Ann Ig 2021 Sept-Oct; 33(5): 487-498. doi:10.7416/ai.2020.2398. Online ahead of print Dec 11.

# The effect of community nurse on mortality and hospitalization in a group of over-75 older adults: a nested case-control study

E. Terracciano[1], S. Gentili[1], O. Madaro[2], E. Curti[3], M.C. Inzerilli[2], L. Albanese[3], N. Accarino[2], A. Tardi[3], S. Orlando[1], F. Riccardi[1], L. Palombi[1], M.C. Marazzi[4], G. Liotta[1]

*Key words: Community Nurse, Functional Geriatric Evaluation, Hospitalization, Mortality, Frail Older Adults, Pro-Active Care*

*Parole chiave: Infermiere di Comunità, Valutazione della Funzionalità Geriatrica, Ospedalizzazione, Mortalità, Anziani Fragili, Assistenza Pro-Attiva*

**Abstract**

***Background.*** *Bio-psycho-social frailty can negatively affect the health status of an ageing population. The integration between community nurses and social services can emphasize community care and prevent the onset of both health and social negative outcomes in the older population. The aim of the paper is to explore the causal association through the analysis of the hospitalization and mortality rate after a pro-active social service integrated by the community nurse.*

***Study Design.*** *A nested case-control study comparing groups of older adults has been carried out. Methods. The paper compares data stem from a cohort followed up by the University of Rome "Tor Vergata" with data from the "Long Live the Elderly!" program (LLE) cohort.*

***Results.*** *One-year standardized mortality rate was 6.5%, 4.7% and 7.5% in the control group, the LLE group and the LLE group integrated by the community nurse (LLE-CN), respectively. One-year hospitalization rate was 15.4%, 15.5% and 10.8% in the control group, the LLE group and the LLE-CN group, respectively.*

***Conclusions.*** *According to our results a social service with a pro-active approach, integrated by the community nurse, appears to be able to reduce mortality and hospitalization in a group of older adults aged>75. The multidimensional assessment of frailty stands for the first step of a new organization of community services.*

---

[1] *Department of Biomedicine and Prevention, University of Rome "Tor Vergata", Rome, Italy*

[2] *Community of Sant'Egidio, "Long Live the Elderly!" program; ASL Roma 3, Rome, Italy*

[3] *Master of Nursing Sciences, University of Rome "Tor Vergata", Rome, Italy*

[4] *University of L.U.M.S.A., Rome, Italy*

**Author Contributions:** Conceptualization, L.G., M. O. and A.N.; methodology, L.P; software, L. G. and G. S.; formal analysis, I.M.C.; investigation, C. E., A.L. and T. A.; resources, N.A. and E.C.; data curation, S.G.; writing—original draft preparation, T. E.; writing—review and editing, T.E. and S.G.; visualization, A.T. and A.L.; supervision, S.O., L.G. and F.R.; project administration, L.G. and M.M.C. All authors have read and agreed to the published version of the manuscript."

Annali di Igiene : Medicina Preventiva e di Comunità (Ann Ig)
ISSN 1120-9135 https://www.annali-igiene.it

## Introduction

Population ageing is associated to the increase of chronic disease prevalence and social fragmentation (1, 2). Both these factors imply the need of improving community care (3), which is a challenge for current models of care (2, 4). Additional challenges stem from the increasing frequency of emergencies like heatwaves (5) or epidemics (6, 7), that exploit the demand for care, especially from socially isolated individuals and urge need for improving the cycle of hospitalization and discharge (8).

All these things are associated with new social and health needs for care at community level. A Community care model based on taking in charge through a holistic approach gives more effective answers than approaches based on selected fields (only health or only social field etc.). A paradigm shift is needed: to overcome the model based on the provision of services towards a health initiative based on early management, community care, self-help and empowerment, integrating social and health services (3, 9).

The paradigm shift requires a proactive approach (10) extended to families and community that can be led by the community nurses (CNs). Community nurse interacts with all actors belonging to the community both professionals and non-professionals (such as general practitioners, social workers, physiotherapists, pharmacists, volunteers, associations, parishes, and others). This co-operation enhances health system performances and mobilizes informal resources contributing to the development of generative welfare (3, 11). Moreover, the development of personalized care plans is an important factor to improve quality of life. This is possible through the collaboration between primary care practitioners and community nurses (12). Focal points of professional home care are centrality of the patient starting from his/her active involvement and training, inter-professional collaboration, training of staff dedicated to care, and analysis of the services' effectiveness based on impact data (13).

Some studies associated community nurse intervention with blood and non-blood indicators (such as diastolic or systolic blood pressure (14, 15), total cholesterol and LDL, triglycerides, glycated hemoglobin (16) and also quality of life (17) in the context of chronic pathologies (18). Few studies have directly evaluate the effects of community nurses' interventions on family caregivers considering outcomes such as burden, coping, quality of life, self-efficacy, and depression (19-21).

