

ても全体の3.8%と30歳代が最も高かった。

賃金全体にせめるプレゼンティーズムによる損失の割合は男女ともに、有訴率が高い腰痛がうつよりも高かった。

本研究の限界としては、最も影響のあった疾患を選択したため、2番目に影響をした疾病については評価ができていないことである。また、治療の状況や、治療によりの程度生産性が向上されるかは今後の課題である。さらに、本研究では欠勤については考慮していない。

E. 結論

一人当たりのプレゼンティーズムによる生産性への影響はうつが最も高かったが、100人の労働者を仮定した場合の賃金の損失は腰痛や首の不調が高かったことが示された。年代ごとに100人の労働者がいたと想定した場合の賃金損失は、全体給与のうち、うつにより男性では、年代によって0.8-4.5%、女性では1.3-3.8%であった。頭痛については男性で1.3-1.6%、女性では0.6-2.3%であった。

F. 参考文献

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II. 研究成果の刊行に関する一覧表

Ⅱ. 研究成果の刊行に関する一覧表

報告書・冊子等

発表者氏名	報告書名	巻号	出版地	出版年	ページ
横山 和仁 飯島 佐知子 井奈波 良一 中尾 睦宏 西田 淳志 安藤 俊太郎 原谷 隆史 福田 敬 山崎 喜比古 和田 耕治	職場におけるメンタルヘルス対策の有効性、費用対効果等に関する調査研究 厚生労働科学研究費補助金 労働安全衛生総合研究事業 平成23～25年度総合研究報告書（本冊子）	平成25年度	東京	2014年	1-194
横山 和仁 他	効果的な職場のメンタルヘルス対策	—	東京	2014年	—
山崎 喜比古 他	健康でいきいきと働き続けるために	—	東京	2014年	—
中尾 睦宏 他	働く人のためのストレスマネジメント 認知行動療法を活用したセルフケア	—	東京	2014年	—
浦川 加代子	ストレス対処力（SOC）を高める心理教育リーフレット	—	東京	2014年	—

雑誌

発表者氏名	論文タイトル	発表誌名	巻号	ページ	出版年
井奈波良一	わが国の職場のメンタルヘルス対策の経済評価に関する文献研究	日本職業・災害 医学会会誌	60	278-281	2012
Wada K Arakida M Watanabe R Negishi M Sato J Tsutsumi A	The economic impact of loss of performance due to absenteeism and presenteeism caused by depressive symptoms and comorbid health conditions among Japanese workers	Industrial Health	51	482-489	2013
Iijima S Yokoyama K Kitamura F Fukuda T Inaba R	Cost-benefit analysis of Comprehensive Mental Health prevention programs in Japanese workplaces: A pilot study	Industrial Health	51	627-633	2013
安藤俊太郎 瀧本里香 井上直美 西田淳志 松長麻美 横山和仁	職場主導で行われる介入が労働者のメンタルヘルスおよび生産性を含むコストに与える影響：系統的文献レビュー	産業医学レビュー	26	157-76	2013

Ⅲ. 研究成果の刊行物・別刷

原 著

わが国の職場のメンタルヘルス対策の経済評価に関する文献研究

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(平成 24 年 3 月 8 日受付)

要旨：わが国の職場のメンタルヘルスの有効性を明らかにする目的で、医学中央雑誌 Web 版(第 5 版)を用いて、職場のメンタルヘルス対策の経済評価に関する文献検索を実施した。医学中央雑誌 Web 版(第 5 版)で、キーワードとして「労働」または「職場」に加えて、「メンタルヘルス」および「費用」の 2 語(合計 3 語)を用いて検索し抽出された文献は 23 件(うち会議録 5 件)と少数であり、関連雑誌を閲覧中、新たに発見した 1 件を加えても 24 件にすぎなかった。これらの文献のうち論文名、抄録から文献研究上有用と考えた文献は、費用効果分析文献が 2 件、費用便益分析文献が 5 件であったが、費用最小化分析文献および費用効用分析文献はなかった。以上の結果から、職場のメンタルヘルス対策の経済評価は、わが国では緒についたばかりであることがわかった。

(日職災医誌, 60 : 278—281, 2012)

—キーワード—

メンタルヘルス対策, 職場, 経済評価

はじめに

今日の保健医療サービスは科学的根拠に基づいた活動であることが求められている。職場のメンタルヘルス対策においてもこれは例外ではない¹⁾。しかし、職場のメンタルヘルス対策の有効性に関する評価、特に経済評価は十分行われていない現状にある^{1)~3)}。

そこで今回、わが国の職場のメンタルヘルスの有効性を明らかにする目的で、医学中央雑誌 Web 版(第 5 版)を用いて、わが国の職場のメンタルヘルス対策の経済評価に関する文献研究を実施した。

方 法

文献検索には、医学中央雑誌 Web 版(第 5 版)を用いた。検索期間は、1983 年~2011 年とした。

日本における職場のメンタルヘルス対策の経済評価に関する文献検索のキーワードとして、「労働」または「職場」に加えて、「メンタルヘルス」および「費用」の 2 語(合計 3 語)を用い、文献検索を行った。

結 果

「労働」、「メンタルヘルス」、「費用」の 3 語を用いて検索した結果、合計 23 件(うち会議録 5 件)が抽出された。

このうち、費用効果分析に関する文献が 6 件(うち会

議録 1 件)抽出されたが、論文名、抄録から文献研究上、2 件を有用と考えた。費用便益分析に関する文献は 5 件(うち会議録 1 件)抽出されたが、文献研究上、4 件を有用と考えた。この 4 件以外に、関連雑誌を閲覧中、費用便益に関する有用な文献を新たに 1 件発見し(金子能宏、篠崎武久：自殺の社会的費用と自殺予防対策の効果。労働の科学 59(1) : 21-24, 2004.)、「費用便益」に関する有用な文献は合計 5 件となった。しかし、費用最小化分析および費用効用分析に関する文献は抽出されなかった(表 1)。

なお、1) および 2) に関して、「労働」の代わりに「職場」を用いた場合の検索も行った。その結果は、すべて「労働」で検索した結果の中に含まれ、新たな文献の追加はなかった。

考 察

今回、医学中央雑誌 Web 版(第 5 版)で、「労働」または「職場」に加えて、「メンタルヘルス」および「費用」の 2 語(合計 3 語)を用いて検索し抽出された日本発の文献は 23 件(うち会議録 5 件)と少数であり、関連雑誌を閲覧中、新たに発見した 1 件を加えても 24 件にすぎなかった。

