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Titolo tesi

***La Casa della Salute* study:**

Integrated care and impact evaluation of the Community Health Centres in Vercelli's ASL after one year of their opening. Results from a survey and Interrupted Time Series Analysis

SSD (Settore Scientifico Disciplinare) della tesi MED-42

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1. Background

This manuscript presents the research project "La Casa della Salute" carried out during the three-years PhD course in collaboration with the Local Health Authority (ASL) of Vercelli and the IRES Piemonte institute.

The manuscript is divided in 6 chapter. In the Chapter 1, we report a literature review of definitions of integrated care and continuity of care concepts. The chapter continues with a brief presentation of the context where the study is implemented with attention to the normative process leading of integrated care in Italy and a focus on Piedmont region. Successively, method and indicators to measure integrated care and continuity of care were presented. Finally, the chapter finishes with a brief presentation of the health context where the Community Health Centres (CHCs) was implemented in Italy.

Chapter 2 presented aims of the study, whereas methods were presented in Chapter 3. Herein, we separately presented the method used for the descriptive study and that used for the evaluation of CHC impact on health, organisational, and economic outcomes.

Results of the study were showed in Chapter 4, which starts with the presentation of the main characteristics of each CHC of Vercelli's ASL and continues with the presentation of results on the measurement of integrated care level in the five CHCs and continuity of care level perceived by patients living near the five CHCs of Vercelli's ASL. Finally, the Chapter concludes with the presentation of results on the impact evaluation.

Results were discussed in Chapter 5 where we presented elements about internal and external validity of results discussing weakness and strengths, whereas some suggestions for research and clinical practice were disclosed in the last chapter (Chapter 6).

1.1. Integrated care and continuity of care: two sides of a coin

The Interest for continuity of care, dating back to the 60ies in North-America, recently became a central topic of studies about health management [1]. Continuity of care and integrated care were originally born in the mental health sector and successively were used in general medicine, pediatrics, nursing, and chronic diseases management. The Health Systems Performance Assessment (HSPA) group of European Commission defined integrated care as "*initiatives seeking to improve outcomes of care by overcoming issues of fragmentation through linkage or co-ordination of services of providers along the continuum of care.*" (HSPA 2017, pg. 2) [2].

Integrated care is often thought in contrast to a sporadic and fragmented care. It is sometimes used as synonymous of coordinated assistance or seamless care, discharge planning, integration of services, or continuum of care [3, 4]. Disease management, care management, managed care, and coordinate care are all synonyms of integrated care [5]. Integrated care includes programmes as

self-management support and patient education, clinical follow-up, case management, disease management, care management, multidisciplinary patient care team, multidisciplinary clinical pathways, interventions for professionals (feedback, reminders, and education), in-depth assessment, personalised care plans, coordinated care, coordination of tailored interventions.

Following the WHO overview on integrated care models [3], there are three type of definitions:

a. Process-based definitions: integration is a method and some models involving funding, administrative, organisational, service delivery and clinical levels planned to create connectivity, alignment, and collaboration among the different care sectors. It aims to increase quality of care, quality of life, system efficiency, and consumer satisfaction toward quality-of-care coordination over time. for example, the classification of Valentijn and colleagues (2011) [6].
b. User-led definitions: integration is thought and planned with patient participation and importance of population and individual needs in process (design, implementation, evaluation).
c. Health system-based definitions: this last approach aims to strengthen person-centred systems toward the promotion of a global system of high-quality services for the course of life. This approach focuses on multidisciplinary teams and standards for care. For example, definitions recognised by European Commission [2].

All these three approaches share idea that integrated care should be centred on individual needs, on their family and communities [3].

Some authors distinguish several types of integrated care. Some examples from literature are showed in Table 1. The European Commission (EC) recalls Shortell et al. (1994) and Simoens and Scott (1999) [2] and identifies four dimensions or targets of integration similar to the dimensions of WHO definition (Table 1). Valentij and colleagues showed a taxonomy of integrated primary care distinguishing two scopes (person-focused and population-based), four type (clinical, professional, organisational, and system), and two enablers (functional and normative) [7, 8].

The WHO's overview recalls Rossi and colleagues (2000) citing a series of models categorised in three main types. Firstly, individual *models* that aims to the individual coordination of high-risk patients and their relatives during life. Examples in literature of these type of models were the case-management, individual care plans, patient-centred medical home in USA. Secondly, disease specific models aim to answer the health needs of a group characterised by a specific disease or health condition. Examples are the chronic-care model, frailty and ageing management, specific care pathways for patients as diabetes, cardiovascular, and COPD pathways. Lastly, the population-based models or models of integrated care aimed to specific population like the USA Veterans Health Administration [3].

Furthermore, integration can be classified by nature of relationships among services and professionals. So, integration can be *horizontal* or *vertical.* The first type imply integration between units/organisations at the same level as well as vertical integration refers to the different stages in the process of delivering services that characterise units involved [2, 3].

WHO also highlights the mechanism distinguishing between the collaboration and coordination of activities at normative levels, called *normative integration*; on the other hand, the coherence of rules and policies at the different levels of an organisation called *systemic integration* [3].

Similarly, Valentijn et al. 2013 presented *functional integration* and *normative integration* as ways to link the micro, meso, and macro levels in a system. These authors introduced the Rainbow Model of Integrated Care (RMIC) as guide for the comprehension of this phenomenon [6–8]. This model recognises six domains of integrated care (clinical, professional, organisational, system, functional, and normative integration) and two principles (person-focused and population-based). While functional integration refers to modalities of financing, information, and management in support to the integrated system, normative is less tangible aspect essential for inter-sectorial collaboration and to ensure consistency between all the levels of a system [6].

