

Influenza vaccination and absenteeism among healthy working adults: a cost-benefit analysis

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Key words: Influenza vaccination, absenteeism, healthy working adults, cost-benefit analysis

Parole chiave: Vaccinazione antinfluenzale, assenteismo, lavoratori, analisi costo-beneficio

Abstract

Background. Seasonal influenza is a highly contagious infection that might lead to serious clinical complications and incurs a conspicuous socio-economic impact. Influenza vaccination is currently recommended only for specific groups of healthy adults (such as healthcare workers) even though it was demonstrated to be effective in reducing absenteeism and decreased workers' productivity during flu epidemic period. The main purpose of this study is to analyse the extent of absences due to illness following a voluntary flu immunization program among the Komatsu Italia Manufacturing company's personnel during the flu season 2017-2018. Secondly, we aimed at performing a cost-benefit analysis of the vaccination campaign from the company's perspective.

Study design. This is an observational cohort study conducted during the period between the 14th week of 2017 and the 13th week of 2018 (from 03/04/2017 to 01/04/2018). The study population was the personnel of Komatsu Italia Manufacturing S.p.A. on duty during the study period.

Methods. For each subject the following data were collected: sex, date of birth, professional profile, seasonal influenza immunization status and sick-leave days. Sick-leave days were compared among the influenza epidemic period and the previous one between vaccinated and unvaccinated and any difference in days of absence was considered to be caused by seasonal influenza.

Results. Out of 408 employees, 60 (14.7%) accepted the voluntary influenza vaccination. In multivariate analysis (logistic model) an age ≥ 50 years was the only predictor for vaccination acceptance (OR_M 3.11 $p < 0.001$). During the flu period, the monthly mean of sick-leave days per employee was significantly lower among the vaccinated than the unvaccinated, respectively of 0.328 days/person vs 0.752 days/person ($p = 0.022$). Unvaccinated employees reported a higher average of sick-leave days during the flu period compared to the previous non-influenza period (0.752 days/month/person vs 0.337 days/month/person $p < 0.001$). The monthly mean cost for sickness absences per employee was significantly higher for an unvaccinated subject compared to one vaccinated, respectively € 129.00 and € 54.00 ($p = 0.028$). The overall net saving estimated was € 314.00 per person vaccinated.

Conclusions. Influenza vaccination proved to be an extraordinary preventive tool and a cost-effective intervention. However, influenza immunization seems to be unappealing among healthy adults and higher flu vaccination coverages could be achieved through educational interventions possibly addressing young

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employees who showed little interest in vaccination. Finally, among health promotion interventions, companies should point out the importance of flu vaccination both for the individual wellbeing and the company environment.

Introduction

Seasonal influenza is a highly contagious infection caused by different viruses. Although in most cases it manifests with mild respiratory and systemic symptoms and it resolves in few days, occasionally it might lead to serious clinical complications, such as secondary bacterial pneumonia or exacerbations of underlying conditions, especially among elderly and vulnerable people. However, it represents a considerable public health issue since globally it causes approximately from 290.000 to 650.000 deaths each year (1). In Europe seasonal influenza accounts for 4-50 million cases per year (2) and it affects up to 9% of Italian population each year (3). In Italy it is monitored through a specific surveillance system (Influnet) (4) and entails a conspicuous cost estimated in an average of 1.3 million euro annually (5, 6). The economic impact gets even more relevant when considering indirect costs incurred by employers, families, National Health Service (Servizio Sanitario Nazionale, SSN), Italian National Social Insurance (Istituto Nazionale Previdenza Sociale - INPS) with an overall cost of approximately 2.86 billion euro (7). In the workplace, seasonal influenza demonstrated to cause lack of productivity and absenteeism (8, 9), with an average of 3.7-5.9 sick leave days per influenza episode (10). Modelling of transmission estimated that a non-negligible percentage of influenza's transmission occurs within the area of employment and specific workplace strategies aimed at preventing and controlling communicable diseases transmission have been proven to reduce presenteeism, absenteeism and related costs (11). Influenza vaccination is

certainly among the most effective strategies to avert influenza, particularly its severe complications among high risk groups, thus reducing hospitalizations and deaths (12-14). The composition of the flu vaccine is updated every year according to the indications provided by the World Health Organization (WHO) (15, 16).