保健医療の経済評価には、効果があるものとして費用のみに注目する費用分析、その特殊型として費用最小化

表1 日本における職場のメンタルヘルス対策の経済評価に関する有用な文献

<p>1. 費用最小化分析 なし</p> <p>2. 費用効果分析</p> <p>1) 今井保次, 根本忠一: 職場メンタルヘルス制度の経済評価をめぐる問題. 労働の科学 59 (1): 13-16, 2004.</p> <p>2) 松本桂樹, 岸本麗: メンタルヘルスケアの費用対効果 EAPの視点で. 労働の科学 59 (1): 17-20, 2004.</p> <p>3. 費用効用分析 なし</p> <p>4. 費用便益分析</p> <p>1) 金子能宏, 篠崎武久: 自殺の社会的費用と自殺予防対策の効果. 労働の科学 59 (1): 21-24, 2004.</p> <p>2) 清水隆司, 永田頌史: 自殺予防のためのツールの開発 EAPによる介入的アプローチ. 産業ストレス研究 12 (4): 309-313, 2005.</p> <p>3) 吉積宏治, 垣内紀亮, 黒崎靖嘉, 秦浩一, 増田将史, 池田正人, 東敏昭: メンタルヘルス対策の費用対便益についての検討. 産衛誌 48 (臨増): 127, 2006.</p> <p>4) 田原裕之, 白川千恵, 鈴木貴代美, 真船浩介, 廣尚典, 永田頌史, 吉積宏治, 東敏昭: メンタルヘルス活動における費用便益分析の試み. 産業ストレス研究 15 (1): 96, 2007.</p> <p>5) Kono Y, Hosaka T: Economic Evaluation of an Occupational Mental Health Program: Decision Analysis of Salary Compensation and Medical Expenses (産業精神衛生プログラムの経済評価 給料報酬と医療費の決定分析). Asian Pacific Journal of Disease Management 2 (3): 77-82, 2008.</p>
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分析, 成果を病気や事故の件数, 損失日数などで評価する費用効果分析, 成果を健康であることの快適さなどをトータルに評価する質調整生存率などの指標で測定する費用効用分析, 投資の費用もその成果も金額で評価する費用便益分析があるとされている⁴⁾. 費用分析は, どの方法でも効果が一定と仮定できれば費用最小化分析が適用できる⁴⁾.

本研究では, 日本におけるメンタルヘルス対策の効果は未だ定まっていなと仮定し, 経済学的分析の特殊型の文献のみに注目した. その結果, 実際, 前述した24文献の中には, 費用最小化分析に関する文献はなかった. さらに費用効用分析に関する文献もなかった. また, 費用効果分析および費用便益分析に関する文献も, それぞれ6件(うち会議録1件), 6件(うち会議録1件)にすぎなかった.

これらの文献のうち論文名, 抄録から文献研究上有用と考えた文献は, 職場のメンタルヘルス対策の費用効果分析文献が2件, 費用便益分析文献が5件であった. その内容について以下に述べる.

職場のメンタルヘルス対策の費用効果分析に関して, 今井と根本⁴⁾は, 最近日本でもメンタルヘルス活動効果測定を試みながされるようになり, 導入後, 欠勤日数が減ったという報告を時々見かける. しかし, 雇用環境が厳しいため, 産業界全体の休暇取得率が減っており, 活動の効果とは考えにくい. また, 経済効果を軽んずることはできないが, 計画してその効果がすぐ出るといほど甘くない. 経済効果の安易な追究そのものが, 人間疎外の危険性を孕むことを戒める必要があるとしている. 松本と岸本⁵⁾は, EAPにどれだけの効果があるかという視点以上に, EAPをどれだけ活用して効果を引き出すかという企業内担当者の積極的な姿勢も, 実際の費用対効果には重要な鍵を握るとしている. しかし, これら2文献は, 実際の調査研究ではなかった.

職場のメンタルヘルス対策の費用便益分析に関して, 金子と篠崎⁶⁾は, マクロ経済学的な観点から, 自殺による社会的な生涯所得の損失=労働者個人レベルの生涯所得

の損失×労働者の自殺者数+自営業者個人レベルの生涯所得の損失×自営業者の自殺者数と見なして推定した. 自殺予防対策が効果を発揮して98年以降5年連続で3万人以上となっている自殺死亡者数がゼロとなった場合, 2001年から05年の5年間の平均でみると, 国内総生産(名目額)が1年間当たり1兆995億円増加する可能性がある. したがって, 自殺予防対策の社会的便益は軽視すべきでないとしている. 清水と永田⁷⁾は, 従業員数が数千名弱の某物流関係の企業におけるEAP活動の費用便益分析を実施した. 費用としては, EAPとの年間契約料の他に, 従業員がカウンセリングで損失した労働時間も含めた. 便益として, 単純に精神疾患による休業日数の減少分とした. なお, 金額は2003年を基準に計算し, 人件費はこの会社の2003年の平均月収を基本とした. また, 割引率は5%を採用した. その結果, 便益/費用=1.4, 便益-費用=約645万円となり, 費用を上回る便益が認められたとしている. 吉積ら⁸⁾は, 日本化学繊維協会に加盟する2企業3事業場を対象に, 各事業場の対象者数, 性, 年齢を調整し, 目的変数として休業日数をとり, メンタルヘルス活動の運営コスト, 投入活動量を独立変数とし, 1995年から2000年までの全費用を算出した. 1995年を基準とし, 追加活動として行われたメンタルヘルス対策により減少している休業日数に1日あたり給与を掛けて便益として算出した. その結果, 工場Aではメンタルヘルス対策導入に伴い, 休業の減少が観察され, 便益-費用は2,366万円と効果があった. 一方, 工場B, Cでは従業員全員を対象とした個人面談を導入したことで, 間接費が大きく計上されており便益が小さくなった. さらに工場Cでは休業日数が増え, 便益が赤字となったとしている. 田原ら⁹⁾は, 2004年度に開発したメンタルヘルス改善意識調査票(MIRROR)を用いて, 2006年度に職場環境改善に取り組んだ6事業場について, 費用便益分析を試みた. その結果, 便益についてはマイナスとなった事業場が4事業場あり, 単年度の観察でメンタルヘルスケアに係る費用が便益を上回る傾向が見られた. しかし, 延べ休業日数は4事業場で減少していた. 便益がマ