There are several studies associating the evaluation of frailty to negative outcomes as mortality (22, 23), hospitalization (24), and malnutrition (25), but the association of Community Nurses with a proactive social intervention carried out by Social Workers is not studied at all, to our knowledge.

However, the impact in terms of public health is rarely assessed as outcome of the activities of community nurses, only one systematic review and meta-analysis has been conducted to evaluate the impact of these care models on the older population (26). This lack of literature suggested the necessity to study the community nurse as a proactive intervention in terms of public health.

Aim of this paper is to assess the causal association of an integrated social and health program made up by the collaboration between a strong social intervention with the community nurse activity.

## 1. Experimental Section

### *1.1 Study design*

The study is a nested case control study comparing groups of older adults having access to different kind of services. The comparison is among data stem from a cohort followed up by the University of "Tor

Vergata" with data from the "Long Live the Elderly!" (LLE) program routine activity and data gathered through the activities of Community Nurses in a selected sample of the LLE program.

For the Standard of Care (SoC) cohort the data were selected from a pre-existing cohort of people aged > 65 residents in the Lazio Region, and was followed by the University of Rome "Tor Vergata" and included residents over 65 who had access to the standard of care of the Lazio Regional Health and Social System. Data collection was carried out between January and December 2014 by five nurses from the list of GPs available to participate in the study (27, 28).

In the two samples selected within the LLE program, the data were collected between November 2018 and March 2019 both in Rome and Naples. All data were collected during the program's routine activity.

The whole paper was developed according to the "STROBE" checklist to standardize the study processing method (29).

*1.2 The "Long Live the Elderly!" program*

The study was carried out on the "Long Live the Elderly!" program. It is based on a universal approach that aims to reach all the over-seventy-fives residents in the area of intervention with a special focus on the over-80s. The social operators of the program perform a proactive search to reach older adults through telephone calls, home visits, organization of dedicated activities and create a personalized care plan which is periodically re-evaluated. The aim of the program is counteracting social isolation by increasing social capital at both individual and population level (5). The reference municipality provides the list of the older adults living in the territory where the project is carried out. LLE focuses on the frailest people and fosters the growth of a network of volunteers (such as neighbors) and professionals (such as the General Practitioner, the pharmacist, the owner of the grocery store, for example) around them. This network may be useful to prevent negative consequences for the over-75 citizens' health during an emergency like a heat wave. The evaluation is followed by the interventions that are identified in collaboration with social workers. Within the program, social workers drafted the individualized care plan, coordinated the intervention to implement it at the older population, and took care of their specific social needs.

Table 1 - Interventions performed by the multidisciplinary teams

| Intervention performed | Number of cases |
|---|---|
| Changing the environment to prevent home falls | 79 |
| Socialization | 74 |
| Medication review | 29 |
| Education to have a correct diet | 25 |
| Support to search for a paid assistant | 17 |
| Social support to the household | 14 |
| Home care | 6 |
| Emotional and psychological support | 4 |

The interventions performed by community nurses in the LLE-CN group were carried out thanks to the professional integration among nurses, social workers, psychologist, and general practitioners, to provide greater assistance to patients (Table 1).These interventions reflect the specific needs of the elderly both in the social and health fields. The most frequent intervention is the correction of the risk factors of domestic fall, followed by socialization interventions and by the review and management of drug therapy.

*1.3 Partecipants*

The entire cohort was made up by 1051 individuals.

• SoC: 664 older people aged> 75 were included in this cohort. They were selected

by randomization among the residents of the Lazio Region, from the list of general practitioners available to participate in the study; participation in the study involved the administration of the questionnaire for the assessment of frailty. The original cohort included residents over 65 who had access to the standard of care of the Lazio Regional Health and Social System (9, 10), of which only residents over 75 were included in this analysis. The exclusion criteria were aged less than 75 and have not participate in the previous study (27,28).

• LLE: consists of 207 "Long Live the Elderly!" (LLE) clients who access only the social intervention. The LLE group was selected by randomization among the clients of the LLE program. The inclusion criteria were having underwent the assessment of frailty, being> 75 years old, and living at home (residence in Rome or Naples) at the time of data collection

• LLE- CN: the cohort was composed of 180 LLE clients accessing both social intervention and community nursing. The last group included seniors participating to the LLE program in the Rome or Naples LLE program indicated by social workers for specific health needs. The inclusion criteria were: age> 75, participate to the LLE program, having been assessed for frailty, be resident in Rome or Naples, and the four additional criteria that make theme suitable for the community nurse intervention based on the social worker evaluation: potential risk of falls, extensive polypharmacy, unbalanced health condition, and dietary prescription.