In Italy, influenza immunization is highly recommended for individuals affected by chronic illnesses, elderly- people aged over 65, pregnant women, residents in health and social care facilities and personnel who have regular contacts with the aforementioned individuals (17, 18).

Currently, influenza vaccination for healthy working adults is not suggested although it has been proven to reduce the incidence of flu syndrome and absences due to illness (19-22) and to be cost effective even for workers in non-health environments (23). Conversely, a recent Cochrane review suggested that influenza immunization among healthy adults would be just mildly effective in preventing cases of confirmed flu and flu-like syndrome (24).

The economic convenience is mostly related to the indirect costs of lost productivity (25) with a stable relationship between the benefits of flu vaccination and the indirect costs of absenteeism at work (26). At European level it was estimated that a 75% coverage with influenza vaccine would have avoided 72.6 million euro in direct costs and 112 million euro in indirect costs (27). However, as economic assessments still have some limitations and the benefit of extending flu immunization to healthy adult workers remains unclear, any evaluation is left at the discretion of each individual and employer, as they are the major beneficiaries of workplace vaccination campaign (24).

The main purpose of this study is to analyse the extent of absences due to illness following a voluntary flu immunization program among the Komatsu Italia Manufacturing company's personnel during the flu season 2017-2018. Secondly, we aimed at performing a cost-benefit analysis considering the absenteeism's economic impact and the vaccination campaign's cost from the company's perspective.

Methods

Study design and subjects

This is an observational cohort study about a voluntary vaccination program and it was conducted during the period between the 14th week of 2017 and the 13th week of 2018 (from 03/04/2017 to 01/04/2018).

The study population was the personnel of Komatsu Italia Manufacturing S.p.A. on duty during the study period. Komatsu Italia Manufacturing S.p.A. is an agricultural machinery company located in Este (Padua, Italy) with 408 employees including workers and other staff employed. In January 2015, thanks to the cooperation between the company's board and the Prevention Department of South Padua District - Euganea Local Health Unit (ULSS) 6 - a three-year project on health promotion at the workplace was started. In addition to several interventions addressed to the adoption of healthy lifestyles (such as proper nutrition, smoking cessation, regular physical activity, lower alcohol consumption and stress management), a voluntary influenza immunization program was implemented. In October 2017, all employees were informed about the influenza vaccination program and correctly instructed about the disease, purpose of vaccination, indications, contraindications to vaccinations and potential adverse effects. Influenza trivalent vaccine (Inflanrix Hexa®) was offered free of charge and it

was administered by a medical doctor at the medical practice of the company in two times during November 2017. Eligibility for vaccination was screened based on predefined criteria (no history of immediate hypersensitive reaction, absence of any acute illnesses or symptoms).

According to current Italian legislation an informed consent was not required (28).

Data collection and management

For each subject the following data were collected: sex, date of birth, professional profile, seasonal influenza immunization status and sick-leave days. The data were obtained by the company's Human Resources Office. All data were anonymized, giving each subject a progressive numerical code (29). All the results of the analysis were reported as aggregated data so that they could not be attributed, either directly or indirectly, to the individual subject.

Sick-leave days referred to absences for all-illnesses causes since the diagnosis codes were not accessible to the company, as imposed by Italian privacy law.

Considering the influenza incidence rates, reported by the regional surveillance (30), within the study period were identified the followings: a non-epidemic period from week 14th to 46th 2017 (i.e. from 03/04/2017 to 19/11/2017), and a flu epidemic period from week 47th 2017 to week 13th 2018 (from 20/11/2017 to 01/04/2018). The non-epidemic period lasted 33 weeks and it was used as baseline, whereas the subsequent flu period lasted 19 weeks. Sick-leave days were compared among the two periods (for the non-influenza baseline period only working days were considered) and any differences in days of absence considered to be caused by flu epidemic.

Cost-benefit analysis

For the cost-benefit analysis, the saving was computed as the difference between the immunization program cost and the money

saved thanks to the absences prevented by vaccination (31).

The company covered the entire cost of the immunization program. The cost of vaccination was € 13 per dose (€ 2.30 with VAT at 10% for the vaccine purchase and € 10.00 for the service).

