

# Impact of social care on Hospital Admissions in a sample of community-dwelling older adults: results of a quasi-experimental study

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*Parole chiave: Anziani, ricoveri ospedalieri, servizi sociali, sistema sanitario, sostenibilità*

## Abstract

**Introduction.** The paper describes the impact on Hospital Admissions of a program targeting the community-dwelling older citizens with social interventions aimed at managing frailty and reducing social isolation.

**Study design.** The study is quasi-experimental intervention program

**Methods.** A randomized sample made up by 207 participants (cases) to the Long Live the Elderly program is compared with a cohort of 308 older adults (controls) followed up since 2014 by the University of Tor Vergata. At the enrolment all the participants have been administered a multidimensional questionnaire to assess frailty. After six months, the two groups are compared for the inpatient's admission rate.

**Results.** The percentage of patients who was admitted to the hospital during the first six month of follow up was 9.1% and 8.3% among the controls and the cases respectively. The inpatient's admission rate was higher among the controls (251.6 per 1000 observation/year) than for the cases (167.3). Despite the cases were older than the controls (mean age 83.5,  $SD\pm 8.1$  vs 76.7,  $SD\pm 7.1$ ;  $p=0.001$ ), showed a lower percentage of frail/very frail individuals (29.5% vs 33.4%). The multivariate linear regression adjusted for gender, age and frailty showed a reduction of the hospital admission rate associated to the Long Live the Elderly program ( $p=0.013$ ).

**Conclusion.** The study suggests the impact on the reduction of acute hospital admission in the first six months of follow up, of a Community-based Program aimed at increasing the social capital of older adults. Further studies with longer follow up are needed to confirm the study results in order to support the hypothesis that the future sustainability of health systems is partially linked to the increase of the social component of community care service. .

## Introduction

The sustainability of Health Systems is threatened at world level by the “epidemic” of non-communicable diseases that is a consequence of the increasing life expectancy

at birth. An ageing population generates a growing demand for care services that translates into an increase of costs especially for the public funded European Health Services. There are two ways to cope with the increasing demand of care services:

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improve the citizens' quality of life through effective prevention programs, in order to reduce the request of health care, and reduce the overall cost of care.

The highest cost for the Italian National Health Services (INHS) is hospital care that accounts for 33.4% of the total health expenditures in 2014 (1). This amount is decreased from the 36.1% registered in 2008; the main intervention to achieve this goal was the reduction of hospital beds available for acute care (from 3.8‰ inhabitants to 3.3‰ (2-3) a reduction of about 13%) that led to a reduction of hospital acute admissions from 127‰ inhabitants in 2008 to 103‰ (4-5) in 2014. During this period, the cumulative reduction of the hospital admission rate among the over-65 individuals reached 19% (4-6). Interestingly the expenses due to Emergency Room Services increased of about 20% in the same period (7) (from 4.7% to 5.6% of total expenses due to hospital care), making evident that the demand for hospital care has not been really limited, but the answer was different from the past.

Because the older adults still generate about 40% of the total number of annual acute hospital admissions, an intervention able to reduce hospital admissions in this population could have a relevant impact on the whole system. Several strategies could be implemented in order to optimize the use of hospital acute care services by older adult population: the implementation of effective out-of-hospital care is one of these strategies that could provide benefits in terms of appropriateness of hospital admissions, even if the issue is still controversial (8-9). Unfortunately in Italy it does not seem to be working (10): the more out-of-hospital care available the more in-patients admissions are recorded. This is probably because in Italy the availability of care services, either in-hospital or out-of-hospital, is among the lower throughout Europe, and the offer of services is totally saturated (11). Another

strategy to limit hospital admissions is to activate teams for the transitional care in order to optimize the relation between hospital and community care (12). In this field several organizational models of transitional care are being tested even if none of them provided a clear evidence of efficacy at population level yet (13).

The analysis of determinants of hospital acute admissions among the older adult population provided information about different factors associated to higher rate of acute admissions, like social isolation and frailty (14-15). However social isolation could be considered a component of frailty and the relation with frailty status and higher acute hospital admission rates has been already discussed by several authors (16-17). This paper describes the impact on hospital acute admissions of a program targeting the community-dwelling older citizens with interventions aimed at managing frailty and reducing social isolation.