イナスとなる傾向が強かったことについては、主に教育研修等にかかる費用の増加が（例えば、全従業員に対するセルフケア教育の実施）が目立った。また、メンタルヘルスに関する教育研修を展開した後は、周知や理解が進むことに伴い、不調者が掘り起こされ、短期的に疾病休業日数を増加させる方向に働くことも考えられるとしている。KonoとHosaka¹⁰⁾は、2002年から導入した職場のメンタルヘルスプログラムの効果を検討するために、医療費と給料報酬との決定分析を行った。3年間にうつ病を発症した従業員数は、41名から133名に増加した。その結果、給料保証費は、全体で189,358千円から377,329千円に増加し、医療費も全体で22,160千円から42,589千円に増加した。このプログラムによる便益/費用 = -19.6となった。しかし、労働損失日数は、786日から305日に減少した。これは、一部うつ病者を早期に発見したことによる。しかし、このような巨大な増加は、日本のほとんど全ての会社における経済不況による抑うつ雇用者の極端な増加と明らかに相関していた。したがって、本研究では、この会社が新しいプログラムを導入しなかったことを想定した時の精神的な病気の雇用者の増加数を使って費用を評価した。このプログラムが導入されなかったら、給料保証費は、全体で189,358千円から614,258千円に増加し、医療費も全体で22,160千円から71,884千円に増加していたと推定される。したがって、間接費用等を含めたさらなる検討は必要ではあるが、このプログラムによる便益/費用 = 24.6となると推測された。本研究では、休職状態や所得保障、医療費のような直接費用だけを評価したが、今後、出勤している労働者のうつ病による労働遂行能力低下状態や間接費用を含めてさらに検討する必要があるとしている。

以上の結果から、わが国では、職場のメンタルヘルス対策の経済評価は緒についたばかりであることがわかった。

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Literature Study on the Economic Evaluation on Mental Health Measures of the Workplaces in Japan

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To evaluate the efficacy of mental health measures of the workplaces in Japan, literature study was performed on the economic evaluation of mental health measures of the workplaces using Ichyushi (医中誌) Web (Ver.5). In the search of literatures, 3 key words (mental health, cost and work or workplace) were used. Only 23 literatures including 5 minutes were found. In addition, one literature was found, while reading journals concerned. 7 literatures were considered to be useful in the literature study from the title and abstract of these literatures. There were 2 literatures on the cost-effective analysis of mental health measure of the workplaces, and 5 literatures on the cost-benefit analysis of that. There were no literatures on the cost-minimization analysis or cost-utility analysis of that. These results suggest that the economic evaluations of mental health measure of the workplaces in Japan have just started.

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The Economic Impact of Loss of Performance Due to Absenteeism and Presenteeism Caused by Depressive Symptoms and Comorbid Health Conditions among Japanese Workers

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Abstract: We aimed to determine the economic impact of absenteeism and presenteeism from five conditions potentially comorbid with depressive symptoms—back or neck disorders, depression, anxiety, or emotional disorders, chronic headaches, stomach or bowel disorders, and insomnia—among Japanese workers aged 18–59 yr. Participants from 19 workplaces anonymously completed Stanford Presenteeism Scale questionnaires. Participants identified one primary health condition and determined the resultant performance loss (0–100%) over the previous 4-wk period. We estimated the wage loss by gender, using 10-yr age bands. A total of 6,777 participants undertook the study. Of these, we extracted the data for those in the 18–59 yr age band who chose targeted primary health conditions (males, 2,535; females 2,465). The primary health condition identified was back or neck disorders. We found that wage loss due to presenteeism and absenteeism per 100 workers across all 10-yr age bands was high for back or neck disorders. Wage loss per person was relatively high among those identifying depression, anxiety, or emotional disorders. These findings offer insight into developing strategies for workplace interventions on increasing work performance.

Key words: Absenteeism, Back pain, Depression, Presenteeism, Workers

Introduction

The economic impact depressive symptoms have on work is significant in most countries, including Japan^{1, 2)}. Okumura and Higuchi estimated that the annual cost of

workplace absenteeism and presenteeism in Japan due to depression²⁾ amounted to US\$6.9 billion. In the United States, depression costs \$44 billion per year in absences from work and reduced performance while at work¹⁾. All-leviating both presenteeism, which is the condition whereby workers' performance is reduced owing to health conditions, and absenteeism, taken in this study to mean those staying away from work because of ill health, are issues of concern for occupational health practices^{3, 4)}.

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To build a strategy for allocating future funding and resources to deal with depressive symptoms, the total burden of those symptoms on presenteeism and absenteeism in the workplace has to be examined. A small sample study in Japan on presenteeism showed that depression, anxiety, or emotional disorders affected individual work performance⁵⁾ and that the prevalence of allergies and back or neck disorders was high. Since wages vary by age and gender, the burden of health conditions needs to be converted into economic indicators, such as wage losses, to clarify the situation for employers.

Depressive symptoms include comorbid conditions such as depression, anxiety, or emotional disorders, back or neck disorders⁶⁾, migraines or chronic headaches⁷⁾, stomach or bowel disorders⁸⁾, and insomnia⁹⁾. To determine the total burden of depressive symptoms, it is necessary to take these comorbid conditions into account. The aim of this study was to determine the economic impact due to absenteeism and presenteeism in terms of five conditions that are potentially comorbid with depressive symptoms—back or neck disorders, depression, anxiety, or emotional disorders, chronic headaches, stomach or bowel disorders, and insomnia—among Japanese workers in the 18–59 yr age bracket. For the purpose of this study, we calculated the economic impact on wages, not only for individuals but for the entire population, by assuming 100 workers for each 10-yr age band.

Subjects and Methods

We recruited participants from 19 workplaces and asked them to complete an anonymous questionnaire featuring the Stanford Presenteeism Scale¹⁰⁾. Six research projects (A to F) were conducted during the course of the study. Research A was carried out at five manufacturing companies among 3,014 workers from October to December 2006; the response rate was 89.0% (2,682 responses). Research B was conducted among 2,397 nurses in three hospitals from October to December 2007; the response rate was 63.2% (1,515 responses). Research C was performed among 950 workers at a manufacturing company in March 2008; the response rate was 74.2% (705 responses). Research D was a Web survey and was carried out in June 2008; of the 1,133 responses, 1,100 participants were recruited. Research E was conducted at a health seminar among 428 employees of three taxi companies; the response rate was 98.8% (423 responses). Research F was performed at training seminars among all 403 solvent-handling workers who participated from January to June 2009; the response rate was 84.3%

(340 responses). From the 6,777 participants (male, 3,819; female, 2,958) we analyzed 5,000 individuals (male, 2,535; female, 2,465) who were aged between 18–59, and for whom there were no missing values.

The Stanford Presenteeism Scale aims to determine the effect of presenteeism and absenteeism due to primary health conditions over the previous 4-wk period^{10, 11)}. Participants first selected one primary health condition from 15 possible conditions. The participants then estimated the performance loss (0–100%) as a result of the primary health condition for the previous 4-wk period and the number of resultant absent days.

Of the 5,000 participants we analyzed the data for those who chose one of the following as the primary health condition: depression, anxiety or emotional disorders; migraines or chronic headaches; back or neck disorders; stomach or bowel disorders; and insomnia (male, 1,393; female, 1,427).