Besides, integration can be *real* when there is a sharing of infrastructures and physical assets, or *virtual* when integration is based on networks, alliances, and other contractual arrangements. Furthermore, not only we can identify the *breadth* of integration (integrated care can be addressed to specific individuals, specific diseases, groups, or entire population), but also the *levels* (micro-level aimed to achieve integrated care for an individual; meso-level is focused on groups with the same disease or condition; macro-level when integration is performed at population level with stratification of needs and tailoring of services) [3, 6].

Also, integration is thought into a continuum of *intensity* or *degree* distinguishing between the *full integration* when health and social sectors are integrated into a new organizational model, *partial integration* or *coordination* when integration is between two or more organisations or sectors of health system [2, 3], and *linkage* when there are connections but organisations operate in separate structures maintaining own service responsibilities, funding, rules. Citing Leutz (1999) [9], a relationship is observed between intensity of integration and levels of needs: linkage is a way of integrated care used for low level of needs as well as full integration is often associated to answer high and complex care needs [2]. Finally, integration is categorised considering the *time-span*: from a single episode of care to a life-course approach [3].

However, integrated care implies great impact on care systems concerning different functions, levels, and sectors of social and health systems. It is a multidimensional and complex concept concerning several types of integration, on one side, and conceptual elements linking the different types of integration, on the other [1, 2].

When focus is moved to the point of views of patient, somebody distinguished between integrated care and continuity of care. Like integrated care, continuity of care is also a broad, multidimensional, and complex concept. It implies values, beliefs, and assumptions of different stakeholders that may sometimes be in conflict with each other causing borders fluid leading to difficult conceptualization [10]. Finally, it is often defined in relation to the integrated care concept, but with differences between health and social-health sectors.

For example, continuity of care is defined in terms of affiliation between patients and their practitioners in the primary care field and not in term of coordination between services and professionals. By contrast, in mental health sectors there was a greater attention to the coordination of services (and care plans) and to the stability of the patient-provider relationship overt time where the relationship is typically established with a team of professionals including social workers [4]. Finally, in nursing context, where emphasis was given on communication between nurses and patients, the focus is on coordination of care over time, especially in relation to the discharge planning after acute care. Furthermore, the delivery of services by different providers in a coherent, logical, and timely way is typical of the long-term disease management [4, 11].

However, continuity of care refers to the perception of continuity of care that the patient experienced accessing to the health services. Freeman reviewed the continuity of care concepts identifying six dimensions related to the point of view of patient (experienced care, information continuity, cross-boundary and team continuity, relational continuity) and of professionals (information continuity, longitudinal continuity, cross-boundary and team continuity, and flexible continuity) [10].

Others defined continuity of care identifying three dimensions (informative, relational, and management) [4, 11–13] collecting information from both patient and professionals. Furthermore, they classified continuity of care in three types (see Table 1) linked by two conceptual elements: i) an event that cause health needs including continuity of assistance, and ii) the health system's need to find an answer to emergency (of patient) following new methods [1].

Yet another study showed definition of continuity of care from users identifying four dimensions (longitudinal, relational, flexible, and management) [14]. Similarly, yet another study identified four dimensions (relational, longitudinal, personal and continuous continuity) implying familiarity, commitment, and trust in a therapeutic relationship and one dimension (management) implying integration and teamwork between professionals across disciplinary and organisational borders [15].

Attempting to better clarify the meaning of continuity of care, many authors distinguished between continuity of care and transitional care, discharge planning, or coordinated care identifying two core elements which characterize many definitions: the care of a patient with the focus on the patient, and the care delivered over time. The first element distinguishes between continuity of care

and integrated care concepts which often were interchangeably used generating confusion; on the other hand, the second term identify the continuity of care as longitudinal concept [4, 14, 16].

We briefly showed that literature presents several definitions of these concepts, especially for integrated care, reflecting different perspectives, points of view, and expectations of the different actors of the health system [3, 17]. Although the different definitions in literature, the scientific community agrees upon a fundamental aspect: integrated care and continuity of care imply relations between services, professionals, and patients. While integrated care refers to an approach and methods relating to the health service delivering, the continuity of care refers to the patient perception about the continuity experienced during its care pathway.

Thus, these two concepts represent two sides of a coin: while continuity of care implies the relationship between patient and health worker (i.e., medical doctor, nurse, social workers, and other caregivers), integrated care refers to the relationship between services and professionals to assure better assistance and care to the patient. Considering continuity of care as the perception of patient of the integration of services and professionals of care [12], continuity of care is reached if services and professionals are integrated in the care provision.

Table 1 Dimensions and definitions of continuity of care and integrated care concepts in literature: main results

Authors	Concepts	Dimensions	Definitions
European Commission 2017 [2]	Integrated care	Functional	Integration of key support functions and activities (e.g., financial management, planning and human resources management)
		Organisational	Creation of network, contracting, mergers
		Professionals	Joint working, group practice, contracting and alliance between institutions and organisations
		Clinical	Integration of different component of clinical process (e.g., care pathways)
Kodner and Spreeuwenberg 2002 [18]	Integrated care	Funding	Funding in support to collaboration
		Administrative	Government regulatory and administrative functions planned to support collaboration
		Organisational	Coordination and collaboration between different organisations (vertical and horizontal)
		Service delivery	Modality of delivery of services (staff trained, perform responsibilities and tasks, work together, work related to patients and family needs)
		Clinical	Common professional language and criteria, shared practices and standards, continue communication with patients and feedback
Valentijn 2013 [6]	Integrated care	System	Refers to the alignment of rules and policies within a system: holist approach putting the needs of people at the heart of the system. At system level (macro), integrated care can be vertical and/or horizontal
		Organisational	Refers to the coordination between different organisations supplying services (meso)