## Methods

The study is a quasi-experimental trial. The control group stems from the study on the impact of frailty on the quality of life and the use of services of a sample of older adults (aged 65 or more) living in the Lazio Region (LR) and in the Umbria Region (UR) (18) (table 1). The group of cases is made up by a randomized sample of the participants to the Long Live the Elderly (LLE) program that has been running for the last 14 years in Rome by the Community of Sant'Egidio, a catholic association, in collaboration with the Municipality of Rome, the Regional Government and the Local Health Units "Roma 1" and "Roma 3". The study was approved by the Independent Ethic Committee of the University of Rome "Tor Vergata".

The Long Live the Elderly program is a Community-based pro-Active Monitoring Program (CAMP) aimed at coping with the social isolation of older adults (19). It targets

Table 1 - Baseline characteristics of the sample

	No	%	Mean age (SD)	Females (%)	Enrolment range	Mean Obs time (SD)
Lazio Region	208	40.4	76.3 (7.1)	122 (58.6)	27.01.2014 06.10.2014	178.7 (13.7)
Umbria Region	100	19.4	77.6 (7.4)	50 (50.0)	15.07.2016 15.08.2016	180.0 (0)
Total	308	59.8	76.7 (7.1)	172 (55.8)		179.1 (11.3)
Long Live the Elderly	207	40.2	83.5 (8.1)	140 (67.6)	14.04.2016 21.11.2016	176.1 (22.1)
			p<0.001	p=0.09		NS
Grand Total	515	100.0	79.4 (8.2)	312 (60.6)		177.8 (16.5)

all the over-75 residents in the operation area providing contact numbers, pro-active phone monitoring especially during environmental emergencies, home visits in case of special needs (namely due a flu in order to deliver medicines and food at home or in the event of a pipe breaks to find a plumber or to apply for invalidity allowance). The program is also an entry point to access other care services (like home care or wheels-on-meals for example) in collaboration with the municipality and the Local Health Authority. Moreover, CAMP involves volunteers as informal carers in order to build up social network around the individuals affected by social isolation. All the program's activities are based on the assessment of frailty carried out by the CAMP operators through the administration of the Short Functional Geriatric Evaluation (SFGE) questionnaire (table 2) during the first month of care. The same questionnaire has been administered to the controls.

The SFGE questionnaire derived from the Functional Geriatric Evaluation (FGE) questionnaire validate for Italy by Palombi and Coll. (20); the SFGE is the short version of the FGE, made up for the administration by phone and it provides a classification of the subject in one of the following four classes: 1. Robust (score  $\leq 0$ ), 2. Pre-frail (1-2), 3. Frail (3-9), Very frail ( $\geq 10$ ).

The comparison is based on the occurrence

of negative events like mortality and hospital admissions during the first six months of follow up after the administration of the questionnaire.

## Results

The Hospital admission rate was higher in the controls than in the LLE program's participants even if the results do not show any statistical significance (table 3). The total number of hospital admissions was 17 and 35 for cases and controls respectively. The cumulative hospital admission rate per observation/year was almost 50% higher among the controls than among the cases (251.6 per 1000/observation year vs 166.5). Moreover, the LR residents also showed the presence of individuals with multiple admissions during the follow up which is not the case for the other two groups. On the contrary the death rate is higher among the LLE participants, but the numbers are very small and the LLE program participants showed to be older than the control groups.

Frailty was lower among the LLE participants than among the controls: more than half of the LLE participants have been classified as robust compared with the 47.1 and 32.0 of the LR and the UR