We calculated the wage loss caused by absenteeism as the number of days absent multiplied by the average hourly wage by age multiplied by 8 (assumed as the number of working hours in a day). We calculated the wage loss caused by presenteeism as follows: (20 [assumed as the number of working days in 4 wk] minus the number of absent days) multiplied by 8 multiplied by 100 (%) (the proportion of the work performance with presenteeism as the primary health condition compared with the ideal condition) multiplied by the average hourly wage by age. Then, we added the wage loss caused by absenteeism and presenteeism for each person. We calculated the mean and 95% confidence intervals for each indicator. We also assumed that there were 100 workers for each 10-yr age band and calculated the total wage loss of presenteeism and absenteeism of the primary health condition by multiplying individual wage losses by the prevalence (the proportion of people who chose primary health condition). Finally, we calculated the proportion of the total wage loss due to absenteeism and presenteeism and divided it by the total wages of 100 persons for 4 wk in each 10-yr age band.

We set the wage per hour for the 10-yr age groups for males and females using the basic survey on wage structure conducted by the Ministry of Health, Labour and Welfare, Japan¹²⁾. The hourly wage was calculated by the mean monthly wage divided by 160 (20 days with 8 working hours per day). All costs were expressed in 2008 US dollar terms (US\$1.00=117 yen). The hourly wage by age for men was \$11.9 (20–29 yr), \$16.6 (30–39 yr), \$21.3 (40–49 yr), and \$21.8 (50–59 yr). The hourly wage by age

Table 1. Prevalence of primary health condition of participants

	Male		Female	
	Primary health condition chosen		Primary health condition chosen	
	n	%	n	%
Age 18–29 (yr)	(n=340)		(n=749)	
Back or neck disorders	67	19.7	207	27.6
Depression, anxiety, or emotional disorders	57	16.8	84	11.2
Migraine or chronic headaches	25	7.4	76	10.1
Stomach or bowel disorders	31	9.1	70	9.3
Insomnia	20	5.9	32	4.3
Age 30–39 (yr)	(n=763)		(n=737)	
Back or neck disorders	224	29.4	190	25.8
Depression, anxiety, or emotional disorders	102	13.4	114	15.5
Migraine or chronic headaches	44	5.8	56	7.6
Stomach or bowel disorders	51	6.7	46	6.2
Insomnia	39	5.1	29	3.9
Age 40–49 (yr)	(n=867)		(n=513)	
Back or neck disorders	212	24.5	165	32.2
Depression, anxiety, or emotional disorders	115	13.3	60	11.7
Migraine or chronic headaches	44	5.1	30	5.8
Stomach or bowel disorders	74	8.5	24	4.7
Insomnia	45	5.2	22	4.3
Age 50–59 (yr)	(n=565)		(n=466)	
Back or neck disorders	120	21.2	143	30.7
Depression, anxiety, or emotional disorders	43	7.6	23	4.9
Migraine or chronic headaches	17	3	19	4.1
Stomach or bowel disorders	44	7.8	28	6
Insomnia	19	3.4	9	1.9

for women was \$10.8 (20–29 yr old), \$12.7 (30–39 yr), \$13.2 (40–49 yr), and \$12.5 (50–59 yr). All analyses were performed using IBM SPSS Statistics 19.

The data collection was approved by ethical committees: Research A, B, and C by Osaka University, Japan; Research D and E by the International University of Health and Welfare, Japan; and Research F by Kitasato University School of Medicine, Japan.

Results

Table 1 shows the prevalence of conditions. The leading primary health condition was back or neck disorders in all age groups. The prevalence of depression, anxiety, or emotional disorders was 13.3–16.8% (males) and 11.2–15.5% (females) among those aged 18–49, the prevalence of depression, anxiety, or emotional disorders among those in their 50s was 7.6% (males) and 4.9% (females).

Table 2 (males) and Table 3 (females) show the days absent, the wage loss due to absenteeism, the loss of working hours due to presenteeism, and the wage loss due to

presenteeism over the previous 4-wk period. The leading cause of absenteeism and presenteeism due to the primary health condition varied by gender and by age. For men aged 18–39 yr, the leading cause of absenteeism was depression, anxiety, or emotional disorders, and the leading cause of presenteeism was migraines or chronic headaches. For men in their 40s, the leading cause of absenteeism was stomach or bowel disorders, while the leading cause of presenteeism was depression, anxiety, or emotional disorders. For men in their 50s, the leading cause of absenteeism was insomnia, while the leading cause of presenteeism was depression, anxiety, or emotional disorders. In all age groups, the leading cause of wage loss due to absenteeism and presenteeism was depression, anxiety, or emotional disorders. For women, the leading cause of absenteeism was stomach or bowel disorders, while the leading cause of presenteeism was depression, anxiety, or emotional disorders for those aged between 18–39 yr. For women in their 40s, the leading cause of absenteeism and presenteeism was depression, anxiety, or emotional disorders. For women in their 50s, the leading cause of absenteeism was

Table 2. Days of absenteeism and lost hours due to presenteeism, with the estimated wage loss for male workers over the previous 4-wk period (n=1,393)

