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Non-familial paid caregivers as potential flu carriers and cause of spread: the primary prevention of flu measured through their adherence to flu vaccination campaigns—A Florentine experience

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ABSTRACT

Introduction: Influenza vaccination is recommended for caregivers of elderly people. In a study aimed at assessing the level of health literacy (HL) in a sample non-familial caregivers in the Florence Health District (Tuscany), data were collected regarding access and adherence to the flu vaccination campaigns.

Methods: The sample consists of 47 non-familial paid caregivers.

We collected information regarding socio-demographic characteristics, services provided and daily work time, whether or not influenza vaccination was administered for the 2016/2017 season and in the previous three years. The level of HL was assessed through the Newest Vital Sign.

Results: 63.8% of non-familial caregivers have not joined the flu campaigns over the last four years, 14.9% have been vaccinated only sometimes (in some epidemic seasons), and 21.3% have received a flu shot in all the seasons investigated. Most of the non-familial caregivers who do not get vaccinated (27.7%) do not perceive that they are in direct contact with a person at-risk; those who get the vaccine regularly (12.8%) reported they want to protect the assisted person as motivation for vaccine uptake. Vaccination was not associated with HL.

Conclusion: Adherence to anti-flu vaccination campaigns for these homecare workers has been resulted rather poor. Coverage does not seem to be related with HL level. It seems appropriate to promote extensively flu vaccination among family carers by actively offering the vaccination in appropriate forms, places and times, to avoid serious consequences on elderly people with higher risk of comorbidity and frailty.

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Introduction

The progressive aging of the population that characterizes OECD countries in recent years is one of the greatest socio-demographic phenomena of our time, with heavy implications in social, cultural, economic, and health-care fields. Life expectancy at birth was on average 80.6 years across OECD countries in 2015.¹ In Europe, the Italian life expectancy ranks second behind Sweden, and Tuscany, with 85.4 years for females and 81.3 for males, is one of the longest-living European regions.² Moreover, if people in OECD countries at age 65 can expect to live another 19.5 years on average (18 and 21 years, respectively, for men and women),¹ this number is higher in Italy (19 and 22.2 years), and even grows in Florence and its surroundings: 19.4 years for men and 22.5 years for women.²

Increased life expectancy at age 65 does not necessarily mean that the extra years of life are spent in good health. If an increase in the years a person can reasonably live is to be considered a great conquest for human beings, this is not so true in case this gain is not characterized by a good quality of life, a loss in self-sufficiency, a growing frailty.

In Europe, as in other parts of the so-called First World, an indicator of disability-free life expectancy, known as ‘healthy life years’, is regularly assessed, based on a general question about disability in the European Union Statistics on Income and Living Conditions (EU-SILC) survey. Among European countries participating in the survey, the mean number of healthy life years at age 65 is the same for women and men: 9.3 years for women and 9.4 years for men.^{1–3}

Care dependence – the loss of functional ability that prevents elderly people from undertaking the basic tasks that are necessary for daily life without assistance – is becoming more and more relevant⁴: it is estimated that the vast majority of them will need to be cared for by another person in the final timespan of their lives.⁵ In many countries, including Italy, a great part of over sixty-five year old persons who are not self-sufficient receive care in their own home, with a contribution warranted by the public health-care services that is often minimal.^{6–9}

So, many elderly people who live at home depend on a caregiver – familial or non-familial – for the routinary activities of daily living. In this picture, paid caregivers are non-familial individuals who receive a salary to assist this kind of persons at home. The assistance includes the support

for the proper use of and adherence to complex medication regimens, for the respect of the established medical visits and the assistance in food preparation and consumption.¹⁰

Given these premises, adherence to anti-flu campaigns to protect elderly people at home becomes very important: in fact, vaccination is considered to be the best preventative measure against influenza, and the main aim of the influenza vaccination campaigns is to protect the most fragile and at-risk groups and individuals from severe complications for their health. This can be done in different ways:

–directly, by vaccinating the subjects at high risk of influenza complications;

–indirectly, by preventing the closest contacts from transmitting the virus: this way is known as ‘cocoon strategy’.¹¹ According to this approach, health-care workers and caregivers, both familial and paid, are comprised among the people for whom vaccination is strongly recommended.^{12–16}

To support primary prevention in at-risk groups, in Italy flu vaccinations are free of charge for those subjects, in case they are Italian citizens or registered at the National Healthcare System.