Authors	Concepts	Dimensions	Definitions
		Professionals	Refers to the coordination between professionals across different disciplines (meso)
		Clinical	Refers to the coherence of care delivery to individual patients: patient care services are coordinated across different professionals, institutions, and sectors (micro)
		Functional	Coordination of support functions
		Normative	Mission and values shared within a system
WHO 2016 [3]	Integrated care	Organisational	Integration of organisation and institutions by merges, coordinated action and programme, network
		Functional	Integration of non-clinical support and back-office functions (e.g., electronic patient records)
		Service	Integration of different clinical services toward, for example, multidisciplinary teams
		Clinical	Integration of care into a coherent process within and across professions (e.g., shared protocols and guidelines)
Freeman et al. 2001 [10]	Continuity of care and integrated care	Experienced	Relationships between patient and professionals from the patients' point of view
		Information	Exchange and share of clinical data following the patient (i.e., medical records)
		Longitudinal	Few professionals involved consistent with other needs
		Cross-boundary and team continuity	Effective communication between services and professionals and with patient
		Flexible continuity	Care and assistance process adjusted to the needs of the individuals over time
		Relational	Long-term therapeutic relationships
Reid et al. 2002 [12]	Continuity of care	Informative	Communication among professionals and with patient
		Relational	Substantial continual contact between patient and professional, development of confidence and durable relationship, fidelity, membership, and responsibility
		Management	Planning of integrated services at health system level
Mendes et al. 2017 [11]	Continuity of care	Information	Information based on previous events is used to ensure continuity of care
		Management	Consistent approach to manage health care of a user responding to her/his change of needs
		Relationship	When there is a continuous therapeutic relationship between a patient and one or more professionals
Guilliford et al. 2013 [14]	Continuity of care	Longitudinal	Regular follow-up of the patient and his or her illness over time
		Relational	Possibility of urgent consultation with professionals
		Flexible	Degree in which services manage to respond in the face of changes to the needs of users over time
		Management	Degree of coherence and coordination of care between different contexts of care and between different ambulatories and clinics

1.2. A brief history of social-health integration in Italy: from Constitutional Charter to born of the Community Health Centres

The Italian legislative basis of social-health integration is placed among cornerstones of Italian Constitutional Charter (1948) in support to an integrated system of services for assure human rights to citizens of Italian Republic through political, economic, social solidarity (art. 2), and the substantial equality (art. 3).

At the end of 70ies, the Italian Presidential Decree 616/77 represents a great surge forward in the pathway toward the social-health integration with some administrative function passed to Regions and Municipalities including not only social assistance, but also health and hospital care (DPR 616/77). A year later, the Law no. 833 established the born of the National Health System. These two legislative interventions were considered early policies toward the social-health integration, with the USL (Local Health Unit) as territorial places for social-health service management.

During the 80ies, the financial Law no. 730/83 and the DPCM on August 8th, 1985 decreed that the social-health activities must been funded by the NHS (e.g., rehabilitation, care of disabled people, mental disorders, addicted people and elderly). In 1992, the Law no. 104 established importance of social-health integration for handicapped people and successively, integration was recognised also in child and adolescent assistance (Law no. 285/97).

However, only with the Law no. 229/99 the integration process reaches major completeness, with the identification of territorial districts (as subunits of ULS) of NHS as places for social-health integration of services distinguishing services with social importance (e.g., health promotion and prevention), health relevance (oriented to support of disability or social exclusion associated to health outcomes), and high-integration-services (e.g., maternal and child health, elderly, disability, psychiatric diseases, addiction, HIV).

The National Health Plan of 1998/2000 is the first national regulation in which the social-health integration is treated at different levels [21]. Firstly, the Plan allows partnerships among different organizations through consortium, contracting, and agreements among services (as programme agreements) permitting integration at institutional level. Secondly, integration is promoted at management level among health and social structures by multidimensionality and networking. Finally, at professional level the Plan establishes sharing of activities by professionals through multidisciplinary evaluative units and documents sharing. This plan was focused on vulnerable subjects by means inter-profession evaluation of needs, integration of social and health services, and development of integrated home care.

During the first decade of the new millennium, two Ministerial decrees (on 11/29/2001 and 3/21/2008) established social-health care within assistance levels considered basic (Livelli Essenziali di Assistenza), whereas the Constitutional Law no. 3 in 2001 converts the Italian State from manager of health

services to guarantor of health equity. About social services, the integration of services is started with the Law no. 328/00.

In 2006, the financial Law no. 296 established public funding for Italian regions in supporting to experimentation of Community Health Centres (CHCs) defined as functional and/or structural models that offer social-health services through special and functional continuity of services and professionals and with their integration. Thus, the CHCs were formally recognised as places for primary care with a wide range of services and professionals: General Practitioners (GPs), continuity of care and assistance, nurses, specialistic doctors, laboratory analyses, diagnostical specialists, social workers work in integrated way to assure medical and nursing care, continuity of care, share of data and medical records, supply of health and social services person-centred, simplification of access to other services.

1.2.1. The regional and local context of the study

In 2008, 23 experimentations of Primary Care Groups (PCGs) started in Piedmont involved 220 General Practitioners and almost 2300 patients: this was the first type of physical integration of some professionals of primary care, specialistic care, social care, and administrative services. Some years later (2012), many small old hospitals were converted into polyfunctional structures for Primary Care Centres (PCCs) in which GPs and services of Health Districts worked together for primary care and assistance.