	Days absent due to primary health condition (d)		Wage loss due to absenteeism over 4 wk per person through the primary health condition (US\$)		Loss of working hours due to presenteeism (h)		Wage loss due to presenteeism per person through the primary health condition (US\$)		Wage loss due to absenteeism and presenteeism through the primary health condition (US\$)	
	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)
Age 18–29 (yr)										
Back or neck disorders	1.6	(0.5–2.6)	150	(50–249)	35.6	(29.0–42.2)	426	(347–504)	575	(465–686)
Depression, anxiety, or emotional disorders	2.4	(0.9–3.9)	228	(83–373)	43.5	(35.0–52.0)	520	(419–622)	748	(610–887)
Migraine or chronic headaches	1.2	(0.1–2.3)	115	(8–222)	49.5	(38.2–60.9)	592	(456–728)	707	(582–831)
Stomach or bowel disorders	2.2	(0.3–4.2)	213	(28–397)	39.4	(28.8–50.0)	471	(345–597)	684	(498–869)
Insomnia	0.6	(0.0–1.9)	57	(0–177)	43.8	(32.4–55.2)	524	(388–660)	581	(429–733)
Age 30–39 (yr)										
Back or neck disorders	2.2	(1.5–2.9)	289	(199–380)	35.9	(32.3–39.6)	596	(535–657)	885	(794–976)
Depression, anxiety, or emotional disorders	4.8	(3.4–6.3)	641	(447–835)	50	(42.8–57.1)	828	(710–946)	1469	(1,316–1,621)
Migraine or chronic headaches	2.4	(0.7–4.1)	316	(93–540)	52	(39.9–64.1)	862	(662–1,063)	1179	(947–1,410)
Stomach or bowel disorders	2.1	(0.8–3.3)	273	(107–439)	45.1	(36.9–53.4)	748	(611–885)	1021	(842–1,200)
Insomnia	1.8	(0.4–3.2)	238	(58–418)	44	(37.0–51.0)	729	(613–846)	967	(804–1,130)
Age 40–49 (yr)										
Back or neck disorders	2.3	(1.6–3.0)	392	(268–516)	34.2	(30.6–37.9)	731	(652–809)	1123	(1,001–1,244)
Depression, anxiety, or emotional disorders	3.6	(2.4–4.7)	607	(410–804)	45.2	(39.6–50.7)	965	(846–1,083)	1572	(1,408–1,736)
Migraine or chronic headaches	2.4	(0.6–4.2)	411	(110–713)	40.2	(29.0–51.3)	858	(619–1,096)	1269	(949–1,589)
Stomach or bowel disorders	4.5	(2.9–6.1)	771	(492–1,049)	33.4	(25.8–40.9)	712	(551–873)	1483	(1,239–1,726)
Insomnia	3.3	(1.3–5.3)	565	(224–907)	35.9	(28.4–43.4)	766	(605–927)	1331	(1,047–1,616)
Age 50–59 (yr)										
Back or neck disorders	2.0	(1.2–2.8)	344	(202–487)	30.9	(26.9–34.9)	674	(587–761)	1019	(874–1163)
Depression, anxiety, or emotional disorders	5.2	(2.9–7.5)	912	(510–1,315)	40.1	(30.0–50.2)	874	(654–1,094)	1787	(1,446–2,127)
Migraine or chronic headaches	5.2	(1.3–9.1)	913	(231–1,595)	31.6	(17.8–45.4)	690	(388–991)	1603	(1,046–2,159)
Stomach or bowel disorders	4.4	(2.5–6.3)	769	(433–1,105)	26.4	(21.0–31.9)	577	(457–696)	1346	(1,056–1,635)
Insomnia	5.8	(1.6–9.9)	1010	(286–1,734)	31.5	(19.9–43.0)	687	(435–938)	1697	(1,127–2,266)

CI: confidence Interval, 1 US\$=117 yen.

migraines or chronic headaches, while the leading cause of presenteeism was insomnia. As with males, the leading cause of wage loss due to absenteeism and presenteeism for females in all age groups was depression, anxiety, or emotional disorders.

Table 4 (males) and Table 5 (females) show the wage loss assuming 100 workers per 10-yr age group over the previous 4-wk period. Assuming 100 workers in each age band and considering the prevalence and wage structure differences by age, the total wage loss due to absenteeism and presenteeism through the primary health condition was high for back or neck disorders. The exception to this was males in their 20s, whose highest mean wage loss was for depression, anxiety, or emotional disorders. The mean total wage loss due to absenteeism and presenteeism through depression, anxiety, or emotional disorders was high among men in their 40s and women in their 30s. Assuming 100 workers per 10-yr age band, the proportion of wage loss of the total wage owing to back or neck disorder was 5.9–9.8% for men and 6.5–9.8% for women;

the proportion of wage loss of the total wage as a result of depression, anxiety, or emotional disorders was 3.9–7.4% for men and 2.4–6.1% for women.

Discussion

This study aimed to determine the wage loss in work performance due to absenteeism and presenteeism using five chronic conditions that are potentially comorbid with depressive symptoms among working populations in Japan: back or neck disorders; depression, anxiety, or emotional disorders; migraines or chronic headaches; stomach or bowel disorders; and insomnia. This is the largest study to date determining the economic impact of presenteeism and absenteeism using individual data for workers in Japan. The leading cause of absenteeism and presenteeism varied by gender and by age. For males and females of all ages, the greatest economic impact due to the primary health condition was caused by depression, anxiety, or emotional disorders; among the 100 people in each age

Table 3. Days of absenteeism and lost hours due to presenteeism with the estimated wage loss for female workers over the previous 4-wk period (n=1,427)

	Days absent due to primary health condition (days)		Wage loss due to absenteeism over 4 wk per person through the primary health condition (US\$)		Loss of working hours due to presenteeism (h)		Wage loss due to presenteeism per person through the primary health condition (US\$)		Wage loss due to absenteeism and presenteeism through the primary health condition (US\$)	
	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)
Age 18–29 (yr)										
Back or neck disorders	1.8	(1.2–2.5)	159	(104–215)	35	(31.6–38.3)	379	(343–415)	538	(483–594)
Depression, anxiety, or emotional disorders	2.4	(1.3–3.6)	211	(112–309)	52.5	(45.9–59.1)	569	(498–640)	780	(695–864)
Migraine or chronic headaches	2	(0.9–3.0)	172	(80–264)	40.4	(35.1–45.7)	438	(380–496)	610	(528–693)
Stomach or bowel disorders	3.4	(1.7–5.0)	292	(149–434)	32.2	(26.7–37.6)	349	(290–408)	641	(518–763)
Insomnia	0.8	(0.0–2.0)	73	(0–178)	43.6	(36.1–51.0)	472	(391–553)	545	(433–657)
Age 30–39 (yr)										
Back or neck disorders	1	(0.6–1.4)	101	(57–145)	32.2	(29.7–34.8)	409	(376–441)	510	(459–560)
Depression, anxiety, or emotional disorders	2.2	(1.1–3.2)	221	(116–325)	45.4	(21.2–59.5)	576	(514–638)	797	(706–888)
Migraine or chronic headaches	1.2	(0.3–2.2)	123	(27–219)	37.3	(40.6–50.3)	473	(392–554)	596	(491–701)
Stomach or bowel disorders	3.3	(1.3–5.2)	331	(131–531)	29.9	(30.9–43.6)	379	(312–446)	710	(547–873)
Insomnia	2.5	(0.3–4.7)	255	(33–478)	36.3	(24.6–35.1)	461	(345–576)	716	(514–919)
Age 40–49 (yr)										
Back or neck disorders	2	(1.2–2.8)	210	(125–295)	33.1	(29.3–36.9)	438	(388–488)	648	(569–726)
Depression, anxiety, or emotional disorders	2.6	(1.3–4.0)	279	(139–418)	51.3	(42.2–60.5)	679	(559–800)	958	(824–1,092)
Migraine or chronic headaches	0.9	(0.0–1.8)	95	(0–193)	43.7	(32.4–55.0)	578	(428–728)	674	(494–853)
Stomach or bowel disorders	1.2	(0.0–3.0)	123	(0–317)	42.5	(29.1–56.0)	563	(385–741)	686	(457–915)
Insomnia	0.9	(0.0–2.0)	96	(0–208)	49.1	(40.3–58.0)	650	(533–767)	746	(589–903)
Age 50–59 (yr)										
Back or neck disorders	3.1	(2.1–4.1)	308	(207–408)	23.6	(20.4–26.7)	296	(256–335)	603	(509–697)
Depression, anxiety, or emotional disorders	3.7	(0.9–6.4)	366	(95–638)	47.5	(34.7–60.4)	596	(435–757)	962	(738–1,186)
Migraine or chronic headaches	6.2	(2.6–9.8)	623	(258–988)	25.6	(16.8–34.5)	322	(210–433)	944	(659–1,230)
Stomach or bowel disorders	2.7	(0.4–5.0)	269	(38–499)	29.8	(16.8–42.8)	374	(211–537)	643	(393–892)
Insomnia	0.9	(0.0–2.9)	89	(0–295)	49.8	(21.5–78.1)	624	(269–979)	713	(353–1,074)

CI, confidence interval; 1 US\$=117 yen.

band, the highest loss of wage through presenteeism and absenteeism was caused by back or neck disorders—with the exception of males aged 18–29.