*1.4 Variables and Outcome*

The primary outcome was to explore the association after the intervention of the Community Nurse in terms of mortality and hospitalization. Demographic variables and frailty have been included in the analysis as potential confounders to increase the comparability among the groups.

Beyond age and gender, the main variables investigated to meet the study objective were:

*Mortality:* To investigate the association with community nurse intervention, it was necessary to analyze one-year mortality in the three study cohorts.

*Hospitalization:* to understand if community nursing intervention was associated with recurrent hospitalizations, and if it influenced public health.

*Level of frailty:* this variable was essential to compare the three study cohorts.

*1.5 Measurement*

Mortality and Hospitalization have been assessed by the analysis of health Regional database and by following up by phone the participants.

The demographic variables have been gathered by administering the questionnaire to assess frailty, that includes a demographic section.

The multidimensional instruments to assess bio-psycho-social frailty was the Functional Geriatric Evaluation (30): it is a development of the GRAUER Functional Rating Scale modified and validated by Palombi et al. (31-33). The aim of the questionnaire is to assess the degree of frailty of the interviewee. The key aspect of the questionnaire is multidimensionality: it investigates various areas of analysis such as the physical, mental, functional, and socio-economic domains. The final synthetic score allows to identify classes of risk: very frail (score <10), frail (score > 10 but <50), pre-frail (score > 50 but <70), robust (score >70). This score is useful to differentiate people with a high need for care, a high risk of mortality and hospitalization/institutionalization from those that do not need care services but just an active monitoring or a periodic re-evaluation of self-sufficiency (31).

The community nurse used three tools to investigate specific aspect of interviewed

needs for care in addition to the frailty assessment:

- Home Fall Prevention Checklist (34) to evaluate the Risk of falling at home.
- Mini Nutritional Assessment (MNA ®) (35-37) to investigate the Nutritional status in older people.
-Therapy compliance (with the collaboration of General Practitioners) to assess problems related to taking medications (38).

*1.6 Statistical analysis*

The statistical analysis was carried out on data gathered from September 2019 to January 2020, through IBM SPSS Statistics 25.0 package. It included descriptive analyses, calculation of mortality and hospitalization rates. To overcome biases due to the different composition of sub samples in terms of age and level of frailty the standardized rates have been calculated by the indirect standardization procedure applying age, gender and frailty specific rate of the standard of care population to the other two populations to calculate the Standardized Mortality Ratio (SMR) . Other biases that did not possible overcome by the statistical methods, have been described as limitation of the study.

*1.7 Ethical consideration*

All data collection conducted in this study is in accordance with the ethical standards of the Helsinki Declaration of 1965 and its subsequent amendments. Moreover, written consent to the processing of sensitive data and to the execution of routine activities is required for all participants in "Long Live the Elderly!" program. For the participants to the standard of care cohort the study was approved by the Independent Ethical Committee of the University of Rome "Tor Vergata" (27).

## Results

Table 2 describes the population (N. 1031) by socio-demographic variables (gender, age classes and level of frailty) according to the intervention carried out.

The SoC group is younger and with higher percentage of females than the interventions group (Table 2).

Table 2 - Baseline parameters and characterization variables of the three groups of study (Standard of Care, "Long Live the Elderly!" program and "Long Live the Elderly!" program with Community Nurse)

| Variables | Standard of care | LLE | LLE-CN |
|---|---|---|---|
| | n (%) | n (%) | n (%) |
| Sample (N. 1031) | 644 (62.5) | 207 (20.1) | 180 (17.4) |
| Gender | | | |
| Male | 297 (46.1) | 60 (29.0) | 66 (36.7)NS |
| Female | 347 (53.9)** | 147 (71.0)** | 114 (63.3)** |
| Frailty | | | |
| Robust | 184 (28.6)* | 39 (19.3)* | 14 (7.8)* |
| Pre-frail | 258 (40.1)* | 46 (22.8)* | 41 (22.8)* |
| Frail | 121 (18.8)* | 58 (28.7)* | 65 (36.1)* |
| Very frail | 81 (12.5)* | 59 (29.2)* | 60 (33.3)* |
| Age (years) | | | |
| < 85 | 502 (78.0) | 106 (51.2) | 107 (59.4) |
| > 85 | 142 (22.0) | 101 (48.8) | 73 (40.6) |
| M ± SD (IC) | 81.9 ± 4.8 (81.6– 82.3)** | 85.2 ± 4.5 (84.4 – 85.8)** | 84.2 ± 5.0 (83.4 – 85.0)** |

Note: M = Mean; SD= Standard Deviation; CI = Confidence Interval (95%); * $p < 0.05$; ** $p < 0.001$; NS= Not Significative

Table 3 - One-year mortality rate and hospitalized in the first year in the three groups of study(indirect standardization)

| | One-year mortality rate | Hospitalized in the first year |
|---|---|---|
| Standard of Care | 6.5% | 15.4% |
| LLE | 4.7%* | 15.5%** |
| LLE-CN | 7.5%** | 10.8%* |

Note: * $p < 0.05$; ** $p > 0.05$

The number of those who were robust decreases progressively from 28.6% to 19.3% and to 7.8% in the control group, the LLE group and the LLE-CN, respectively (Table 2). The prevalence of frailty ($p < 0.05$) increases progressively across the three groups.