Despite this, the adherence to influenza vaccination among health-care workers is very low both for hospital as well as for homecare professionals, in line with a very low national coverage of 15.8% in the 2017–18 epidemic season.^{17–20}

Vaccine hesitancy refers to the refusal to get vaccines or a delay in acceptance, in spite of the available and free offer by the public health services. This phenomenon, that is context- and vaccine-specific, is well known in many countries: it results from a complex decision-making process influenced by many factors, summarized in three different categories – complacency, convenience, and confidence.²¹ Health literacy (HL) and, more specifically, vaccine literacy, has been gaining growing interest as a determinant of vaccine hesitancy: in fact, it can influence vaccine uptake, since it ‘is linked to literacy and entails people’s knowledge, motivation and competencies to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course’.²²

According to the results of a recent systematic review, the relationship between HL and vaccination is still unclear. The role of HL in predicting vaccine hesitancy or acceptance seems to be influenced by country, age-range, and type of vaccine.²³

To the best of our knowledge, no studies have been published regarding vaccination against influenza among paid non-familial caregivers, so it remains unknown their degree of protection as well as the underneath predictors of refusal or acceptance.

Due to the increasing importance and diffusion in the domestic Tuscan healthcare paid non-familial caregivers assisting frail elderly people, we decided to investigate their characteristics and skills. This paper presents the results related to their flu vaccination compliance in the last four years, with the aim to describe their degree of protection towards flu for themselves and their assisted persons, in line with the cocoon strategy, and the factors associated with vaccination adherence, including HL.

Results

During the study period, 303 elderly people were receiving economic contribution. Among the paid caregivers hired by the families of those elderly people, 84 agreed to be enrolled and signed the informed consent (compliance: 28%). Of the others, 39% refused to participate, 23% were untraceable, and 17% were no longer working for the contacted family because of the death or institutionalization of the senior. Data refer to 47 caregivers, the vast majority of whom is formed by women (93.6%) (Table 1). Most of the non-familial paid caregivers come from countries abroad (97.9%) and share the domicile with the seniors they assist (83%). The mean age is 53.4 ± 9.59 years (range: 25–66). Two caregivers were 66 years old, so they were considered at risk for influenza in the previous year (2016).

As for the education level, 21.3% have attained a degree, 48.9% are high school graduates, 23.4% have attended only primary or secondary school, and 6.4% declared that they have no educational qualifications. Regarding HL, most (55.3%) resulted to have high likelihood of limited HL, 23.4% possibility of limited HL, and 21.3% high likelihood of adequate HL.

Most caregivers (85.1%) have been hired directly by the senior’s family through personal contacts, and the kind of work relationship is full-time in 74.5% cases. For 97%, job responsibilities include caregiving tasks (comprising drug administration), personal care, household management, and food preparation. The mean age of the assisted seniors is very high: 89.5 ± 7.8 years (range: 68–102).

Table 1. Descriptive analysis.

Variables		N	%
Gender	Females	44	93.6
	Males	3	6.4
Country of Origin	Italy	1	2.1
	African countries	4	8.5
	American countries	9	19.1
	Asian countries	4	8.5
	European countries (other than Italy)	29	61.7
Educational level	None	3	6.4
	Primary school	2	4.3
	Middle school	9	19.1
	High school	23	48.9
	Graduate	10	21.3
Domicile with the senior	Yes	39	83.0
Level of comprehension of Italian language (for foreigners)	Low	10	21.7
	Medium	20	43.5
	High	16	34.8
Health Literacy	High likelihood of limited HL	26	55.3
	Possibility of limited HL	11	23.4
	High likelihood of adequate HL	10	21.3
Influenza vaccination in 2016/2017		17	36.2
Influenza vaccination in 2015/2016		12	25.5
Influenza vaccination in 2014/2015		11	23.4
Influenza vaccination in 2013/2014		11	23.4
Vaccinations in the four epidemic seasons	Never	30	63.8
	Sometimes	7	14.9
	Always	10	21.3
Variables	Mean \pm SD	median	range
Age (years)	53.4 ± 9.59	55	25–66
Years in Italy (for foreigners)	11.7 ± 5.86	11	2–27
Years of schooling	11.3 ± 4.14	12	0–17
NVS score	1.8 ± 2.06	1	0–6

Table 2. Influenza vaccination uptake in 2016 and in 2013–2016, by collected variables.