Depression, anxiety, or emotional disorders are the major cause of absenteeism and presenteeism^{5, 13, 14}. In the present study, the total economic loss due to depression, anxiety, or emotional disorders was lower than for back or neck disorders; however, we were unable to include workers with long-term absence due to depression. Based on a survey by the Japan Productivity Center in 2008, 0.4% of workers took more than one month working absence in Japan¹⁵. Hence, our assessment of absenteeism and its wage loss due to depression, anxiety, or emotional disorders could be an underestimation. Symptoms of depression, anxiety, or emotional disorders include feelings of sadness, a lack of interest, difficulty in making decisions, and—at worst—thoughts of death and suicide¹⁶. Those symptoms could severely affect an individual's core work performance as well as making them unable to respond to our questionnaire.

The most chosen primary health condition was back or neck disorder, which resulted in the greatest wage loss through presenteeism and absenteeism among 100 workers in the 10-yr age bands. The prevalence of back or neck disorders in this study was similar to a survey finding on the state of employees' health by the Ministry of Health, Labour and Welfare, Japan¹⁷. According to that survey (carried out in 2007 and used multiple-choice questions), the proportion of people with back pain was 25.6% for males and 21.4% for females. In our study, the prevalence of back or neck disorders was 19.7–29.4% for men and 25.8–32.2% for women. However, the prevalence could vary depending on the type of work: some types of occupation are more likely to cause work-related back or neck disorders^{18, 19}.

Migraines or chronic headaches (primarily tension-type headaches), cause intensive work loss by presenteeism among men aged 18–39 yr and by absenteeism among men in their 50s. Globally, tension-type headaches have a four times greater prevalence than migraine²⁰. In the

Table 4. Wage loss due to presenteeism and absenteeism and its proportion of the total wage assuming 100 workers per 10-yr age group for male workers over the previous 4-wk period

	Total wage loss due to absenteeism and presenteeism per 100 workers (US\$)		Proportion of total wage loss due to absenteeism and presenteeism in the total wage of 100 workers (%)	
	Mean	(95% CI)	Mean	(95% CI)
Age 18–29 (yr)				
Back or neck disorders	11,340	(9,170–13,510)	5.9	(4.8–7.1)
Depression, anxiety, or emotional disorders	12,543	(10,220–14,866)	6.6	(5.3–7.8)
Migraine or chronic headaches	5,196	(4,282–6,109)	2.7	(2.2–3.2)
Stomach or bowel disorders	6,234	(4,542–7,927)	3.3	(2.4–4.1)
Insomnia	3,419	(2,524–4,313)	1.8	(1.3–2.3)
Age 30–39 (yr)				
Back or neck disorders	25,986	(23,312–28,660)	9.8	(8.8–10.8)
Depression, anxiety, or emotional disorders	19,634	(17,592–21,676)	7.4	(6.6–8.2)
Migraine or chronic headaches	6,797	(5,463–8,131)	2.6	(2.1–3.1)
Stomach or bowel disorders	6,823	(5,628–8,018)	2.6	(2.1–3.0)
Insomnia	4,944	(4,109–5,778)	1.9	(1.5–2.2)
Age 40–49 (yr)				
Back or neck disorders	27,456	(24,486–30,427)	8.0	(7.2–8.9)
Depression, anxiety, or emotional disorders	20,849	(18,676–23,022)	6.1	(5.5–6.7)
Migraine or chronic headaches	6,439	(4,817–8,062)	1.9	(1.4–2.4)
Stomach or bowel disorders	12,654	(10,578–14,731)	3.7	(3.1–4.3)
Insomnia	6,910	(5,434–8,387)	2.0	(1.6–2.5)
Age 50–59 (yr)				
Back or neck disorders	21,637	(18,564–24,709)	6.2	(5.3–7.1)
Depression, anxiety, or emotional disorders	13,599	(11,007–16,191)	3.9	(3.2–4.6)
Migraine or chronic headaches	4,822	(3,148–6,497)	1.4	(0.9–1.9)
Stomach or bowel disorders	10,480	(8,226–12,733)	3.0	(2.4–3.7)
Insomnia	5,705	(3,789–7,621)	1.6	(1.1–2.2)

CI, confidence interval; 1 US\$=117 yen.

United States, the prevalence of migraine was highest for both men and women aged between 35–45 yr²¹). Our study found the prevalence of migraine has been found to be higher in women than in men^{21, 22}). In the present study, we were unable to determine the proportion of wage loss due to migraines and tension-type headaches; however, based on the epidemiological characteristics of headaches, occupational health practitioners should intervene and provide better access to treatment for those suffering from these conditions²³).

Stomach or bowel disorders, which include a variety of conditions, such as gastritis, gastroesophageal reflux, and irritable bowel syndrome, can also lead to work impairment. Dean *et al.*²⁴) reported that the symptom severity of gastroesophageal reflux and nocturnal heartburn disturbed work performance. In addition, such working conditions as shift and night work can promote the development of stomach disorders, e.g., chronic gastritis, gastroduodenitis, and peptic ulcers^{25, 26}). With regard to bowel disorders,

impairment due to irritable bowel syndrome, whose prevalence is high in Japan as a result of perceived stress, was estimated to amount to 9.7–14 h of lost productivity per week among sufferers^{27, 28}). Stomach or bowel disorders are the leading cause of absenteeism among men in their 40s and women aged 18–39, and those populations need to receive information about controlling their symptoms and treatment.

Insomnia is often caused by depressive symptoms, visual display terminal workload, over-involvement in work, and frequent alcohol consumption^{29, 30}). In Japan, the prevalence of insomnia, including mid-sleep awakenings and early morning awakening insomnia, is high among people aged 50–64 yr³⁰). As the present study shows, for men in their 50s insomnia can lead to absenteeism among those severely affected.