Mortality and hospitalization rates show different trends across the three groups.

One-year mortality rate according to intervention adjusted for frailty level, gender, and age (table 3) is 6.5% in the SoC group; 4.7% ($p > 0.05$) in LLE group and 7.5% ($p > 0.05$)) in LLE-CN group.

The percentage of citizens hospitalized in the first year after the assessment of frailty adjusted for frailty level, gender and for age is 15.4% 15.5% ($p > 0.05$) and 10.8% in SoC group, the LLE group and the LLE+CN respectively (Table 3). Despite the decreasing trend, the differences in hospitalization and mortality rates are not statistically significant.

The hospitalization rate in the first year after the assessment of frailty varies according to frailty level. In the SoC group hospitalization rate grows from 11% among robust to 29.8% among very frail. In the LLE group hospitalization rate decreases from 19.4% among robust to 14.3% among very frail. In LLE-CN group hospitalization rate goes from 15.4% among robust to 12.5% among very frail ($p< 0.03$) (Table 4).

## Discussion

The main aim of this study was to evaluate the hospitalization and mortality of three groups of frail elderly undergoing three different kinds of care.

The three groups under study showed differences in all characterization variables: a greater prevalence of women in LLE and LLE-CN compared to the control cohort associated with a greater prevalence of older ages. The frailty rate was also higher in the same two samples, especially in the sample that received the intervention integrated with the community nurse. This is probably due to the criteria used from social workers to select patient for the community nurse intervention, in fact in many cases

Table 4 - Hospitalization Rate according to Intervention and frailty level in the first year after the assessment of frailty

| | Standard of Care | LLE | LLE-CN |
|---|---|---|---|
| Level of frailty | | | |
| Robust | 11.0%* | 19.4%NS | 15.4% NS |
| Pre-frail | 16.5%* | 15.6% NS | 7.7% NS |
| Frail | 20.0%* | 16.1% NS | 8.6% NS |
| Very Frail | 29.8%* | 14.3% NS | 12.5% NS |

Note. ** $p > 0.05$; NS = Not Significative

the criteria are associated to worse clinical condition which are risk factor for higher frailty. This is the possible explanation of the higher mortality rate recorded in the LLE-CN group compared whit the LLE group Mortality was lower in the LLE group compared with the SoC even if frailty was more prevalent: this could be considered an effect of the LLE program that is aimed at managing multidimensional frailty. Use of comprehensive multidimensional evaluation has been already associated to better outcome in terms of survival (5, 26), so that this result is not surprising. Interestingly, the LLE program is mainly providing social intervention which, in the framework of a multidimensional evaluation, showed to be able to improve survival (5-7).

Regarding hospitalization, a complete reversal of the hospitalization trend by level of frailty is noted when moving from the SoC cohort to is the ones followed by the program. In the control cohort the one-year hospitalization rate increases with the increasing level of frailty, from 11% among the robust to 29.8% among the very frail. On the other hand, in the sample followed by the program we observe the opposite trend, so the frailest are hospitalized less than the others. Probably, it can be explained with the efforts of the program to focus on the frailest, preventing the worsening of individuals' health and improving the citizens' quality of life. In the third group, that is the one followed with the intervention of CN, the same trend is not observed, even if very frail continue to be less hospitalized then robust. Frail and pre-frail, in the third group, experience a great decrease of the hospitalization rate (8.6% and 7.7% respectively); the highest rate associated with very frail is probably due to the higher prevalence of severe diseases. It is worth of note that a program providing social intervention can have an association with the hospitalization rate; it means that social factors are related to hospitalization. At the same time the results of the paper showed the effectiveness of addressing the social component of frailty with interventions that result in improving parameters associated to the health status like hospitalization. Many evidences from international literature underline the impact of lack of social resources on health status. Here we have the evidence that rebuilding social capital in citizens with social resources scarcity, could fill the gap and improve health status parameters. The result in the LLE-CN group are not so linear as in the other group probably for the impact of CN's intervention related to the individual mix of diseases and diseases' severity.

International literature provides some information about the impact of Community Nurses on hospitalization rate. Consistent with our results Hamar et al. shows that the admission rate decreases in the intervention group, who receives calls from trained nurse-counsellors, compared to the control (10.8% Vs 15.4%) (39) as well as in studies with smaller sample (40-44). The dose-response relationship (the admission rate decrease as the number of call increases) underlined by Hamar et al is also highlighted in the LLE group of our study.