Variables		% influenza vaccinated in 2016 (N)	% influenza vaccinated in 2013–2016 (N)			
			Never	At least one year	Always	
Gender	Females	36.4 (16)	63.9 (28)	13.6 (6)	22.7 (10)	
	Males	33.3 (1)	66.7 (2)	33.3 (1)	0 (0)	
Country of Origin	European countries	33.3 (10)	70 (21)	10 (3)	20 (6)	
	Others	41.2 (7)	52.9 (9)	23.5 (4)	23.5 (4)	
Educational level	Middle school or lower	28.6 (4)	64.3 (9)	14.3 (2)	21.4 (3)	
	High school or graduate	39.4 (13)	63.6 (21)	15.2 (5)	21.2 (7)	
Domicile with the senior	Yes	36.6 (14)	63.4 (25)	17.1 (7)	19.5 (7)	
Level of comprehension of Italian language (for foreigners)	Low	30	70	10	20	
	Medium	25	70	10	20	
	High	50	56.3	18.8	25	
Health Literacy	High likelihood of limited HL or Possibility of limited HL	37.8 (14)	62.2 (23)	16.2 (6)	21.6 (8)	
	High likelihood of adequate HL	30 (3)	70 (7)	10 (1)	20 (2)	
Influenza vaccinated in 2015*		100 (12)	–	–	–	
Influenza vaccinated in 2014*		90.9 (10)	–	–	–	
Influenza vaccinated in 2013*		90.9 (10)	–	–	–	
Variables (Mean ± SD)						
Age (years)		51.5 ± 10.5	56.71 ± 6.8	51.47 ± 10.44	56.57 ± 6.80	56.9 ± 7.37
Years in Italy (for foreigners)		10.63 ± 5.7	13.75 ± 5.8	10.47 ± 5.53	13.14 ± 5.11	14.78 ± 6.67
Years of schooling		10.8 ± 4.3	12.12 ± 3.8	11.17 ± 4.08	12.14 ± 4.71	11 ± 4.29
NVS score		1.8 ± 2.17	1.71 ± 1.90	1.9 ± 2.15	2 ± 2.08	1.2 ± 1.81

*Fisher exact test < 0.001 for both '% influenza vaccinated in 2016' and '% influenza vaccinated in 2013–2016'.

Table 3. Reasons reported for influenza vaccination acceptance/non-acceptance in 2016.

Reasons for*....	N	%
... vaccination acceptance in 2016		
I have been recommended vaccination.	3	16.7
I do not want to get sick.	5	27.8
I want to protect the senior and my cohabitants.	10	55.5
I felt compelled to get vaccinated.	0	0
I get vaccinated every year.	0	0
I got sick with influenza in the past.	0	0
... vaccination non-acceptance in 2016		
I did not have time to get vaccinated	1	3.1
I did not know where to get vaccinated	1	3.1
I am not in the target group.	16	50.0
I do not get sick with influenza.	6	21.9
I have never been vaccinated before.	6	21.9
I was worried about the side effects.	0	0
I'm afraid of needles.	0	0
The vaccine causes influenza.	0	0
The vaccine is not effective.	0	0
I forgot to get vaccinated.	0	0

*more answers possible.

The uptake of influenza vaccination was definitely poor: 63.8% of non-familial paid caregivers have never received a flu shot in the last four years, 14.9% in one or more, but not every, years, and only 21.3% declared they have been vaccinated in all the investigated epidemic seasons. Among the two caregivers that were 66 years old, one get the vaccine in 2016.

