

Work Productivity Loss Among Those With Pain Associated With Medical Illness

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INTRODUCTION

- Pain associated with medical illness can impair many aspects of patients' quality of life by interfering with their social and occupational functioning as well as their overall emotional well-being.^{1,2}
- Patients with pain associated with medical illness place a substantial economic burden on society, including employers; in particular, costs associated with lost productivity and to a lesser degree costs associated with absenteeism.³
- Costs associated with lost productivity because of pain associated with medical illness were estimated to be \$61.2 billion/year in 2002.⁴

OBJECTIVE

- The impact of pain caused by medical illness on work productivity was evaluated in this retrospective analysis of employee data from the Human Capital Management Services (HCMS) database.

METHODS

SUBJECTS

- Data for approximately 280,000 employees from the retail, service, manufacturing, and financial industries were collected.
- ICD-9 codes were used to identify employees in the HCMS database for the year 2002 or 2004 with a medical illness associated with pain. The medical illnesses included osteoarthritis, back pain, neuropathic pain, headaches, and cancer.
- Employees in the HCMS database without any of the medical illnesses were used as the control group.

STUDY DESIGN

- Subjects were chosen if they had pain associated with medical illnesses identified by ICD-9 codes.
- Each employee's output was monitored and the amount of work produced each day by each employee was measured in units of output specific to the type of work.
 - The units of output were standardized to allow comparison across the different types of work environments.
- Productivity values for each employee were calculated from the standardized daily units of output.
 - Annual productivity values (number of units processed per 12-month period worked) incorporated employee absenteeism.
 - Hourly productivity values (number of units processed per hour worked) represent on-the-job productivity.
- Health-related absences included days on sick leave, short-term disability, long-term disability, and workers' compensation.
- Salary opportunity costs (SOC) were calculated as the percent decrease from control in the number of units processed multiplied by the employee's annual salary.
- Benefits, for example, days paid but not worked and out-of-pocket costs such as insurance and taxes, were calculated at 35% of the salary.⁵
- Indirect overhead costs were calculated as 110% of SOC plus benefits.⁵
- Total costs associated with lost productivity were calculated as SOC + benefits + indirect overhead costs.⁵

DATA ANALYSES

- Generalized linear regression models were used to calculate the impact of pain on productivity for each medical illness using the hourly and annual productivity values calculated for each employee.
- Two-stage generalized linear regression models were used to calculate the impact of pain on absences for each specified medical illness.

- The regression models controlled for demographic differences between the cohorts and generated estimated absent days and numbers of units processed per hour or year worked.
 - The demographic differences controlled for included age, tenure, gender, marital status, race, salary, exempt status (hourly paid status per occupation), full-time/part-time status, salary, and region.

RESULTS

- The 278,206 employees included in the analysis had the following characteristics:
 - Female, 43%; race, white, 66%, black, 19%; age, 41.0±0.2 years (mean±SEM).
 - 88% were employed full time (annual salary [mean±SEM], \$49,381±170).
- The prevalence of each medical illness is presented in **Illustration 1**.

1 Prevalence of Medical Illness

Medical Illness	n (%)
Osteoarthritis	7,596 (2.7)
Back pain	27,311 (9.8)
Neuropathic pain	7,522 (2.7)
Headaches	15,305 (5.5)
Cancer	30,745 (11.1)
Control ^a	206,277 (74.1)

Total **278,206^b**

^aEmployees without any of the specified medical illnesses.

^bSome employees had > 1 pain condition.

- The proportion of employees using prescription opioids is presented in **Illustration 2**.

2 Employee Use of SAOs and LAOs by Type of Medical Illness

Medical Illness (n)	Proportion of Employees (%)			
	SAO	LAO	SAO+LAO	Non-Opioid Use ^a
Osteoarthritis (7,596)	44.3	1.1	3.5	51.1
Back pain (27,311)	42.3	1.1	2.9	53.7
Neuropathic pain (7,522)	40.0	1.2	3.4	55.2
Headaches (15,305)	42.1	1.0	2.6	54.2
Cancer (30,745)	32.3	1.0	1.6	65.0
Control (206,277) ^b	18.1	0.7	0.4	80.8

^aEmployees not using opioids.

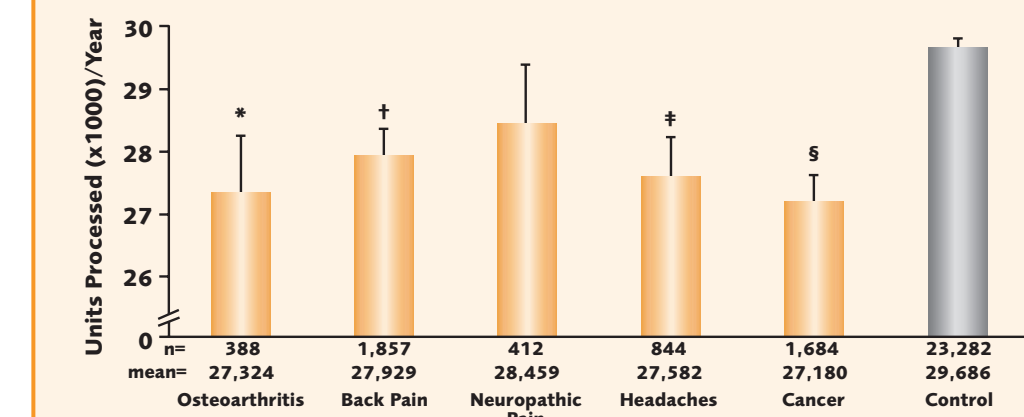
^bEmployees without any of the specified medical illnesses.