In 2010, Aguado et al. finds fewer unplanned readmissions and emergency department visits in the intervention group than the control one (45). It was the result of an intervention consisted in a home visit by trained nurse who assessed and educated patients. These data refer to the two-year follow-up and are statistically significant. Schubert et al shows that in GRACE group (Geriatric Resources for Assessment and Care of Elders) hospital admission rate decreases as opposite to the control one (46).

Mortality and hospitalization are not often evaluated outcomes in primary care studies. Studies that analyse mortality as an outcome are mostly concerning cardiovascular events: coronary heart disease (47, 48) and chronic

heart failure (49, 50). In these four studies the number of deaths in the group undergoing to nurse support intervention was lower than the control, even if just two of them achieve statistically significant results in favor of the intervention.

Community nurse is a strategic element of the "continuum of care". The community nurse care model is a "relational model". It focuses on the person, his/her family and the community considering them within a network of formal and informal relationships and connections (3).

Some authors suggest that the community nurse is associated to an increase of individual and community well-being. Moreover, a cornerstone of the community nurse is the promotion of respect for human dignity (51). In European countries, as in many others, professional care at home is raising steadily (52) and whenever possible, home is the preferred place of treatment chosen by most patients with severe diseases (13).

However, the type of intervention ran by the community nurse is not exactly coded in literature. This leads to a wide variety of types of intervention collected under the general definition of community nursing. This lack of homogeneity makes the results of the interventions difficult to compare in some cases.

Risk of falling was detected in almost 50% of the subjects. Nutritional counselling is necessary to effectively address the theme of malnutrition which is often associated with obesity and less frequently with a protein or calories deficiency condition. The intervention achieved the reduction of hospital admissions compared with standard of care intervention probably because of the positive association with these aspects of daily life.

A noteworthy aspect of our study is that most of the interventions carried out by the LLE program are purely social interventions: however, the integration with the CNs resulted in a synergistic effect that reduced hospitalization rate. Although it is often reported as a fundamental aspect of the integration of health and social interventions at community level, community nurses are still rarely implemented. The results of this study underline the crucial relevance of the care service integration to achieve the improvement of quality of life as well as a better performance from the public health point of view. However, the effectiveness of CN is often discussed in terms of clinical, economic, or experiential aspects but leaving out the causal association from the public heath point of view does not allow a comprehensive evaluation.

*1. Limitation*

Limitations of the study include that the CNs participating in the study are Registered Nurses in training, therefore they are authorized to limited number of interventions as assessment, health promotion and liaison with other professionals. Another limitation is that the study was conducted in two different cities that have different hospital and non-hospital services. In addition, subjects recorded were exposed to various factors affecting mortality such as the time of observation. Despite this bias, an attempt was made to mitigate the difference between the cohorts as they were studied during the 2019 heat wave (LLE and LLE-CN) and the 2015 heat wave (SoC).

## Conclusions

In conclusion, according to our results a social service with a pro-active approach, integrated by the community nurse, appears to be able to reduce mortality and hospitalization in a group of older adults aged >75. The integration of the social and health services seems even more effective than the services taken individually. The evaluation of bio-psycho-social frailty stands for the first step towards a new organization of territorial services.

The implications for the future foresee that the study should be conducted on the role played by health and social integration in the effectiveness of community care, in order to put the basis for extending this good practice.

**Funding:** "This research received no external funding"

**Conflicts of Interest:** The authors declare that they have no conflict of interest to influence the work reported in this paper.

**Author Contributions:** Conceptualization, L.G., M. O., L.P. and A.N.; methodology, L.P; .; data analysis, G.L. and G.S; investigation, C. E., A.L. and T. A.; resources, N.A. and E.C. ; data curation, G.S. and I.M.C.; writing—original draft preparation, T. E.; writing—review and editing, T.E. and G.S.; visualization, A.T. and A.L.; supervision, S.O., L.G. and F.R.; project administration, L.G. and M.M.C. All authors have read and agreed to the published version of the manuscript.

## Riassunto

***L'effetto dell'Infermiere di Comunità sulla Mortalità ed Ospedalizzazione in un gruppo di anziani over-75: uno studio caso-controllo nidificato***

**Background.** La fragilità bio-psico-sociale associata alla popolazione anziana può influire negativamente sullo stato di salute. L'integrazione tra l'infermieristica di comunità e i servizi sociali può migliorare l'assistenza e prevenire l'insorgenza di esiti negativi nella popolazione anziana. L'obiettivo del documento è esplorare l'associazione causale attraverso l'analisi del tasso di ospedalizzazione e mortalità a seguito di un servizio sociale proattivo integrato dall'infermiere di comunità.

**Disegno dello studio.** È stato condotto uno studio retrospettivo caso-controllo nidificato che confronta gruppi di anziani. Metodi. lo studio confronta i dati derivanti da una coorte seguita dall'Università di "Tor Vergata" con i dati del programma "Viva gli Anziani!" (LLE).