Table 2 - Short Functional Geriatric Evaluation

<b>ID</b>	<b>Personal data:</b>		Name.....		
Date ....../...../.....	Gender.....	DOB ....../...../.....	Weight .....	Height .....	
1. Age	a. <75 (0) <input type="radio"/>	75-85 (1) <input type="radio"/>	>85 (2) <input type="radio"/>		
2. Education	a. None/Primary (1) <input type="radio"/>	Secondary /Degree (0) <input type="radio"/>			
3. Living:	a. Alone (1)				
	b. With partner (-1)				
	i. Age of the partner: <75 (-1) <input type="radio"/>	75-85 (0) <input type="radio"/>	>85(1) <input type="radio"/>		
	c. With a paid assistant (0) <input type="radio"/>				
	d. Others (0) <input type="radio"/>				
<b>Informal/formal social network</b>					
4. In case of need, is there someone you can count on?	a. Someone who would take care of me (as long as needed) (-1) <input type="radio"/>				
	b. Someone who would help me now and then (0) <input type="radio"/>				
	<i>(taking me to the doctor once or take me lunch, or medicines if needed)</i>				
	c. No (1) <input type="radio"/>				
5. Are you involved in a social activities or group?	Yes (-1) <input type="radio"/>		No (0) <input type="radio"/>		
6. Are you receiving formal care services?	Yes (-1) <input type="radio"/>		No (0) <input type="radio"/>		
	<i>(like Home care or participating to a daily center or meals-on-wheels or others)</i>				
<b>Financial situation</b>					
7. How well does the amount of money you have take care of your needs?	a. Very well (-1) <input type="radio"/>		b. Fairly well (0) <input type="radio"/>		c. Poorly; (1) <input type="radio"/>
8. if "Poorly": what did you give up in the last six month?	a. Food or drugs or clothes or pay rent/bills or personal care (2) <input type="radio"/>				
	b. Domestic help (1) <input type="radio"/>				
<b>Psychological condition</b>					
9. Energy and Motivation	Normal (0) <input type="radio"/>		Hypoactive (2) <input type="radio"/>		
<b>Health/functional status <sup>(1)</sup></b>					
10. Able to use the shower or bathe independently	Yes (0) <input type="radio"/>		No (2) <input type="radio"/>		
11. Gets out from the house	Yes (0) <input type="radio"/>		No (4) <input type="radio"/>		
12. Bedridden <sup>1</sup>	Yes (8) <input type="radio"/>		No (0) <input type="radio"/>		
13. Confused	Yes (8) <input type="radio"/>		No (0) <input type="radio"/>		

<sup>1</sup> The score from question 10 to 12 must not be added: the more severe state must be recorded and counted

Table 3 - Acute Hospital Admissions and Deaths

	N.	Hospital admissions rate (acute care)				Death rate				
		No	%	CL 95%	X <sup>2</sup> p	Subjects with multiple admissions	No	%	CL 95%	X <sup>2</sup> p
Controls	308	28	9.1	5.9-12.3	0.120	5 (1.62%)	3	1.00	0-2.12	0.211
Cases	207	17	8.3	4.5-11.9		0	3	1.45	0-3.07	

Table 4 - Distribution of frailty according to samples

	SFGE				Total	
	Robust	Pre-frail	Frail	Very Frail		
Lazio Region	98 47.1%	54 26.0%	30 14.4%	26 12.5%	208 100.0%	p <0.001
Umbria Region	32 32.0%	21 21.0%	35 35.0%	12 12.0%	100 100.0%	
Rome – Long Live the Elderly	108 52.2%	38 18.4%	39 18.8%	22 10.6%	207 100.0%	
Total	238 46.2%	113 21.9%	104 20.2%	60 11.7%	515 100.0%	

residents respectively (Table 4,  $p=0.001$ ). The association between older age and lower frailty observed among the sample under intervention is unusual, and could be explained only by the action of the LLE program aimed at reversing the frailty status or at delaying the progress toward frailty. The participants to the LLE program have been taking part to the program for 4.49 years on average ( $SD\pm 2.26$ ). The frailty level assessed by the SFGE questionnaire is associated to a higher hospital admission rate among the controls (from 171.6‰ inhabitants among the “Robust” to 705.1‰ among the “Very Frail”,  $p=0.007$ ) while it is not associated among the cases (from 206.5‰ inhabitants among the “Robust” to 184.3‰ among the “Very Frail”,  $p=0.684$ ).

The multivariate analysis showed the

effect of the LLE program, adjusted for age, gender and baseline frailty status, on the Acute Hospital Admission rate: the program is able to reduce of about 10% the acute admission rate (table 5). The same analysis for the death rate did not show any statistical significance as expected since the small number of events observed during the six months follow up.