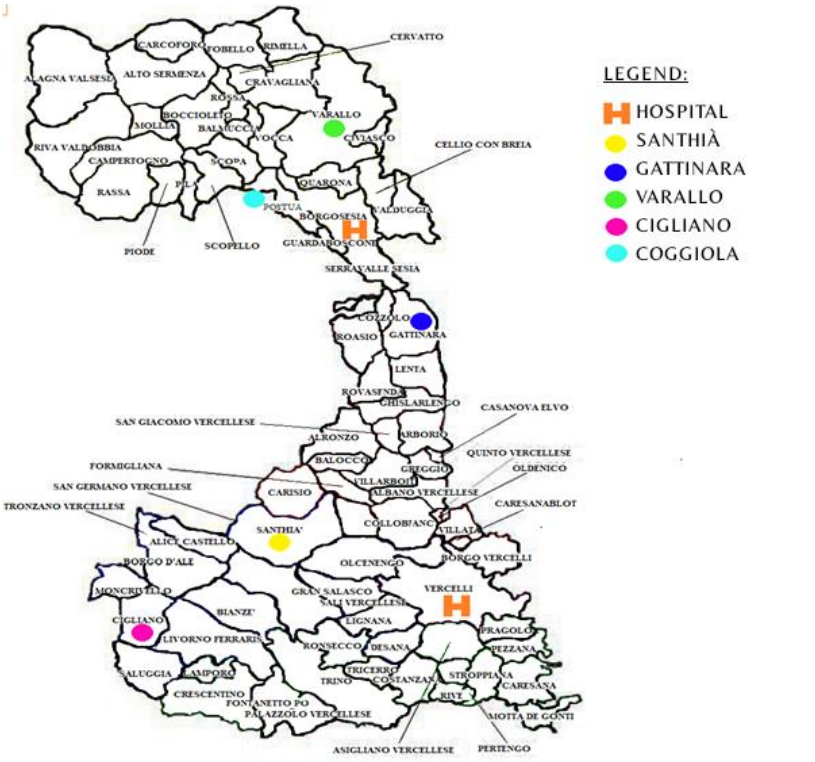
The first two regions started with experimentation of CHCs were Emilia-Romagna and Tuscany regions, when polyfunctional structures were thought as the first places to answer to health needs of citizen thanks to integration of professionals and services. CHCs with different levels of specialization and services supply were implemented in Emilia-Romagna from 2010, and a few years later 123 CHCs were identify in this region. In Tuscany, with the regional deliberation no. 1235/2012 CHCs were identify as model of territorial district where professionals can work in integrated way toward a new care model characterized by initiative for prevention and chronic disease management. Today, Tuscany counts 120 CHCs in all regional territory.

In 2016, in Piedmont started an experimentation of CHCs (DGR 3-4287/2016) with 8millions of Euro and established three types of CHC for this region: structural (when CHC is located on a or more physical structures), functional (when social-health integration is realized only at relation levels with a network of professionals) and mixed type (of the first two). With this policy, Piedmont established that the several types of primary care models (PCGs, PCCs, and community hospitals) existing must be converted in CHCs.

On the end of 2017, the experimental of CHCs started in the Local Health Authority (ASL) of Vercelli using five little old hospitals reconverted in health centres during the 90s. The Vercelli's ASL cover an area of 87 municipalities of Vercelli's province and includes few municipalities in province of Biella and Novara (see Fig. 1). The ASL is characterized by one District and distinguished by two Hospitals

(Vercelli and Borgosesia) and five Community Health Centres (Cigliano, Santhià, Gattinara, Coggiola, and Varallo).

Figure 1 Map of Vercelli's ASL territory



1.3. How to measure integrated care and continuity of care?

The European Innovation Partnership on active and healthy ageing elaborated the Maturity Model, a tool to evaluate the capacity of a system to adopt an integrated care approach. This is not a model aimed to compare the regions in terms of their performance in integrated care. By contrast, it is a tool to support discussion among stakeholders, a guide to improve performance or for ranking performance in integrated care policies and interventions [19, 20]. They also offer a tool for measuring the level of integration of services (SCIROCCO – Scaling Integrated Care in Context) through a scale with 12 dimensions: ambitions, capacity building, empowerment, evaluation methods, funding, telemedicine, innovation management, population-based approach, readiness, restraint elimination, standardization and simplification, governance and structure [21].

Another model recently developed to observe and evaluate integrated care is the Context-Mechanism-Outcomes Model allowing to focus attention to the mechanisms of integrated care (or types), the setting in which mechanisms are putted in practice and the effects triggered by mechanisms and context [22].

Also, the Rainbow Model of Integrated Care Measurement Tool (RMIC-MT), a questionnaire of 44 items used as indicators of the eight dimensions of integrated care: two dimensions for the goal

(person-focused and population-based), four dimensions for the type (organizational, clinical, professional, and system) and two dimensions for the enablers category (functional and normative integration) [6].

Overall, indicators usually used to measure both integrated and continuity of care in scientific literature are related to the following dimensions: temporal continuity, informative continuity, relational continuity, organizational integration.

The *temporal continuity* is measured using chronological indicators. This dimension is often observed, but also it is the most critical aspect to evaluate with valid and reliable indicators: validity of this type of measure is related to the presence of information about the other dimensions (clinical, professional, and organisational dimensions) [12]. Some indicators often used to measure this dimension are:

- duration and frequency of contacts between patient and professional [12, 23];
- number of professionals in contact with a patient for a care pathway or during a period [23]. For the *care concentration* measurement, different index were developed as the Usual Provider of Care (UPC) index [24]. the Continuity of Care (COC) index [25], and the Likelihood of continuity index (LICON) [26, 27]. In addition, there are adjusted index for the service supply [28], for the total number of meeting [29], or for the chronological order of care intervention [30];
- consecutive visits measured with the Sequential Continuity Index [23, 28].