**Risultati.** Il tasso di mortalità standardizzato ad un anno è stato del 6.5%, nel gruppo di controllo, 4.7%, nel gruppo LLE e 7.5% nel gruppo LLE integrato con l'infermiere di comunità (LLE-CN). Il tasso di ospedalizzazione di un anno è stato del 15.4% nel gruppo di controllo, 15.5% nel gruppo LLE e 10.8% nel gruppo LLE-CN.

**Conclusioni.** In base ai nostri risultati, un servizio sociale con un approccio proattivo, integrato con l'infermieristica di comunità, sembra essere in grado di ridurre la mortalità e il ricovero in un gruppo di anziani di età> 75 anni. La valutazione della fragilità multidimensionale rappresenta il primo passo di una nuova organizzazione di servizi territoriali.

## References

1. Eurostat. Household Composition Statistics, 2019. Available on: https://ec.europa.eu/eurostat/statistics-explained/ [Last accessed: 2020, Oct 5].
2. Bone AE, Morgan M, Maddocks M, et al. Developing a model of short-term integrated palliative and supportive care for frail older people in community settings: perspectives of older people, carers and other key stakeholders. Age Ageing 2016; **45**(6): 863-73. doi:10.1093/ageing/afw124.
3. Pellizzari M. L'infermiere Di Comunità - Dalla Teoria Alla Prassi. McGraw-Hill Education, 2008.
4. Murray CJL, Vos T, Lozano R, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: A systematic analysis for the Global Burden of Disease Study 2010. Lancet 2012; **380**(9859): 2197-223. doi: 10.1016/S0140-6736(12)61689-4.
5. Liotta G, Inzerilli MC, Palombi L, et al. Social Interventions to Prevent Heat-Related Mortality in the Older Adult in Rome, Italy: A Quasi-Experimental Study. Int J Environ Res Public Health 2018; **15**(4): 715. doi: 10.3390/ijerph15040715.
6. Liotta G, Marazzi MC, Orlando S, Palombi L. Is social connectedness a risk factor for the spreading of COVID-19 among older adults? The Italian paradox. PLoS One 2020; **15**(5): e0233329. eCollection 2020. doi: 10.1371/journal.pone.02333.29
7. Palombi L, Liotta G, Orlando S, Emberti Gialloreti L, Marazzi MC. Does the Coronavirus (COVID-19) Pandemic Call for a New Model of Older People Care? Front Public Health 2020; 8. doi: 10.3389/fpubh.2020.00311.
8. Horrocks S, Pollard K, Duncan L, et al. Measuring quality in community nursing: a mixed-methods study. Health Serv Deliv Res 2018; **6**(18): 1-132. doi:10.3310/hsdr06180.
9. Liotta G, Ussai S, Illario M, et al. Frailty as the Future Core Business of Public Health: Report of the Activities of the A3 Action Group of the European Innovation Partnership on Active and Healthy Ageing (EIP on AHA). Int J Environ