No significant associations emerged between vaccination and the assessed variables, with the exception of acceptance in 2016 and vaccination acceptance in one of the previous years (2013–2015) (Table 2). Regarding the potential barriers to vaccination, most of the non-familial paid caregivers who did not get vaccinated do not perceive that they are in the target group (53.3%). In addition, the other reasons given by the caregivers who did not get vaccinated were “I do not get sick with influenza” or “I did not have time to get vaccinated” or “I did not know where to get vaccinated”, or “I have never been vaccinated before” (Table 3). None of the caregivers not

having received the vaccination referred due to being worried about the side effect, being afraid of needles, and the idea that vaccine causes influenza and it is not effective.

On the other side, most of those who have been vaccinated were motivated by their understanding that they should represent a potential risk of contagion for their contacts (55.5% referred the willingness to protect the senior and his/her cohabitants), more than for protecting themselves (none reported “I got sick of influenza in the past” as motivation for getting the vaccine) (Table 3).

Discussion

The study shows that the acceptance of influenza vaccination in the sample of investigated paid non-familial caregivers of elderly people with disabilities is rather poor (36.2%) in 2016/2017, although immunization rates result to be higher than national health-care workers.²⁴ Only a little more than one out of five (21.3%) got the vaccine in each of the four investigated seasons. Analyzing the reasons of the failure in vaccine uptake, it emerges that the majority of interviewed non-familial paid caregivers perceive this preventative intervention as a benefit only for themselves, while they do not perceive the importance of being vaccinated to protect the susceptible senior together with they live. So, the fact that a majority of non-familial caregivers reported answers as “I'm not in the target group” can be associated more with ignorance of flu disease, comprising the mode of transmission and the recommendations made by the public health authorities, rather than a kind of concern about the vaccine, as testified by the absence of positive answers to the questions “I was worried about the side effects”, “the vaccine causes influenza” or “the vaccine is not effective” as motivations for not being vaccinated. On the contrary, those who carry out the vaccine regularly show full perception of being ‘subject to risk’ as workers in contact with susceptible people and most of them report that “I want to protect the senior and my cohabitants”. Influenza vaccine

hesitancy is a significant threat to global efforts to reduce the burden of seasonal and pandemic influenza. Potential barriers to influenza vaccination need to be identified to inform interventions to raise awareness, acceptance, and uptake of influenza vaccine.²⁵

These results can be compared to those obtained from a Tuscan study in 2011 on the attitudes and motivations of health-care workers (doctors, nurses, etc.) in the context of influenza vaccination. Adherence to vaccination campaigns was low also in this case, with 74.6% of subjects reporting that they had never been vaccinated, in spite of evidence that influenza vaccination of health workers is associated with increased patient safety.²⁶

Our results are similar to those obtained in other studies on elderly patients, even though caregivers' vaccination rates among different settings vary widely. A literature search of articles published since 2000 in the areas of geriatrics, infectious diseases, and pneumology reveals insufficient vaccination coverage of health-care personnel both at national (France) and international levels.¹³ A cross-sectional study conducted among nursing homes in France estimates influenza vaccine coverage for the 2015–2016 season among permanent workers at 20% (95% Confidence Interval 15.3–26.4%).¹⁴ A US study reports that the average vaccination across nursing homes was 55% during the 2010–2011 and 2011–2012 influenza seasons.²⁷

The low educational level of the assessed sample is probably linked to the low NVS scores. Thus, the lack of significant association between variables could be due to a relatively low cultural homogeneity of the included subjects, which can determine a ceiling effect. Ceiling effects can skew distributions significantly and lead to concerns about attenuated correlations.²⁸ The analysis of the motivations of non-vaccination shows a low perception of caregivers' role as a contact of high-risk subjects. It is necessary to educate non-familial caregivers about the importance of vaccination in relation to the type of work they do and to extensively promote and facilitate their flu vaccination. According to the SAGE Working Group on Vaccine Hesitancy, vaccine hesitancy refers to the delay in acceptance or refusal of vaccination despite the availability of vaccination services.²¹ In the context of the promotion of influenza vaccination, the vaccination of non-familial caregivers should certainly be included. To date, evidence-based interventions able to increase vaccination coverage among health-care workers exist.^{29,30} Some of those may be implemented in order to increase vaccination adherence among non-familial paid caregivers, however, there are no specific recommendation regarding these people. To increase their coverage, GPs could play an important role: in fact, they often administer the flu vaccination to elderly people at home, that is in the same place in which he can find the caregiver, and could take the opportunity to do it in the same visit. To be able to do this, since most caregivers are foreigner, it is necessary to know whether or not they have subscribed to the Public Health System, since many of them are not enrolled in any GP list and, therefore, can not receive flu vaccination free of charge, as contacts of persons at risk. It is also necessary to consider the fact that is quite hard, for the non-familial paid caregivers, to receive the shot by the GPs, since their working hours tend to be overlapped with that of the GPs. Moreover, this consideration is