The data regarding sick-leave costs were provided by the company. Regardless of the professional profile, each working day accounts for eight working hours. Each sick-leave hour incurs a direct cost for the company equal to € 24.76 for individuals employed in administration duties or involved in the production line and a cost equal to € 35.58 for all other professional profiles (such as manager profile). According to Italian legislation, after the fourth day of absence (considering both working days and weekend days), the sick-leave cost for “worker” profile is half covered by the National Institute of Social Security (INPS) (32). Differently, for all other employee profiles, the sick-leave costs are entirely charged to the company. The hourly costs derive from the sum of the direct costs due to: basic remuneration, extraordinary remuneration, related social contributions, holiday pay and severance indemnity. The indirect costs at the expense of the company caused by either absenteeism or presenteeism were not calculated.

Statistical analysis

Demographics and professional profile characteristics of employees among those vaccinated and unvaccinated were compared using descriptive statistics. Chi-squared test, or Fisher test when appropriate, were used for analysing categorical variables and student's t-tests for continuous variables. A logistic regression model was fit to evaluate the association between covariates and vaccination acceptance.

Incidents rates (IR) of sick-leave days per person per week during the flu period were calculated and comparisons were

made between vaccinated and unvaccinated employees.

The degree of association between the Incident Rate Ratio (IRR) of sick leave days during the epidemic period and the vaccination condition was assessed by a multivariate negative binomial model considering the following covariates: vaccination status, sex, age and professional profile.

Sick leave days and related costs incurred by the company were compared between vaccinated and unvaccinated using the Two-sample Wilcoxon rank-sum test and between flu and non-flu period using the Wilcoxon signed-rank test. In all the analyses carried out a p-value value <0.05 was considered significant. The data were analysed with the Stata software version 14 (Stata Corporation, College Station, TX, USA).

Results

Out of 408 employees, 60 (14.7%) accepted the voluntary influenza vaccination. The socio-demographic characteristics of the subjects according to vaccination status are summarized in Table 1. Among the vaccinated participants, 25 had duties related to “administration” or “production line” whereas 35 had a “manager” professional profile. The vaccinated subjects were older than the unvaccinated ones (aged 50-69 years vs < 50 years; $p < 0.001$) and mostly employed in management duties ($p = 0.026$).

In multivariate analysis (logistic model) an age ≥ 50 years was the only predictor for vaccination acceptance ($OR_M 3,11$ $p < 0.001$) (Table 2).

During the influenza period the monthly mean of sick leave days per employee was significantly lower among the vaccinated than the unvaccinated, respectively 0.328 days/person vs 0.752 days/person ($p = 0.022$). Unvaccinated employees reported

Table 1 - Demographics of the study population employed in the Komatsu Manufacturing S.p.A. according to vaccination status, gender, age and duty area.

	Vaccinated (N=60)		Unvaccinated (N=348)		All workers (N=408)		p value
	n	%	n	%	n	%	
Gender							
female	5	6	17	94.4	18	100.0	0.492
male	59	15.1	331	84.9	390	100.0	
Age (yr)							
18-49	19	8.3	210	91.7	229	100.0	0.000
50-69	41	22.9	138	77.1	179	100.0	
Duty area							
manager	9	28.1	23	71.9	32	100.0	0.026
worker/ employee	51	13.6	325	86.4	376	100.0	
Sick-leave days, no-flu period (mean ± sd)	0.48	±1.315	0.34	±1.231	0.36	±1.246	0.238
Sick-leave days, flu period (mean ± sd)	0.33	±0.780	0.75	±1.774	0.69	±1.671	0.022

Table 2 - Predictors of influenza vaccination acceptance by gender, age and duty area. (multivariate analysis, logistic regression)

Covariates	Multivariate analysis		
	OR _A	95% CI	p value
Sesso			
Female	1.00		
Male	1.80	0.23 – 4.28	0.575
Age (yrs)			
18-49	1.00		
50-64	3.11	1.72 – 5.62	0.000
Duty			
Manager	1.00		
Worker/Employee	0.45	0.19 – 1.06	0.069

a higher average of illness absence during the flu period compared to the previous non-influenza period (0.752 days/month/person vs 0.337 days/month/person $p < 0.001$). The variation in the monthly mean of days of illness absence between the non-influenza period and the flu period is significantly different between vaccinated and non-vaccinated (respectively +0.416 days/person and -0.152 days/person; $p = 0.0239$).