Res Public Health 2018; **15**(12). doi:10.3390/ijerph15122843.
10. Yu R, Tong C, Woo J. Effect of an integrated care model for pre-frail and frail older people living in community. Age Ageing June 2020. doi:10.1093/ageing/afaa087.
11. Ganann R, Weeres A, Lam A, Chung H, Valaitis R. Optimization of home care nurses in Canada: A scoping review. Heal Soc Care Community 2019; **27**(5): e604-e621. doi:10.1111/hsc.12797.
12. Garrard JW, Cox NJ, Dodds RM, Roberts HC, Sayer AA. Comprehensive geriatric assessment in primary care: a systematic review. Aging Clin Exp Res 2019; **32**(2): 197-205. doi:10.1007/s40520-019-01183-w.
13. Vaartio-Rajalin H, Fagerström L. Professional care at home: Patient-centredness, interprofessionality and effectivity? A scoping review. Health Soc Care Community 2019; **27**(4): e270-e288. doi:10.1111/hsc.12731.
14. Shea S, Weinstock RS, Teresi JA, et al. A Randomized Trial Comparing Telemedicine Case Management with Usual Care in Older, Ethnically Diverse, Medically Underserved Patients with Diabetes Mellitus: 5 Year Results of the IDEATel Study. J Am Med Informatics Assoc 2009; **16**(4): 446-56. doi:10.1197/jamia.M3157.
15. Rudd P, Houstonmiller N, Kaufman J, et al. Nurse management for hypertension. A systems approach. Am J Hypertens 2004; **17**(10): 921-7. doi:10.1016/j.amjhyper.2004.06.006.
16. Taylor CB, Miller NH, Reilly KR, et al. Evaluation of a nurse-care management system to improve outcomes in patients with complicated diabetes. Diabetes Care 2003; **26**(4): 1058-63. doi:10.2337/diacare.26.4.1058.
17. Walters J, Cameron-Tucker H, Wills K, et al. Effects of telephone health mentoring in community-recruited chronic obstructive pulmonary disease on self-management capacity, quality of life and psychological morbidity: A randomised controlled trial. BMJ Open 2013; **3**(9). doi:10.1136/bmjopen-2013-003097.
18. Massimi A, De Vito C, Brufola I, et al. Are community-based nurse-led self-management support interventions effective in chronic patients? Results of a systematic review and meta-analysis. PLoS One 2017; **12**(3): e0173617. doi:10.1371/journal.pone.0173617.
19. Becqué YN, Rietjens JAC, van Driel AG, van der Heide A, Witkamp E. Nursing interventions to support family caregivers in end-of-life care at home: A systematic narrative review. Int J Nurs Stud 2019; **97**: 28-39. doi:10.1016/j.ijnurstu.2019.04.011.
20. Bischoff EWMA, Akkermans R, Bourbeau J, Van Weel C, Vercoulen JH, Schermer TRJ. Comprehensive self management and routine monitoring in chronic obstructive pulmonary disease patients in general practice: Randomised controlled trial. BMJ 2012; **345**(7885). doi:10.1136/bmj.e7642.
21. Cramm JM, Nieboer AP. Self-management abilities and quality of life among frail community-dwelling individuals: the role of community nurses in the Netherlands. Health Soc Care Community 2017; **25**(2): 394-401. doi:10.1111/hsc.12318.
22. Ofori-Asenso R, Chin KL, Sahle BW, Mazidi M, Zullo AR, Liew D. Frailty confers high mortality risk across different populations: Evidence from an overview of systematic reviews and meta-analyses. Geriatrics 2020; **5**(1): 1-2. doi:10.3390/GERIATRICS5010017.
23. Coelho T, Paúl C, Gobbens RJJ, Fernandes L. Frailty as a predictor of short-term adverse outcomes. PeerJ 2015; **3**: e1121. doi:10.7717/peerj.1121.
24. Wen YC, Chen LK, Hsiao FY. Predicting mortality and hospitalization of older adults by the multimorbidity frailty index. PLoS One 2017; **12**(11). doi:10.1371/journal.pone.0187825.
25. Muszalik M, Gurtowski M, Doroszkiewicz H, Gobbens RJJ, Kędziora-Kornatowska K. Assessment of the relationship between frailty syndrome and the nutritional status of older patients. Clin Interv Aging 2019; **14**: 773-80. doi:10.2147/CIA.S201835.
26. Deschodt M, Laurent G, Cornelissen L, et al. Core components and impact of nurse-led integrated care models for home-dwelling older people: A systematic review and meta-analysis. Int J Nurs Stud 2020; **105**: 103552. doi:10.1016/j.ijnurstu.2020.103552.
27. Von Elm E, Altman DG, Egger M, et al. STROBE Statement: Linee Guida per descrivere gli studi osservazionali. Trad Ital. Terapia Evidence Based 2008; **1**(1).
28. Liotta G, O'Caoimh R, Gilardi F, et al. Assessment of frailty in community-dwelling older adults residents in the Lazio region (Italy): A model to plan regional community-based