This study has its limitations. First, workers tend to develop multiple chronic health conditions; however, we only examined the primary health condition. Thus could

Table 5. Wage loss due to presenteeism and absenteeism and its proportion of the total wage assuming 100 workers per 10-yr age group over the previous 4-wk period for female workers

	Total wage loss due to absenteeism and presenteeism per 100 workers (US\$)		Proportion of total wage loss due to absenteeism and presenteeism in the total wage of 100 workers (%)	
	Mean	(95% CI)	Mean	(95% CI)
Age 18–29 (yr)				
Back or neck disorders	14,880	(13,342–16,419)	8.6	(7.7–9.5)
Depression, anxiety, or emotional disorders	8,744	(7,796–9,691)	5.0	(4.5–5.6)
Migraine or chronic headaches	6,192	(5,356–7,029)	3.6	(3.1–4.1)
Stomach or bowel disorders	5,987	(4,844–7,130)	3.5	(2.8–4.1)
Insomnia	2,329	(1,850–2,808)	1.3	(1.1–1.6)
Age 30–39 (yr)				
Back or neck disorders	13,137	(11,842–14,433)	6.5	(5.8–7.1)
Depression, anxiety, or emotional disorders	12,331	(10,925–13,736)	6.1	(5.4–6.8)
Migraine or chronic headaches	4,530	(3,731–5,329)	2.2	(1.8–2.6)
Stomach or bowel disorders	4,430	(3,413–5,446)	2.2	(1.7–2.7)
Insomnia	2,818	(2,021–3,615)	1.4	(1.0–1.8)
Age 40–49 (yr)				
Back or neck disorders	20,841	(18,317–23,365)	9.8	(8.7–11.0)
Depression, anxiety, or emotional disorders	11,206	(9,643–12,769)	5.3	(4.6–6.0)
Migraine or chronic headaches	3,939	(2,887–4,991)	1.9	(1.4–2.4)
Stomach or bowel disorders	3,210	(2,139–4,281)	1.5	(1.0–2.0)
Insomnia	3,200	(2,526–3,874)	1.5	(1.2–1.8)
Age 50–59 (yr)				
Back or neck disorders	18,512	(15,630–21,394)	9.2	(7.8–10.7)
Depression, anxiety, or emotional disorders	4,748	(3,643–5,854)	2.4	(1.8–2.9)
Migraine or chronic headaches	3,851	(2,686–5,016)	1.9	(1.3–2.5)
Stomach or bowel disorders	3,862	(2,363–5,361)	1.9	(1.2–2.7)
Insomnia	1,378	(681–2,074)	0.7	(0.3–1.0)

CI, confidence interval; 1 US\$=117 yen.

lead to an underestimation of the burden of each chronic health condition. In addition, the health conditions identified by individual workers are not necessarily based on clinical diagnosis. Second, the prevalence of health conditions could vary according to occupation and other work-related factors. Finally, although the response rate was relatively high, the generalizability of our study is limited. Further studies should address the effect of working conditions on absenteeism and presenteeism.

In conclusion, the wage loss due to presenteeism and absenteeism per 100 workers in the 10-yr age bands was high for back or neck disorders, as these were identified by a large number of participants. However, the wage loss per person was relatively high among those choosing depression, anxiety, or emotional disorders. We delineated the burden of presenteeism and absenteeism of depressive symptoms. These values offer insight into forming strategies for workplace interventions toward increasing work performance.

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Cost-benefit Analysis of Comprehensive Mental Health Prevention Programs in Japanese Workplaces: A Pilot Study

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Abstract: We examined the implementation of mental health prevention programs in Japanese workplaces and the costs and benefits. A cross-sectional survey targeting mental health program staff at 11 major companies was conducted. Questionnaires explored program implementation based on the guidelines of the Japanese Ministry of Health, Labor and Welfare. Labor, materials, outsourcing costs, overheads, employee mental discomfort, and absentee numbers, and work attendance were examined. Cost-benefit analyses were conducted from company perspectives assessing net benefits per employee and returns on investment. The surveyed companies employ an average of 1,169 workers. The implementation rate of the mental health prevention programs was 66% for primary, 51% for secondary, and 60% for tertiary programs. The program's average cost was 12,608 yen per employee and the total benefit was 19,530 yen per employee. The net benefit per employee was 6,921 yen and the return on investment was in the range of 0.27–16.85. Seven of the 11 companies gained a net benefit from the mental health programs.

Key words: Mental health, Workplaces, Costs, Cost-benefit analysis, Prevention programs

In 2008, Yokoyama *et al.* estimate that the social cost of mental disorders in Japan, in 2008, was about 11 trillion yen. Presenteeism and increasing absenteeism and suicide caused declines in labor productivity accounting for about 60% of mental disorder social costs¹⁾. In 2006 the Japanese Ministry of Health, Labour and Welfare developed Guidelines for the Maintenance and Promotion of Workers' Mental Health (hereafter referred to as Guidelines) for companies nationwide²⁾. The Guidelines promote a

three-tiered comprehensive mental health program. This program includes checkups and workplace improvements at a primary prevention level, mental health checkups and counseling for secondary prevention, and disease management and rehabilitation support at a tertiary prevention level. In 2010, just over half, (50.4%) of 5,250 Japanese companies workplaces tried to develop mental health programs. Primary prevention programs were frequently implemented³⁾.

Seven cost-benefit analysis reports calculated (in monetary terms) increasing productivity and decreasing absenteeism resulting from mental health programs. However, none of these studies are intracorporate. Many

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Japanese companies have introduced Employee Assistance Programs (EAP), targeting primary prevention⁴⁾. Improvements to work environments have also been introduced. Cost-benefit analysis shows that similar programs have different costs and benefits⁵⁾. However, only the partial efforts of employees in a few companies were studied. Tange *et al.* reported no relationship between the number of comprehensive mental health care activities and stress-related diseases or rates of extended leave⁷⁾. Tsuchiya *et al.* indicated that no Japanese program has decreased absenteeism⁸⁾. Kono reported that an increase in part-time psychotherapists and full-time industrial doctors within companies increased mental health patient numbers and treatment costs⁹⁾.

Therefore, no program has effectively decreased employee numbers on administrative leave or the period of absence. It is unclear which Guideline program is most effective. Using previous research, this study sought to clarify which Guideline programs should be emphasized so as to most effectively decrease the number of employees on administrative leave or the period of absence. An assessment of the programs was conducted analyzing their costs and benefits.