The incidence rate (IR) of sick-leave days per week, among vaccinated and unvaccinated, during both the epidemic and non-epidemic period, as well as the Incident rate ratios (IRR) for the vaccinated are reported in Table 3.

Table 3 - Incidence rate (IR) per 1.000 person/week among vaccinated and unvaccinated subjects, during the influenza and non influenza period.

	Vaccinated (n = 60)	Unvaccinated (n = 348)	All workers (n = 408)	
	IR	IR	IRR _R (CI95%)	IRR _A (CI95%)
Non-flu period	111.1	77.8	1.427 (1.226-1.656)	1.518 (0.619-3.721)
Flu period	75.5	173.0	0.436 (0.346-0.543)	0.441 (0.219-0.890)

Incidence Rate Ratio Raw (IRR_R), Incidence Rate Ratio Adjusted* (IRR_A).

*considering the followings: age, vaccination status, gender, professional profile.

Table 4 - Incidence rate ratio of sick-leave days by gender, age and duty area (multivariate analysis, negative binomial model).

Covariates	Multivariate analysis		
	IRR _M	95% CI	p value
Vaccination			
no	1.00		
yes	0.44	0.22 – 0.89	0.022
Gender			
female	1.00		
male	0.47	0.14 – 1.63	0.237
Age (yrs)			
18-49	1.00		
50-64	1.01	0.62 – 1.66	0.967
Duty			
Manager	1.00		
Worker/employee	2.42	1.43 – 4.08	0.001

During the epidemic flu period the vaccinated reported a lower IR of sick-leave days compared to the unvaccinated with an incidence difference of -97.6 per 1000 person-week.

In multivariate analysis (negative binomial model) the IRR_A of sick-leave days during influenza period for the vaccinated was confirmed as significant with a value of 0.441 ($p=0,022$) and duties related to administration or production line (compared to the manager profile) resulted significantly associated to the incidence of days of absence (IRR = 2.42, $p < 0.001$) (Table 4).

As regards the costs analysis due to illness absenteeism, the sick leave days and relative costs in both periods are described in Table 5. The costs reported were computed

considering the hourly cost per person taking into consideration each employee specific professional profile.

The monthly mean cost for sickness absenteeism per employee was significantly higher for an unvaccinated subject compared to one vaccinated, respectively € 129.00 and € 54.00 ($p = 0.028$).

Regardless of the professional profile, during the epidemic period the company covered an average cost for illness absenteeism of € 236 per vaccinated employee and of € 563 per unvaccinated employee. Thus, exclusive of vaccination costs (€13/person), the net saving estimated was € 314 per person vaccinated.

Considering specific job profile, during the flu period the company spent € 289 per

Table 5 - Sick leave days and related costs – labour costs only, by vaccination status.

	Vaccinated (N=60)		Unvaccinated (N=348)		All workers (N=408)	
	Sick leave days	Costs	Sick leave days	Costs	Sick leave days	Costs
Flu period	220	34,536 €	894	170,737 €	1,114	205,273 €
Non-flu period	86	14,161 €	1,144	195,921 €	1,230	210,082 €
Entire study period	306	48,697 €	2,038	366,658 €	2,344	415,355 €

worker/administrative employee and € 381 per manager.

Since influenza immunization campaign entailed € 780 cost, multiplying the net saving per person for the number of participants vaccinated, considering also their professional profiles, the company overall saved € 19,674.

Discussion

Seasonal influenza immunization appears to be considered mostly unappealing among healthy adults who probably do not deeply acknowledge and appreciate its potential benefits. In our cohort study voluntary influenza vaccination was accepted by approximately 15% of company personnel similarly to other immunization coverage achieved among other cohorts of Italian workers, particularly among healthcare workers (33-37). As already reported by other surveys, older workers are more likely to get vaccinated probably due an increased perceived risk and greater awareness and care of their own health (19, 20, 38).