valid in our study because we have enrolled only “regular” non-familial caregivers, who can access to the public health services, but we have to exclude all the “irregular” caregiver, who can not be registered to the National Health Service, so having a GP and receiving flu shot with no charge. In this perspective also Tuscany, where a specific legislation to help the families with not self-sufficient people by means of an economic contribution exists, does not have a public policy to include foreign paid caregivers in the healthcare and disease prevention system. This is in line with other studies, which mostly refer to policies aimed at supporting the economic burden of the family to hire a caregiver, but not to accompany this with interventions for social and health-care protection of the caregivers as well.^{31,32}

This study has some limitations. First, the questionnaire was administered in a limited geographical area; together with a low compliance of the invited caregivers, this has determined a small dimension of the sample. Second, it is a convenience sample: all the participant have been recruited among those who worked at families included in a specific regional programme of social support. In addition, the sample size has been influenced by the difficulties in obtaining two different forms of contact and informed consent – one from the elderly person or one of his/her relatives, one from the caregiver himself – resulting in a hard way of recruitment. Moreover, no data are available for those who refused to participate, so that it is not possible to understand potential differences between those who joined to the study and those who did not, so making impossible to generalize the results. Furthermore, among the vaccinated non-familial caregivers, information about who administered the vaccine was not collected. Finally, socio-economic data of the non-familial caregivers were not collected, and this could limit the analysis of the predictors of vaccination acceptance. These information were not collected to facilitate the compliance with the questionnaire. In fact, in many cases, there are substantial differences between the working hours in the employment contract and those actually performed. These differences, which also lead to differences between the “real” perceived salary and those reported in the employment contract, could have decreased, in our opinion, the compliance with the study.

Influenza vaccination is poorly diffused among caregivers of non-self-sufficient elderly people, although it represents a patient safety issue. In our sample, influenza vaccination adherence does not seem to be related with HL levels.

Our study, without claiming to be exhaustive, represents one of the first researches about this theme in this casuistry, which deserves to be explored: in fact, many studies have been conducted on health-care workers and influenza vaccination coverage in health-care settings (i.e. nursing homes, hospitals) but only very little information are available on caregivers living and working in the domestic environment of elderly people with disabilities. Moreover, published studies regarding caregivers' HL level do not assess the correlation between HL and vaccination coverage.

Further specific studies, with larger numbers of persons recruited, using a probability sampling method and assessing more variables on caregivers, are necessary to confirm and generalize, or deny, our result.

Materials and methods

The study complies with the principles laid down in the Declaration of Helsinki and obtained the Ethic Committee approval in March 2017. It was conducted in the territory of the Florentine Health District in May–October 2017. The population comprises 227 non-familial paid caregivers, selected among who was working for families that received an economic support in the context of a regional social support programme for impaired elderly people who lived at home. The inclusion criteria are: being a non-familial paid caregiver of a person over 65 years included in the above mentioned Tuscan social project³³; working in the Florentine Area; showing willingness to participate in the study by signing the informed consent form. The exclusion criterion is the expressed refusal to participate.