A cross-sectional survey targeting staff in charge of mental health services within 11 companies was conducted from December 2011 to December 2012. The survey questionnaire included a range of discussions and items. Subjects were asked about their business categories and employee numbers. Using the Guidelines, we established 36 items concerning the implementation status of mental health prevention programs. Five items examined primary prevention: health committee discussions, new employee and manager health education, leaflet distribution, and workplace reviews. Seven items concerned secondary prevention, including mental health checkups, interviewing overworked employees, and introducing hospital services to employees. Tertiary prevention questions to assess the worsening of symptoms of employees at work contained six items, including periodic interviews with industrial doctors and health nurses, information exchanges with industrial and family doctors, and job transfer assistance by personnel management officers. On-leave employee programs had six items, including periodic interviews with industrial doctors and health nurses, evaluations on the employees' fitness to return to work, management interviews, and rehabilitation preparation. Return to work programs included industrial doctors checking patient conditions, assessments on the person's ability to continue working, and restrictions on their work. The implemen-

tation of 15 outsourcing activities were surveyed. To investigate the labor costs of persons in charge of mental health checks, we asked about their job categories, staff numbers and the hours required for mental health checks, and annual salaries. Absentee numbers and total days' absence were used as indicators of effective mental health programs.

The labor cost of the person in charge of mental health was calculated by multiplying their annual salary by the hours spent providing mental health evaluations. Mental health absence rates were calculated by multiplying absentees by the number of mental health evaluations. Cost-benefit analyses were conducted from the company's viewpoint. According to the labor market theory of Pauly *et al.*, a loss of working days means a daily loss of wages, including welfare expenses¹⁰⁾. Therefore, a loss caused by an absence is counted as lost work time and days. The benefit of absenteeism is that companies are not required to compensate employees on the day of their absence. Using Leon's example, we divided the average monthly salary by monthly work days, and multiplied it by the ratio of compensation for workplace absence, working days, and number of absences¹¹⁾. We established the monthly average salary of a male office worker in a major company as 386.1 thousand yen¹²⁾. In accordance with Health Insurance Law, compensation rates for absence were set at two-thirds the average salary. The number of working days was calculated using the working condition survey from the Ministry of Health, Labour and Welfare. Working days were set at 243.0 days. This was established by taking 365 days and subtracting 113.0 (annual holiday days), and 8.6 (annual leave days in Japan during 2011)¹³⁾. The working day absences were calculated by subtracting administrative leave days per absentee in each company from 243.4 days. The absentee rate was calculated for each company. The benefit of work attendance for mental discomfort was calculated by multiplying the number of employees participating in secondary and tertiary prevention programs, by income per day and by 243.0 days less medical examination days, and then multiplied by the production capacity factor. The friction cost method was used to calculate income per day by dividing 386.1 thousand yen, (the average monthly salary for a major company employee), by 20.6 (the average monthly working days)¹⁴⁾. There were 26.8 medical examination days. This was established by dividing 365 by 13.6, which according to a 2008 patient survey is the average number of medical examination days of asylum patients suffering psychiatric conditions, including depression. Basing our work on the studies of

Table 1. Implementation status of mental health prevention programs at surveyed companies

	Mean	SD	Mini.value	Max.value
Total number of employees	5,543.1	10,481.6	380.0	36,000.0
Total number of targeted employees	1,169.5	1,364.7	130.0	4,500.0
Implementation rate of primary prevention programs (%)	65.5	15.7	40.0	80.0
Implementation rate of secondary prevention programs (%)	48.1	26.6	14.0	100.0
Implementation rate of tertiary prevention programs (%)	58.3	22.4	13.0	83.0
Implementation rate of prevention programs before absenteeism (%)	63.7	27.7	17.0	100.0
Implementation rate of prevention programs during absenteeism (%)	61.4	28.2	0.0	100.0
Implementation rate of prevention programs before return to work (%)	48.9	26.5	0.0	75.0
Implementation rate of prevention programs after return to work (%)	63.6	23.4	33.0	100.0
Annual duty hours of industrial doctors	238.9	304.0	0.0	945.0
Annual duty hours of occupational health nurses and nurses	571.8	903.8	0.0	2,880.0
Annual duty hours of other occupation staff members	200.7	344.8	0.0	950.0
Annual activity hours of health committee × number of members	33.0	44.2	0.0	130.0
Annual activity hours of council × number of members	46.2	109.9	0.0	360.0
Annual interview hours of managers	5.7	12.0	0.0	36.0
Annual interview hours of laborers and personnel management officers	3.6	5.4	0.0	13.5
Total duty hours of persons in charge	1,046.2	1,322.8	51.6	4,706.4
Labor cost (yen)	7,418,765.5	6,998,949.0	25,270.0	18,958,167.0
Outsourcing cost (yen)	967,854.5	1,553,063.3	0.0	4,000,000.0
Material cost and overhead (yen)	1,258,365.5	2,611,948.0	0.0	7,500,000.0
Total cost (yen)	9,644,985.5	6,751,744.9	193,000.0	20,279,566.0
Cost per targeted employee (yen)	12,608.2	9,101.4	508.0	28,611.0
Number of absentees	7.4	7.8	1.0	25.0
Total days of absence	880.6	743.7	60.0	2,454.0
Average days of absence per employee	135.9	56.0	60.0	247.0
Number of attendees with mental discomfort	13.2	11.3	1.0	42.0
Rate of employees with mental discomfort (%)	0.020	0.019	0.003	0.069
Rate of absenteeism (%)	0.007	0.003	0.003	0.012

N=11.

Uegaki¹⁵⁾ and others, we counted productivity of healthy employees as one. The productivity of employees with mental illness was 0.8, and their associated productivity was 0.2. We calculated net benefit, subtracting the benefit of one person from the cost of the mental health program. Also, we calculated the ratio of benefit to investment (the return on investment: ROI). Return on investment = (gain from investment – cost of investment)/ cost of investment. Companies were divided into two groups: companies with an ROI of more than one and those with an ROI of less than one. We then examined the difference between the mental health programs in the two groups. IBM SPSS STATISTICS Ver. 20 was used for analysis.

The average total number of employees in each company was 5,543. The average total number of workers in each company targeted by mental health prevention programs was 1,169. There were 11 target companies including six wholesale dealers, three transportation companies,

and two production companies.

The average implementation rate of primary prevention programs were 65.5% (3.3 item of the 5 primary prevention measures), secondary programs undertaken for 48.1% (3.4 item of the 7 measures), and tertiary programs undertaken for 58.3% (14.1 item of the 24 measures) (Table 1). The average annual hours for mental health programs were: 238.9 h for part-time industrial doctors; 571.8 h for occupational health and general nurses; and 200.7 h for psychotherapists and associated professionals.

The annual average number of employees on administrative leave with mental discomfort was 7.4 for the 11 companies. The annual average leave period of an employee with mental discomfort was 135.9 days. The average number of employees with mental illness but still attending work was 13.2. The average ratio of attendance for employees with mental discomfort was 0.020. The average ratio of employees on administrative leave was 0.007.