
- For the purposes of the analysis, subjects from the GERD and control groups needed to be continuously employed and eligible for health benefits for at least 1 year after their index date.
- Productivity was measured in terms of units processed per hour worked using real, day-to-day, person-level work output data collected electronically by their employers.
- At-work productivity was analyzed per hour (*hourly productivity*) and for a 12-month period (*annual productivity*):
 - hourly productivity was calculated by dividing the units processed during the given day by the actual hours worked that day
 - annual productivity was calculated from the number of units processed by each employee over the 12-month period following the employee's index date.

Statistical analysis

- Generalized linear regression models, with a gamma distribution and a log link, measured the impact of GERD on productivity output in separate models (hourly and annual). The models controlled for population differences in age, marital status, race, full-time/part-time status, Charlson Comorbidity Index¹⁰ and region (defined by the first digit of the employee's postal zip code). Tenure and salary were not included as they were too highly correlated with other variables in the model.

RESULTS

- Productivity data were available for 541 employees with GERD and 26 775 employees without GERD (control group). Demographic characteristics are summarized in Table 1.

Table 1. Demographic characteristics of employees with and without gastroesophageal reflux disease (GERD)

Characteristic	Employees with GERD (n = 541)	Employees without GERD (n = 26 775)
Mean age, years (at index date)	40.3	37.8
Mean tenure, years (at index date)	9.5	8.3
Women, %	24.8	21.9
Married, %	64.5	59.6
Race, %		
White	77.3	64.2
Black	15.3	21.4
Hispanic	5.7	11.5
Full-time employment, %	76.9	73.2
Mean annual salary, \$US	34 001	33 512
Mean Charlson Comorbidity Index	0.19	0.09

- Comparison of the two groups in terms of hourly and annual at-work productivity showed that employees with GERD averaged 0.84 fewer units processed per hour worked (4.4% reduction, $P = .048$) and 1754 fewer units processed per year (6.0% reduction, $P = .039$) (Figure 1).

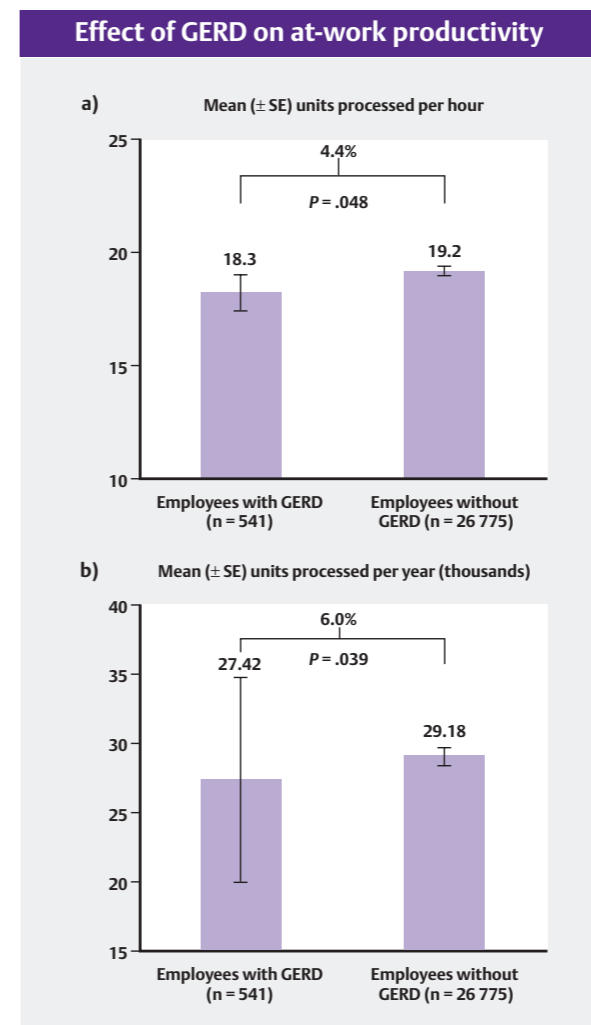


Figure 1. a) Hourly and b) annual at-work productivity per employee with and without gastroesophageal reflux disease (GERD).

- The observed annual at-work productivity loss was higher (6.0%) than the hourly loss (4.4%) because annual at-work productivity measurements also included absence from work.

Study strengths and limitations

- The main strengths of this study were that:
 - objective productivity measures have no recall or response bias that may be present in self-report results⁹
 - the models controlled for a broad array of differences between employees with and without GERD.
- A limitation of this study was that employees studied work in specific task-oriented positions that may not necessarily be generalized to other populations. The at-work productivity losses that GERD causes, however, are also likely to be seen in other occupations.

REFERENCES

1. American Gastroenterological Association. The burden of gastrointestinal diseases. Bethesda, MD: American Gastroenterological Association, 2001. Available at: <http://www.gastro.org/user-assets/Documents/burden-report.pdf>
2. Dean BB, et al. *Gastroenterology* 2003; 124 (4 Suppl 1): A505
3. Dubois R, et al. *Gastroenterology* 2005; 128 (4 Suppl 2): A286
4. Liker H, et al. *Gastroenterology* 2005; 128 (4 Suppl 2): A386
5. Bixquert M, et al. *Gut* 2004; 53 Suppl. VI: A99
6. Wahlqvist P, et al. *Value Health* 2002; 5: 106–13
7. Wahlqvist P, et al. *Value Health* 2004; 7: A349
8. Johnson D, et al. *Am J Gastroenterol* 2005; 100: 1914–22
9. Prasad M, et al. *Pharmacoeconomics* 2004; 22: 225–44
10. Charlson ME, et al. *J Chronic Dis* 1987; 40: 373–83