The selection of the sample began with the provision, by the Health district of Florence, of a list of elderly people receiving an economic contribution to hire a paid caregiver. Each elderly person or one of his/her family members, after being informed about the aim of the study and the opportunity to take part in it, provided the caregiver's contacts; subsequently, each of the paid caregivers was contacted for the interview. In all, 47 (20.7%) non-familial paid caregivers joined the study. Of the others, 39% refused to participate, 23% were untraceable, and 17% were no longer working for the contacted family due to the death or recovery of the senior in a nursing home. By means of an ad hoc questionnaire administered during a face-to-face interview, the following variables were collected: age, sex, country of origin, years of stay in Italy, educational level (qualification and years of education), co-habitation with the assisted person (yes/no), daily working time (part-time/full-time, indicated as number of hours/week), mode of initial contact with the family, services provided to the assisted person, ability to understand the Italian language, and the HL level by means of NVS. It was then investigated whether or not the participant joined the influenza vaccination campaigns (he/she decided to be vaccinated) during the current season (2016/2017) and in the previous three years. Reasons for having been vaccinated or not vaccinated in 2016/2017 were investigated as well and was given the opportunity to give more than one answer. In particular, reasons for not getting the vaccine were listed as follow: 'I am not in the target group', 'I am concerned about the side effects', 'The vaccine is not effective', 'I am concerned about getting influenza from the vaccine', 'I do not fall sick with influenza', 'The vaccine administration was not convenient', 'I did not get time to be vaccinated', 'I forgot to be vaccinated', 'Fear of needle', 'No one informed me about the vaccination campaign', 'I have never been vaccinated before'. Reasons for getting the vaccine were listed as follow: 'I do not want to get sick', 'I want to protect the senior and my cohabitants', 'I get vaccinated every year', 'I have been sick with influenza in the past', 'The vaccine administration was convenient', 'I have recommended vaccination', 'I felt compelled to be vaccinated'. HL was assessed using the Newest Vital Sign (NVS), an objective measurement tool of HL. It was originally developed in the United States (US) for English- and

Spanish-speaking people.³⁴ The Italian version of this tool (NVS-IT) was validated in 2015 and has been applied to measured HL in different settings: emergency departments, primary care settings, specialist departments, general population, and non-familial caregivers of elderly people.^{35–38}

The NVS-IT consists of an ice-cream nutrition label and seven associated questions that measure literacy and numeracy. It produces a final score ranging from 0 to 6, allowing subjects to be classified into three categories – high likelihood of limited HL (score: 0–1), possibility of limited HL (score: 2–3), and adequate HL (score: 4–6).

Statistical analyses

The information on the sample of non-familial paid caregivers was collected in an electronic database and analyzed using IBM SPSS 25TM. After data collection, information was anonymized by assigning a numeric code for both caregivers and seniors. Any original identifiable information was destroyed when the study was completed.

Data were presented as mean \pm standard deviation or as percentage. For each variable, normality was assessed using the Kolmogorov–Smirnov test. Confidence intervals were not calculated since the analysis aimed at describing the collected data, not at estimating the prevalence in the population of paid non-familial caregivers. This fact is related to the sampling procedures, that limits the possibility of inference.

For the analysis, influenza vaccination in 2016 has been assumed as a proxy of more general influenza vaccination acceptance/non-acceptance. Associations between caregivers' influenza vaccination in 2016 and the other data related to the caregivers were assessed using Fisher's exact test for categorical data. Student's two-tailed t-test for independent data and the Mann–Whitney U test for continuous data were, respectively, used for normally distributed and non-normally distributed continuous data. Since age was not correlated with vaccine uptake, data were not stratified by age-class. An alpha level of 0.05 was considered as significant.

Contributors

All authors contributed to the conception and design of the study, interpreted the data and drafted the article. Study conception and design: Guglielmo Bonaccorsi, Paolo Bonanni, Chiara Lorini, Francesca Pieralli, Maddalena Innocenti, Chiara Milani, Sara Boccalini, Angela Bechini, Marco Del Riccio. Acquisition of data: Francesca Pieralli, Maddalena Innocenti, Chiara Milani, Marco Del Riccio. Analysis of the data: Chiara Lorini. Interpretation of data: Guglielmo Bonaccorsi, Chiara Lorini, Francesca Pieralli, Maddalena Innocenti.

All authors gave final approval of the version to be published and agree to be accountable for all aspects of the work.

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All authors confirm all personal identifiers have been removed or disguised so the persons described are not identifiable and cannot be identified through the details of the story.

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