Informative continuity is related to the information exchange between professionals and is often measured with:

- presence of shared databases, exchange of information about a patient, presence and use of integrated care plan, verbal communication between professionals, or visits of patient in different contexts [12];
- update and use of previous information about a patient: Do the professionals use information from previous professionals met by the patient? Do the professionals access to test and exams and medical record elaborated by other professionals?? [12];
- completeness of information exchanged between professionals [23];
- professional level of knowledge of patient, and conversely [23].

Besides, *relational continuity* is observed with:

- affiliation of patient to professional: is there trustworthy medical doctor? Is there a structural relationship between patient and professional? [12, 23];
- the strength of relationship between patient and professional measured with indicators related to the level of communication, trust, comfort, knowledge of clinical history, behaviours, predispositions, preferences, and other social conditions. Some examples, the

Perception of Continuity [31], the Primary Care Assessment Tool [32], the Primary Care Assessment Survey [33], or the Alberta Continuity of Services Scale for Mental Health [34].

Finally, *organisational continuity* often measured with:

- scheduled follow-up or time between the first visit and the following one [12, 23];
- consistency of care between professionals measured with the extent of specific protocols followed by the different professionals, the real implementation of visit plans, so the conformity of practices with protocols and care plans [23].

Other indicators are proposed by WHO [35], for example indicators of system characteristics (care access, hospital use, transfer across care pathways, treatment management, coordination of care) and experience of care from patients.

1.4. Why to study the Community Health Centres?

Recently, the constant increase of inappropriate accesses to emergency departments without "real emergency needs" is a great challenge not only for the Italian public health system [36], but also for the rest of Europe [37]. This is causing overcrowding of waiting rooms of hospitals, loss of efficiency and efficacy of health services, worsening of care quality, as well as worsening of several organizational indicators and health outcomes (e.g. mortality, length of hospitalizations, stress in health workers) [38–40], increase of costs [41], and loss of the patient rights [42].

So, this phenomena is analysed by many Italian, European, and American studies aimed to identify its determinants (e.g. ageing of population, longest waiting list for specialistic visit, low health literacy of population, lack of trust on general practitioner) [43–51].

In Italy, the National Health System (NHS) is centred on hospital model as mainly service for answer to health needs of population [52]: 45,5% of public spending for health was addressed to hospitals (2016 data). In addition to the overcrowding of waiting rooms, the hospital-centred model is today not efficient and effective for the new needs associated to the ageing of the population. The number of people with chronic diseases is constantly increasing also because of the ageing process of societies: in Italy, 53% of people aged 55-59 years live with a chronic disease; this percentage increase to 85% among the over 75 [53]. Diabetes, and cancer, heart and respiratory diseases are associated to a progressive reduction of functional abilities in the elderly that needs assistance and long-term care. Furthermore, hospital admissions could negatively impact on health and wellbeing of elders, with isolation and exclusion by family and community relations including the risk of loss of autonomy and hospital acquired infections.

So, the public debate is recently oriented towards a NHS focusing on territorial services and home care using a patient-oriented approach, opening to a wide range of actions and interventions in prevention, chronic management and tailored assistance [54]. More attention was addressed to strategies associated to low health spending, improvement of quality of life during the diseases,

increase responsibility of patients about their life-styles, increase of active management of own health condition (self-care) [55].

Besides, the traditional primary care model centred on General Practitioners appears ineffective to answer to the current social-health context: the health system needs to be integrated with social services to assure continuity of care and assistance considering health as a psychological, physical, and social condition. Moreover, the importance of integration of several professions (health, social, and administrative) for major efficiency and effectiveness of public health, is confirmed by several studies with positive effects on different aspects of care, health, and socio-health outcomes.

For these reasons, CHCs have been recently introduced in Italy as structures where multi-professional teams work for primary and specialised care through (spatial and functional) continuity of services and professionals and integration of health care with social assistance. Preliminary data on CHC's impact comes from the early experiences in Emilia-Romagna [56] but are not generalizable to other Italian contexts given the heterogeneity of regional health systems where CHCs has been implemented. Thus, our long-term goal is to evaluate the health effect of CHCs, comparing organizational, health, and economic outcomes seen in municipalities with CHCs to that recorded in municipalities lacking CHC.

2. Aims

This study aimed to pursue the following general objectives:

1. describe the context and policy of the five CHCs in Vercelli's ASL;
2. measure the level of integration of professionals and the perceived continuity of care by patients in CHC's area of Vercelli's ASL;
3. evaluate effect of CHCs implementation on organisational and health outcomes in Vercelli's ASL.

And these following specific objectives:

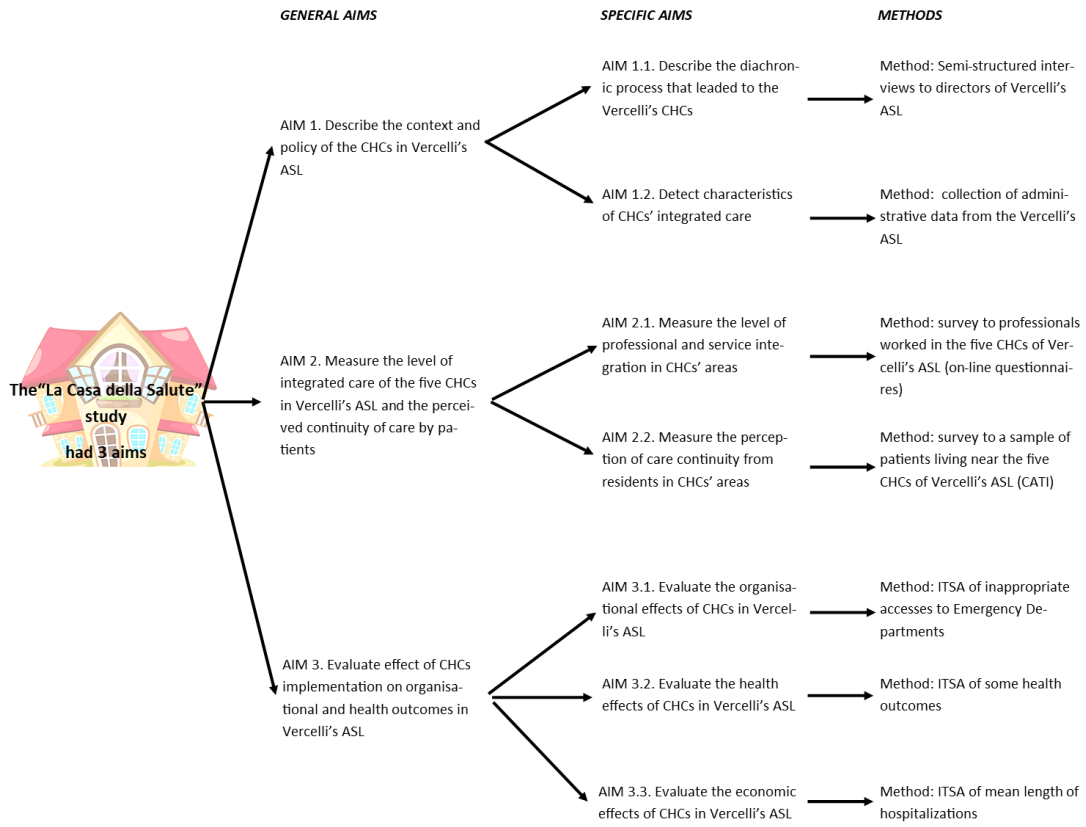
- aim 1.1: describe the diachronic process that leaded to the Vercelli's CHCs
- aim 1.2: detect characteristics of CHCs integrated care
- aim 2.1: measure the level of professional and service integration in CHCs' areas
- aim 2.2: measure the perception of care continuity from residents in CHCs' areas
- aim 3.1: evaluate the organisational effects of CHCs in Vercelli's ASL
- aim 3.2: evaluate the effects of CHCs in Vercelli's ASL on health outcomes
- aim 3.3: evaluate the economic effects of CHCs in Vercelli's ASL

The study was planned in collaboration to IRES Piemonte and Vercelli's ASL. The Principal Investigator was the professor Fabrizio Faggiano of University of Eastern Piedmont and director of the Epidemiologic Unit of Vercelli's ASL.

3. Method

A mixed method was used to reach aims of the study, as showed in Figure 2. Data were collected using some typical methods and tools of social sciences combining qualitative and quantitative tools. Not only for the descriptive study, but also for the impact evaluation we used an observational study typically used in econometry to assess the impact of policies or complex intervention and to forecast movements in a single time series (e.g. a stock market price) after the introduction of policies.

Figure 2 Method used in the "La Casa della Salute" study.



3.1. Process evaluation of CHCs' implementation and integrated care measurement: methods used

This section will present methods used to reach the first two macros aims (Aims 1 and 2): describe the context and policy of the five CHCs in Vercelli's ASL and measure the level of integration of professionals and the perceived continuity of care by patients in CHC's areas.

3.1.1. Study design

To reach these two macros aims, a descriptive study was carried out with individual semi-structured interviews (Aim 1.1), administrative data collection (Aim 1.2), and questionnaires (Aims 2.1 and 2.2).

We collected data and information related characteristics of CHCs (type of services and professionals), and some dimensions of integrated care concept, as defined from literature (organisational integration, professional integration, clinical integration, informative integration, functional integration, continuity of care perceived by patients). Table 2 shows the indicators collected by dimensions of integrated care concept and modality of collection.

Table 2 Indicators, dimensions and collection methods used to measure integrated care and continuity of care in CHCs of Vercelli's ASL

Dimensions	Indicators	Methods / Data sources
Integrated care		
Clinical	Sharing of care and programmes among professionals	Questionnaire to professionals (integrated care scale)
Functional	Telemedicine service	Administrative data
Functional	Data management systems	Administrative data
Informative	Multidimensional need assessment tool	Administrative data
Informative	Frequency of informative exchange between professionals about a patient (number of contacts by type)	Questionnaire to professionals (integrated care scale)
Informative	Sharing and use by professionals of common databases	Questionnaire to professionals (integrated care scale)
Organisational	Presence of Health and Social Single Point of Entry	Administrative data
Organisational	Care pathways	Administrative data
Organisational	Presence of continual assistance (12 or 24 hours per day)	Administrative data
Organisational	Mean hours of assistance during non-working days	Administrative data
Organisational	Number and type of professionals distinguished between health and social sectors	Administrative data
Organisational	Coordination and network with other structures of ASL (hospitals, territorial districts, primary care)	Semi-structured interviews to directors of Vercelli's ASL
Continuity of care		
Management	Level of coordination among professionals perceived by patients (Likert scale)	Questionnaire to patients (continuity of care perception scale)
Management	Easy access to local health services (Likert scale)	Questionnaire to patients (continuity of care perception scale)

Dimensions	Indicators	Methods / Data sources
Relational	Quality of relationship between patient and health professionals respect to informative exchange (Likert scale)	Questionnaire to patients (continuity of care perception scale)
Relational	Yearly mean number of contact patient-health worker; yearly mean number of time when ASL contacted patient; yearly number of blood exams; yearly mean number of visits	Questionnaire to patients (continuity of care perception scale)

Goals and processes of CHCs' implementation were studied interviewing the General Director and the District Director of Vercelli's ASL. The semi-structured interview used is presented in paragraph 3.1.2 (Aim 1.1).