Seasonal influenza demonstrated to deeply affect also healthy adults and, according to our results, flu period proved to be associated with a notable increase in absenteeism among employees (8-10). Particularly, a relevant increase (more than doubled) in sick-leave days was reported for unvaccinated subjects during the epidemic period compared to the previous one. Certainly, as we lacked data regarding specific diagnosis, the assumption that sick-leave days surplus compared to the previous non-flu period could be due to influenza is an hypothesis, but we are confident it could be quite reliable given the difference in average sick-leave days between vaccinated and unvaccinated comparing the flu period with the previous one. Influenza vaccination revealed to be an effective preventive strategy capable of reducing days of absence

due to illness thus confirming the literature data (23, 25, 38). Indeed, in our cohort of study, vaccinated subjects during the flu period reported significantly lower average of sick-leave days per person compared to the unvaccinated ones. Similarly, another Italian study carried out among personnel of a research institute reported a lower number of days of absence among the vaccinated employees (25) and according to a recent review influenza vaccination could reduce absenteeism by approximately 0.15-3 days per employee (24). Independently of demographic characteristics and professional profile, vaccinated personnel showed a halved probability of incidence of sick-leave days during the flu epidemic period. Moreover, workers or administrative employers have a likelihood of absenteeism more than doubled compared to managers, without regard of immunization status and other demographics (age and gender). Apparently, this might imply that those duties might lead to an increased risk of acquiring or transmitting infection or that manager's duties could be carried out notwithstanding mild symptoms. Although lack of confirmed influenza diagnosis represented a relevant limitation, we appraised a measure of flu vaccination effectiveness in reducing absenteeism due to illness suggesting that vaccinated employees had a 56.4% reduction (IRR=0.44) in sick-leave days following vaccination. Whilst, considering the entire cohort of study population, a 14.7% flu vaccination coverage proved an 8.3% efficacy in reducing the days of absence.

People accepting vaccination are usually more concerned in their health status and adopt more carefully healthy lifestyles. However, we can reasonably reject that this sort of selection bias might have influenced our results, since those participants who accepted flu vaccination, in the previous non-epidemic period had shown a significantly higher incidence of absenteeism compared to the ones unvaccinated. Therefore, not

only can we exclude that they had been healthier, but we can also dare to suggest that they had been more “fragile” or exposed to risk conditions (for instance being in close contact with young kids) and then more prone to get vaccinated.

As regards the cost-benefit evaluation, performed from company perspective, the influenza vaccination campaign confirmed to be a cost-effective intervention (21, 23, 39). In our study, it proved to be extraordinarily advantageous, allowing a significant reduction of absenteeism and therefore generate a saving of up to 300 € per employee vaccinated, considering only the direct costs. Supposedly, the gain would have been even more remarkable if indirect costs due to slowed down production line as well as delayed goods deliveries were accounted. Furthermore, we did not comprise direct costs for healthcare incurred by National Health Service along with the burden for families and civil society itself.

Influenza thus endorsed its considerable negative impact on labor market in terms of absenteeism, productivity loss and related costs causing a conspicuous economic burden for the specific company, amounting to at a total cost of 210,083 euros for the 1,230 total days of sick-leave for all employees.

Seasonal influenza entails for companies a relevant economic burden that could be at least partially averted by increasing immunization coverage. Some studies reported reductions of more than 80% of sick leave days during flu period compared to the previous one thanks to flu vaccination coverage even slightly above 50% (21, 38). In our study cohort, if we had a 50% flu vaccination coverage we estimate further savings of more than 45,000 euros. A higher flu vaccination coverage might be achieved through educational interventions stressing the importance of immunization and possibly specifically addressing younger employees who showed little interest in vaccination

(40) and workers. Furthermore, in order to increase adherence to influenza vaccination as a preventive tool in the workplace, the occupational competent doctor of each company could play a leading role in providing adequate information.

This study has some limitations: (1) exposure misclassification: since we did not obtain information regarding factors that might have influenced vaccination acceptance such as health status, previous flu vaccination, personal medical history and personal health attitude; (2) effect misclassification giving the lack of specific diagnosis, some other pathological conditions might have caused illness absenteeism. For instance, long-term absences are more likely to be caused by illnesses other than influenza such as surgical interventions and subsequent rehabilitation, neoplastic diseases or mental diseases such as depressive syndromes; (3) in the cost analysis we did not consider the indirect costs caused by the slowing down of the entire production chain due to the absence of personnel, as well as those due to presenteeism (i.e. reduced productivity of mildly sick employees at work) (11).