services. Arch Gerontol Geriatr 2017; **68**: 1-7. doi:10.1016/j.archger.2016.08.004.
29. Liotta G, Gilardi F, Orlando S, et al. Cost of hospital care for the older adults according to their level of frailty. A cohort study in the Lazio region, Italy. PLoS One 2019; **14**(6): e0217829. doi:10.1371/journal.pone.0217829.
30. Capanna A, Scarcella P, Gilardi F, et al. Sensitivity and Specificity of a Short Questionnaire to Screen Frailty in the Community-Dwelling Older Population. Adv Aging Res 2018; **07**(03): 52-63. doi:10.4236/aar.2018.73005.
31. Palombi L, Liotta G, Scarcella P, Gilardi F, eds. Rapporto La valutazione del grado di fragilità e del fabbisogno di assistenza continuativa degli ultrasessantaquattrenni nel Lazio. Available on: https://biomedicinaeprevenzione.uniroma2.it/uploads/9/3/7/9/93798184/report_screening_fragilità.pdf. Published 2015 [Last accessed: 2020, Oct 5].
32. Grauer H, Birnbom F. A geriatric functional rating scale to determine the need for institutional care. J Am Geriatr Soc 1975; **23**(10): 472-6. doi:10.1111/j.1532-5415.1975.tb00933.x.
33. Scarcella P, Liotta G, Marazzi MC, Carbini R, Palombi L. Analysis of survival in a sample of elderly patients from Ragusa, Italy on the basis of a primary care level multidimensional evaluation. Arch Gerontol Geriatr 2005; **40**(2): 147-56. doi:10.1016/j.archger.2004.07.004.
34. Centers for Disease Control and Prevention (CDC). Check for Safety a Home Prevention Checklist for Older Adults. 2005. Available on: https://www.cdc.gov/steadi/pdf/check_for_safety_brochure-a.pdf [Last accessed: 2020, Oct 5].
35. Vellas B, Villars H, Abellan G, et al. Overview of the MNA® - Its history and challenges. J Nutr Health Aging 2006; **10**(6): 456-63.
36. Guigoz Y. The Mini Nutritional Assessment (MNA®) review of the literature - What does it tell us? J Nutr Health Aging 2006; **10**(6): 466-85.
37. Rubenstein LZ, Harker JO, Salvà A, Guigoz Y, Vellas B. Screening for undernutrition in geriatric practice: developing the short-form mini-nutritional assessment (MNA-SF). J Gerontol A Biol Sci Med Sci 2001; **56**(6): M366-72. doi:10.1093/gerona/56.6.m366.
38. Pharmaceutical Care Network Europe. DRP-Registration Form V6.2 (PCNE Classification), 2010.
39. Hamar B, Wells A, Gandy W, et al. The impact of a proactive chronic care management program on hospital admission rates in a German health insurance society. Popul Health Manag 2010; 13(6): 339-45. doi:10.1089/pop.2010.0032.
40. Delaney C, Apostolidis B. Pilot testing of a multicomponent home care intervention for older adults with heart failure: an academic clinical partnership. J Cardiovasc Nurs 2010; 25(5): E27-40. doi:10.1097/JCN.0b013e3181da2f79.
41. Huggins CM, Phillips CY. Using case management with clinical plans to improve patient outcomes. Home Healthc Nurse 1998; 16(1): 15-20.
42. Moore JAM. Evaluation of the efficacy of a nurse practitioner-led home-based congestive heart failure clinical pathway. Home Health Care Serv Q 2016; 35(1): 39-51. doi:10.1080/01621424.2016.1175992.
43. Rondinini L, Coceani M, Borelli G, et al. Survival and hospitalization in a nurse-led domiciliary intervention for elderly heart failure patients. J Cardiovasc Med (Hagerstown) 2008; **9**(5): 470-5. doi:10.2459/JCM.0b013e3282f19350.
44. Young W, Rewa G, Goodman SG, et al. Evaluation of a community-based inner-city disease management program for postmyocardial infarction patients: A randomized controlled trial. CMAJ 2003; **169**(9): 905-10.
45. Aguado O, Morcillo C, Delàs J, et al. Long-term implications of a single home-based educational intervention in patients with heart failure. Heart Lung 2010; **39**(6 Suppl): S14-22. doi:10.1016/j.hrtlng.2010.04.010.
46. Schubert CC, Myers LJ, Allen K, Counsell SR. Implementing Geriatric Resources for Assessment and Care of Elders Team Care in a Veterans Affairs Medical Center: Lessons Learned and Effects Observed. J Am Geriatr Soc 2016; **64**(7): 1503-9. doi:10.1111/jgs.14179.
47. Delaney EK, Murchie P, Lee AJ, Ritchie LD, Campbell NC. Secondary prevention clinics for coronary heart disease: a 10-year follow-up of a randomised controlled trial in primary care. Heart 2008; **94**(11): 1419-23. doi:10.1136/hrt.2007.126144.
48. Murchie P, Campbell NC, Ritchie LD, Simpson JA, Thain J. Secondary prevention clinics for coronary heart disease: Four year follow up of a randomised controlled trial in primary care. BMJ 2003; **326**(7380): 84-7. doi:10.1136/bmj.326.7380.84.
49. Galbreath AD, Krasuski RA, Smith B, et al. Long-term healthcare and cost outcomes of

disease management in a large, randomized, community-based population with heart failure. Circulation 2004; **110**(23): 3518-26.
50. Sisk JE, Hebert PL, Horowitz CR, McLaughlin MA, Wang JJ, Chassin MR. Effects of nurse management on the quality of heart failure care in minority communities: A randomized trial. Ann Intern Med 2006; **145**(4): 273-83. doi:10.7326/0003-4819-145-4-200608150-00007.
51. Muntean A, Tomita M, Ungureanu R. The Role of the Community Nurse in Promoting Health and Human Diginity. Iran J Public Health 2013; **42**(10): 1077-84.
52. Rostgaard T, Szebehely M. Changing policies, changing patterns of care: Danish and Swedish home care at the crossroads. Eur J Ageing 2012; **9**(2): 101-9. doi:10.1007/s10433-011-0209-1.

Corresponding author: Susanna Gentili, RN, MSN, PhD student University of Rome "Tor Vergata", Department of Biomedicine and Prevention, Via Montpellier 1, 00133 Rome, Italy
e-mail: susanna.gentili@outlook.com