## Discussion and Conclusion

The LLE program seems to be able to reduce of about 10% the acute hospital admission rate in a sample of older adults in the first six months of follow up. The impact of the program is independent by age, gender and frailty status assessed by the

Table 5 - Multivariate Linear Regression. Dependent variable: hospital admission rate per 1000 observation/year

	Non Standardized Coefficient		Standardized Coefficient	Sign.	95.0% CL	
	B	Std Error.			Beta	Lower
Constant	-1.082	0.436		0.013	-1.938	-0.226
Intervention <sup>a</sup>	-0.108	0.043	-0.131	0.013	-0.192	-0.023
Age <sup>b</sup>	0.018	0.006	0.171	0.002	0.007	0.030
Gender <sup>c</sup>	0.008	0.038	0.011	0.830	-0.066	0.082
SFGE Score <sup>b</sup>	0.008	0.073	0.005	0.916	-0.136	0.152

a) Categorical variable: Controls = 1, Cases = 2

b) Continuous variable

c) Categorical variable: Female = 1, Male = 2

administration of the SFGE questionnaire. The association between deeper frailty status and higher rate of hospital admissions observed only among the controls, seems a further indirect support to the thesis of the impact of the program on the quality of life of the citizens. In fact, even if the cases are older than the controls, the prevalence of frailty is lower, which is unusual; it is likely the result of the LLE program aimed at mitigating frailty impact on the individuals by reducing the level of social isolation and increase the social capital of the communities. This result needs to be confirmed by a follow up longer than six months, however it is an initial indication of the potential effectiveness of the LLE program, as already observed in the past (21). The LLE program provides mainly social interventions able to mitigate the social isolation of the older adults. The intervention is based on the assessment of frailty carried out with an instrument thought to highlight mainly, even if not only, the socio-economic component of frailty. The impact on health care services of a program mainly aimed at increasing the individuals' social capital should lead to acknowledge the relevance of this component in the daily management of health care demand generated by frail individuals. In the management of non-communicable diseases, the social aspects of care include, for example, the support to the care for the nutritional issues, to the self-management of medical prescriptions, to the activities aimed at screening/monitoring the most common diseases like diabetes, hypertension, COPD, mild cognitive impairment, just to mention some of them. The transitional care model should probably take into account this component in a multi-professional approach aimed at improving the health condition and consequently the quality of life of the subjects. Many of the obstacles to an effective collaboration between hospital and community care actors are due to the under-estimation of the social component

in the demand for care services generated by frail individuals.

Social isolation is associated to negative outcomes especially during environmental emergencies like heat or cold waves (22), and in general, it makes more severe most of the episodes that are threatening the older adults' health like a fall or a simple fever (15). The LLE program based on phone monitoring linked to other intervention with growing intensity according to the level of frailty, which is assessed at the baseline and updated annually or bi-annually, showed the capacity of reducing mortality during the environmental emergency as well as the admissions to long term care and to acute care (21). The results of these studies are a further support to the hypothesis of the potential benefits in terms of appropriateness of acute hospital admissions deriving from the strengthening of social care at community level. Steventon & coll. and Campitelli & coll. in two different papers reported the association of phone monitoring or phone management of some diseases to higher rate of hospital admission (17, 23). The possible explanation of these results is the lack of coordination of the health approach (for example an approach based on the implementation of telemedicine services) with the social approach. In some cases, the reduction of hospital admissions has been linked to the improving of primary care (for example a strong relation with the GP or a support to manage the medicines) because of the prevention role played through these activities which are often associated to a strong formal or informal social support (24). The lack of social support has been linked to the increased use of hospital services (25), so it is likely that an intervention based on increasing the individual social capital can reduce the hospital admission rate without affecting negatively the citizens' quality of life.

In Europe the increase of both life expectancy at birth and at 65 years is not followed by a comparable increase of healthy

life years expectancy since the beginning of the 21<sup>st</sup> century (26). Nonetheless, this is not necessarily translating into an increase of acute hospital care demand (16). In Italy we are currently witnessing the impact of the reduction of hospital beds that is associated to an apparently unmet demand for hospital care, in a framework of scarcity of community care services, especially in some regions like Lazio region (5, 27). In this particular framework the LLE program increases the offer of social care at community level by encouraging results that can improve the health care sustainability, especially for hospital acute care. The balance among community care and hospital care for the older adults affected by chronic non communicable diseases should be shifted towards community services and the social component of this services should be increased and addressed to cope with social isolation.