Although influenza vaccination at the workplace definitely appears to be a cost-effective intervention with important organizational and managerial advantages for the company perspective, it might also result in undeniable profits for each employee. Indeed, for each individual himself immunization could provide considerable personal health and economic advantages thanks to the reduction of illness days. Moreover, the employee could benefit from a healthier workplace, with reduced viruses' circulation and risk of infection transmission and take advantage of the economic welfare of its own company.

To conclude, we firmly consider the workplace as an important environment for health promotion interventions allowing to target healthy adults otherwise hard to access and to raise their awareness regarding

health issues. Moreover, during health education interventions the importance of flu vaccination should be stressed. Given our findings, it would be desirable for companies, besides investing in health education campaigns also to point out the importance of flu vaccination for both the individual and the company environment.

Conflict of interest: The authors declare that there are no conflicts of interest. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Riassunto

Vaccinazione antinfluenzale e assenze per malattia in ambiente di lavoro: analisi costo beneficio

Premessa. L'influenza è un'infezione altamente contagiosa con possibili gravi complicanze cliniche che comporta ingenti costi socioeconomici. La vaccinazione antinfluenzale è attualmente raccomandata per gli adulti sani in età lavorativa solo per alcune categorie a rischio (es. operatori sanitari) sebbene si sia dimostrata efficace nel ridurre l'assenteismo e la perdita di produttività dei lavoratori nel corso dell'epidemia influenzale. Lo scopo dello studio è analizzare l'entità e i costi delle assenze per malattia del personale dell'azienda Komatsu Italia Manufacturing in relazione alla vaccinazione antinfluenzale, nella stagione influenzale 2017-2018.

Disegno dello studio. Lo studio è di tipo osservazionale di coorte. La popolazione in studio è il personale dipendente dell'Azienda Komatsu Italia Manufacturing S.p.A. in servizio (senza interruzioni) nel periodo compreso tra la 14[°] settimana del 2017 e la 13[°] settimana del 2018 (ovvero dal 01/04/2017 al 01/04/2018).

Metodi. Per ciascun soggetto sono stati raccolti i seguenti dati: sesso, data di nascita, profilo professionale, condizione di vaccinazione antinfluenzale e giorni di assenza per malattia. Sono stati confrontati i giorni di assenza del periodo di epidemia influenzale con quelli del precedente periodo non epidemico, tra dipendenti vaccinati e non vaccinati, ed eventuali differenziali dei giorni di assenza sono stati attribuiti all'epidemia influenzale.

Risultati. La vaccinazione antinfluenzale è stata accettata dal 14.7% dei dipendenti cui è stata offerta (60/408). Durante il periodo influenzale, i dipendenti vaccinati hanno riportato una media di giorni di assenza per dipendente significativamente inferiore di quelli non vaccinati (0.328 giorni vs 0.752 giorni; $p=0.022$).

I dipendenti non vaccinati hanno riportato una media di giorni di assenza per dipendente significativamente maggiore durante il periodo influenzale rispetto al non influenzale (0.752 vs 0.337 $p<0.001$). Un'età ≥ 50 anni è risultata l'unico fattore predittivo per la vaccinazione (OR_M 3.07 $p<0.001$). Il rischio relativo di incidenza di giorni di assenza (Incident rate ratio -IRR) è risultato 0.436. Il costo medio per assenze per dipendente al mese è risultato maggiore per un soggetto non vaccinato rispetto ad uno vaccinato, rispettivamente € 129.00 e € 54.00 ($p=0,028$). Complessivamente la campagna di vaccinazione ha consentito un risparmio netto di € 314.00 per dipendente vaccinato e un risparmio complessivo per l'azienda di € 19.674.

Conclusioni. La vaccinazione si è dimostrata uno straordinario strumento preventivo in grado di ridurre significativamente i giorni di assenza durante il periodo influenzale comportando per l'azienda un risparmio notevole a fronte dei costi sostenuti per la campagna vaccinale. La vaccinazione antinfluenzale si dimostra quindi un intervento costo-efficace per l'azienda. Sarebbe auspicabile che le aziende, nell'ambito degli interventi di promozione alla salute, sottolineassero l'importanza della vaccinazione antinfluenzale per il benessere sia dell'individuo che dell'azienda. In particolare, interventi educativi più specificamente rivolti ai lavoratori più giovani potrebbero consentire di raggiungere coperture vaccinali antinfluenzali maggiori nelle coorti di lavoratori.

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