To know the level of professional integration (Aim 2.1), socio-health professionals working into the five CHCs in Vercelli's ASL were asked to answer to an on-line questionnaire (see paragraph 3.1.3). For this purpose, the following dimensions were investigated: activities integration, professional integration, extent of primary care, medical offices, socio-health services, assistance continuity, specialisation levels, coordination with hospital care.

Moreover, a sample of patients living in CHCs' areas were selected to participate to a survey about their perception on continuity of care (aim 2.2). The questionnaire used is showed in paragraph 3.1.3.

Study protocol was submitted to Ethics Committee of University and protocol was written in collaboration to the Data Protection Office of Vercelli's ASL to respect all aspects of Italian and European privacy regulations (the D. Lgs. 196/2003 and the GDPR 2019/679, respectively). All letters to professionals and patients were signed by the General Director, District Director, and the Principal Investigator of the study.

3.1.2. Semi-structured interviews to know context and process leading to the CHCs' implementation in Vercelli's ASL

Interviews to directors of Vercelli's ASL were thought to collect information about goals of CHCs' implementation, the logic that driven the policy (regional program and ASL's strategy), significant events leaded to CHCs' implementation, differences between pre and post CHCs in terms of services and professionals, changes in social-health integration practices and activities, resources used, barriers to the implementation and solutions adopted, territorial differences in the implementation between CHCs, linkage with hospital and other health services of ASL, general practitioner presence and ways of collaboration among primary and specialised care, linkage with social services, opinions and point of views about this policy.

3.1.3. Measurement tools of integrated care: the questionnaires used

Aims 2.1 and 2.2 were reached through a survey which involved both professionals and patients living in municipalities of the five CHCs' area: Santhià, Gattinara, Varallo, Coggiola, and Cigliano.

Integrated care (aim 2.1) was measured using the scale of Longo et al. 2009 proposed to this purpose. This tool measures the level of integration of professionals in chronic diseases management using a weighted summation index (0-to-5-point scale) that measures the following dimensions: frequency of informative communication exchange between professionals, level of sharing between professionals of care plans and programmes, level of using of common informative systems to collect clinical and social data about a patient [1]. Items were adapted to CHCs' context (with a few changes of terminology) and the fully questionnaire was integrated (items no. 1-20) to collect socio-demographic data (items no. 1-4), and data about work experience (items no. 5-20). The items of the scale were though in relation to the contacts and sharing of data and care program between professionals for the management of specific chronic diseases and social-health conditions (heart failure, diabetes, COPD, tumour, mental disorders, handicapped, elderly housebound, addicted persons, abused women). A draft of questionnaire used is showed in Appendix A.1.

Longo's scale of continuity of care was also used to measure perception of a sample of patients (aim 2.2). Also this tool is a 5-points-scale measuring the patient perception of continuity of care in relation to the local health services respect to the following dimensions: intensity level of relationship between physicians and patient (longitudinal continuity); the ease access to the local health services; the quality of relationships between physicians and patient respect to the communication process (exchange of information); the level of integration among professionals whom is perceived by patients. Our finally questionnaire was integrated with information about the place of visits (items no. 5, 21-24), the knowledge and use of CHC's services (items no. 22-23), and the level of satisfaction with CHC (item no. 24). Questionnaire is showed in Appendix A.2.

3.1.4. Population observed and inclusion criteria

Questionnaire of integrated care was submitted to all health and social professionals worked in the five CHCs of Vercelli's ASL during a year (from May 2019 to May 2020). All professionals were invited by e-mail from the ASL's District Director to answer to the questionnaire above presented in on-line version. Questionnaire was also presented to social services involved in a technical committee by means health sectors and local social services collaborate for social-health care.

In parallel, a sample of patients living in the CHCs' area of Vercelli's ASL was selected to answer to continuity of care perception about local health services (questionnaire to patients above showed). Thus, we carried out telephonic interviews to patients over 18 years agreed to the freely participation to the survey. Sample was composed by patients that in 2018 had at least an exemption for the following health conditions: heart failure, hypertension with organ damage, asthma, chronic respiratory failure, diabetes (type 2), cancer, disabled people, work related injury, addicted people.

The sample was randomly selected following a stratified method by level of frailty (from 1 to 3. Table 3), gender, age (18-64 years, 65 years and more), and municipality of residence. Frailty levels were calculated by means the algorithm used in the "Frail patient" project of Vercelli's ASL. Levels were showed in Table 3.

Table 3 Frailty levels following the algorithm used for the "Frail patient" project of Vercelli's ASL

Frailty level	Criteria used
1	Subjects with at least an exemption, an access to ED and that used ≥3 prescribed drugs during the last year
2	Subjects with at least an exemption, ≥2 accesses to ED and that used ≥3 prescribed drugs during the last year
3	Subjects with at least an exemption, that used ≥3 prescribed drugs and with Integrated Home Assistance during the last year

Sample size was identify following an efficiency logic based on the practical feasibility in relation to the human resources available for the survey manage as well as the expected refusal of eligible participants (40%). We selected a stratified sample of 1,000 patients living in CHC's area of Vercelli's ASL and with the above characteristics. The random sample of patients was selected from a reference population of 2,478 patients. Table 4 reports distribution frequencies about strata of the sample extracted.

Sample was extracted by data of Vercelli's ASL in collaboration to the Epidemiological Unit of ASL.