These results need to be accepted with caution because of the limitations of the study. The SFGE questionnaire do not take into account the diseases of the subjects. An observational study carried out in the Lazio region (also including Rome) about the relation between frailty and the use of hospital services, showed that no pathologies are related to higher hospital admission rate among older adults, but only the progression of the disease (that means its impact on the performance in the ADLs) joined to social and health problems (28). However, the absence of co-morbidities as a covariate in the model represents a limitation of the study, even if comorbidity should be more frequent among the cases because of their older age compared with that of the controls. The short follow up is a further limitation of the study because of the well-known “seasonality” of mortality and morbidity among the older adults. The six-months follow up and the use of historical controls could cause an unbalance in the observation period: in fact, some of the follow up of the

controls covered the winter of 2015, a period with higher mortality and morbidity reported among the older adults in Italy, mainly due to a fall of anti-flu immunization rate (29). However only one admission and no deaths have been reported in the control group from January to March 2015: the analysis repeated without this admission confirmed the previous results.

In conclusion the study suggests the impact of a Community-based pro-Active Monitoring Program aimed at increasing the social capital of older adults on the reduction of acute hospital admission in the first six months of follow up. The future sustainability of health systems is partially linked to the increase of the social component of community care service targeting the older adults, with a specific attention to fight against social isolation. Further studies with a full clinical trial design and longer follow up are needed in order to analyse the medium-long term effect of this kind of program.

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#### **Conflict of Interest**

The Authors declare no conflict of interest.

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#### **Riassunto**

*Valutazione dell'impatto dell'assistenza sociale sull'ospedalizzazione di un campione di anziani: risultati di uno studio quasi-sperimentale*

**Introduzione.** lo studio descrive l'effetto sull'ospedalizzazione di un programma rivolto agli ultrasessantenni, diretto alla valutazione della fragilità ed al contrasto dell'isolamento sociale.

**Disegno di studio.** Si tratta di un disegno quasi-sperimentale di valutazione dell'intervento descritto.

**Metodi.** Un campione randomizzato composto da 207 partecipanti al programma 'Viva gli Anziani' (casi) viene confrontato con una coorte di 308 anziani reclutata a partire dal 2014 dall'Università di Tor Vergata utilizzata come coorte di controllo. All'arruolamento a tutti i partecipanti è stato somministrato il questionario multidimensionale di valutazione della fragilità Short Functional Geriatric Evaluation. Dopo sei mesi i due gruppi sono stati confrontati per il tasso di ospedalizzazione.

**Risultati.** La percentuale di pazienti ospedalizzati durante i primi sei mesi di follow-up è stata 9,1% e 8,3% rispettivamente tra i controlli ed i casi. Il tasso di ospedalizzazione è stato più alto tra i controlli (251,6 per 1000 osservazione/anno) che tra i casi (167,3) mentre la mortalità è risultata più alta tra i casi (1.45% vs 1.00%). Nonostante i casi fossero più anziani dei controlli (età media 83,5, SD  $\pm$  8.1 vs 76,7, SD  $\pm$  7.1;  $p = 0,001$ ), la percentuale di individui fragili/molto fragili era inferiore (29,5% per i casi vs 33,4% per i controlli). La regressione lineare multivariata stratificata per sesso, età e fragilità ha mostrato una riduzione del tasso di ammissione dell'ospedale associato al programma Long Live the anziani ( $p = 0.013$ ) mentre le differenze di mortalità non sono risultate statisticamente significative.

**Conclusioni.** Lo studio manifesta l'impatto sulla riduzione dell'ospedalizzazione nei primi sei mesi di follow-up, di un programma indirizzato ad aumentare il capitale sociale in una popolazione molto anziana. Ulteriori studi con periodi di follow up più prolungati sono necessari per confermare queste iniziali osservazioni. La futura sostenibilità dei sistemi sanitari potrebbe essere positivamente condizionata dall'aumento dei servizi di assistenza sociale rivolti agli anziani, con una particolare attenzione alla lotta contro l'isolamento sociale.

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