SAO, short-acting opioid; LAO, long-acting opioid.

WORK PRODUCTIVITY

- Significantly lower annual productivity was found for employees with osteoarthritis, back pain, headaches, and cancer compared with those in the control group (**Illustration 3**).

3 Annual Productivity of Employees With Pain Associated With Medical Illnesses (mean±SEM)



*P=0.02, †P=0.0001, ‡P=0.002, §P<0.0001 vs. control group.

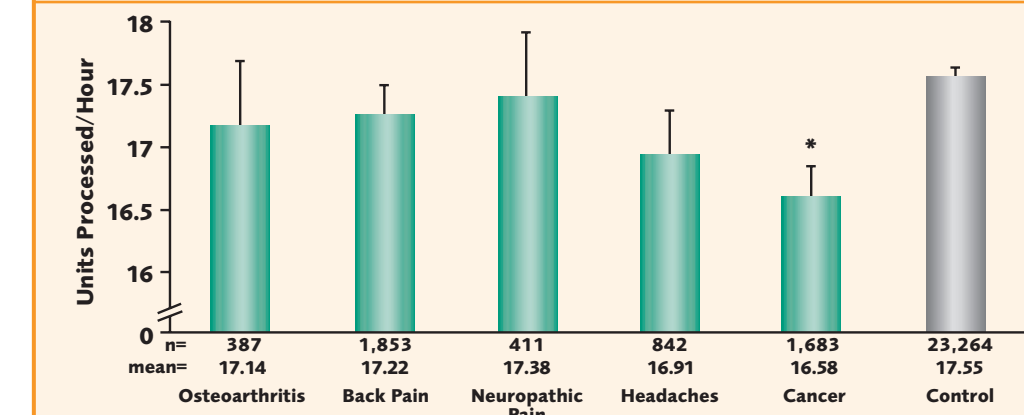
n=number of employees.

mean=average number of units processed (output standardized across the types of work) per year for each employee.

Units processed incorporated absenteeism, and were adjusted for age, tenure, gender, marital status, race, exempt status, full-time/part-time employment status, salary, and region.

- Mean hourly productivity for employees with pain associated with a medical illness ranged from 16.58 to 17.38 (**Illustration 4**).
- Employees with cancer had significantly lower hourly productivity than the control group (16.58 vs. 17.55, P=0.0003) (**Illustration 4**).

4 Hourly Productivity of Employees With Pain Associated With Medical Illnesses (mean±SEM)



*P=0.0003 vs. control group.

n=number of employees (restricted to those employees with productivity data). Outliers (> 4 SD) were removed. mean=average number of units processed (output standardized across the types of work) per hour for each employee on a daily basis. Productivity output measurements are taken during the measurement year. Units processed were adjusted for age, tenure, gender, marital status, race, exempt status, full-time/part-time employment status, salary, and region.

EMPLOYEE ABSENTEEISM

- All groups of employees with pain associated with a medical illness had significantly more total absences than the control group.
 - Employees in the osteoarthritis, back pain, neuropathic pain, headaches, and cancer groups averaged 10.23, 9.40, 8.87, 8.29, and 7.53 days absent per year, respectively, while employees in the control group averaged 4.60 days absent per year.

COST IMPACT

- The annual cost to the employer for lost productivity per employee with pain associated with a medical illness ranged from \$5,982 to \$13,622 (**Illustration 5**).
- Lost productivity in the cancer group had the greatest annual cost impact for employers (**Illustration 5**).

5 Costs Associated With Lost Annual Productivity

	Osteoarthritis (n=388)	Back Pain (n=1,857)	Neuropathic Pain (n=412)	Headaches (n=844)	Cancer (n=1,684)
SOC	\$4,042	\$2,987	\$2,110	\$3,372	\$4,805
Benefits	\$1,415	\$1,046	\$738	\$1,180	\$1,682
Indirect overhead costs	\$6,003	\$4,436	\$3,133	\$5,008	\$7,136
Total ^a	\$11,460	\$8,469	\$5,982	\$9,561	\$13,622

^aTotal costs were calculated by adding the salary opportunity costs (SOC), associated costs of benefits (35% of salary), and indirect overhead costs (110% of SOC plus benefits).

CONCLUSIONS

- Annual productivity was significantly lower for employees with pain associated with osteoarthritis, back pain, headaches, and cancer than for employees in the control group.
- Employees with cancer had significantly lower hourly productivity compared with the control group. However, this may not be an accurate reflection of the productivity lost as a result of pain associated with cancer, but may be a consequence of the relative course of the disease itself.
- Health-related absenteeism and lost productivity resulting from pain associated with medical illnesses placed a significant impact on cost to employers.
- Additional analysis may provide specific information regarding the impact of pain severity on work productivity.

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