Table 4 Sample size extracted by CHC, age, sex, and frailty level (Total=1,000)

				Frailty		
CHCs			**Age class**	**Level 1**	**Level 2**	**Level 3**
Santhià	Sex	Women	18-64 years	18	11	0
			≥65 years	45	20	7
		Men	18-64 years	19	9	1
			≥65 years	40	17	6
Cigliano	Sex	Women	18-64 years	16	5	1
			≥65 years	39	11	7
		Men	18-64 years	15	6	1
			≥65 years	36	10	4
Gattinara	Sex	Women	18-64 years	21	13	2
			≥65 years	77	39	54
		Men	18-64 years	28	15	4
			≥65 years	55	30	19
Varallo	Sex	Women	18-64 years	13	6	2

CHCs			Age class	Frailty Level 1	Level 2	Level 3
			≥65 years	28	17	24
		Men	18-64 years	10	8	1
			≥65 years	37	16	8
Coggiola	Sex	Women	18-64 years	8	8	1
			≥65 years	22	15	16
		Men	18-64 years	10	6	1
			≥65 years	22	15	5

3.1.5. Enrolment of participants

Professionals were invited to participate to the survey through a letter sent by e-mail and signed by General Director and District Director of Vercelli's ASL (see Appendix A.4). Questionnaire was sent to all professionals through REDCap Software - Version 6.11.5. General practitioners (GP) were contacted by means the virtual notice board used for communication between the Health District and GPs (see Appendix A.5 for the letter used). Finally, the professionals self-reported questionnaires across a year (from May 2019 to May 2020).

Patients were advised with a postal letter (see Appendix A.6) about the study and the sample selection. At the same time, the GPs were informed about the survey in reason to have a support for the enrolment of patients selected. Successively, patients were contacted by telephone by 3 trained interviewers. During the call, the interviewers presented the study and asked availability for the participation to the survey. Interviews were just all conducted during the first contact. An interview was long about 20 minutes, including the opening presentation. Due to the time provide for the organisation of the letter shipping, interviews were successively collected (from January 2020 to March 2021).

3.1.6. Data collection

Semi-structured interviews with directors of Vercelli's ASL lasted about an hour and were recorded and transcribed for analyses. Interviews were conducted in Italian language. The draft is attached in Italian language in Appendix A.

Professionals of the five CHCs answered to the on-line questionnaire through RedCap Software and data were automatically registered in the on-line storage of the software. Questionnaire was projected to start only if participant had given its free and informed consent to the data collection and use.

Patients were interviewed through the Computer-Assisted Telephone Interviewing (CATI) method. The Epidemiological Service of Vercelli's ASL, that extracted the randomized sample, provided personal data of eligible selected participants in a register. The full register reported data about name, address, telephone number, frailty level, sex, date of birth, and exemptions of each

participant of the sample. The full register was at disposal of the principal interviewer, whereas the other interviewers had only the access to partial registers normally corresponded to the patients living in a specific CHC's area. Interviewers called each participant in list on their partial registers and noted information about the acceptance of participation to the survey. Interviews were collected only then the telephonic free and informed consent. Only this part of communication was registered, as asked by the Data Protected Office of Vercelli's ASL. Data were directly inputted in the RedCap software during the interview.

Successively, the collected data from both questionnaires were download in .csv format and saved in a local protected storage of the personal computer at the disposal of supplied of Public Health Laboratory of Department of Translational Medicine of the University of Eastern Piedmont. Data were stored and analysed in anonymous.

3.1.7. Analyses

Along with the descriptive analyses performed with the main descriptive statistic indices and test, two indexes were calculated by the two scales used to measure professional integration and continuity of care perceived by patients. Chi-squared test and ANOVA were used to test differences among groups.

A summatory index was calculated to describe the level of professional integration measured with the Longo's scale. Firstly, we calculated a summatory weighted index of the following indicators of informative integration about communication among professionals:

- the total number of telephonic contacts with other professionals in the last 12 months (weight=1)
- the total number of e-mail sent to other professionals in the last 12 months (weight=0,5)
- the total number of face-to-face meets with other professionals in the last 12 months (weight=2)

Secondly, the total partial score obtained (for the informative integration) was transformed into a 1-5-points scale and summed in individual total scores with:

- the level of sharing of care and programmes among professionals (5-points-Likert's scale)
- the level of sharing of databases among professionals (5-points-Likert's scale).

Lastly, the total score was obtained by the unweighted mean of the individual total scores. This score ranged from 1 (low level of professional integration) to 5 (high level of professional integration) points.

Similarly, to obtain the final index about the level of continuity of care perceived by patients, we firstly calculated a summatory weighted index of indicators used to measure the longitudinal continuity:

- the number of contacts with health workers (nurses, GPs, or other medical doctors) in the last 12 months (weight=1)
- the number of times when the Vercelli's ASL contacted the patient for appointment or other health questions in the last 12 months (weight=1)
- the number of exams of blood in the last 12 months (weight=0,5)
- the number of visits with the health workers (nurses, GPs, or other medical doctors) more frequently met in the last 12 months (weight=2).

Then, the total partial score obtained for longitudinal continuity was transformed into a 1-5-points scale and summed in individual total scores with:

- the level of easy access to health services measured using a 5-points-Likert's scale ranging from the highest difficulty perceived (1) to the highest easy access (5);
- the quality of relations about information and communication with the health works met measured using a 5-points-Likert's scale ranging from the lowest (1) to the highest quality level (5) perceived by patient;
- the level of coordination between the different health professionals met by patient for a specific health condition measured with a 5-points-Likert's scale ranging from the lowest (1) to the highest level of coordination (5) perceived by patient.

Like the index of professional integration, the total score was obtained the unweighted mean of the individual total scores and ranged from 1 (low level of continuity of care perceived) to 5 (high level of continuity of care perceived) points.

Both the scores have been calculating for each CHCs in observation. In addition, differences between scores of the five CHCs were tested with appropriate non-parametric test.

3.2. Impact evaluation of CHCs in Vercelli's ASL: the ITSA analyses

This section will present methods used to reach the third macro aim (Aim 3): evaluate the organisational (aim 3.1), economic (aim 3.2), and health effects of CHCs of Vercelli's ASL.

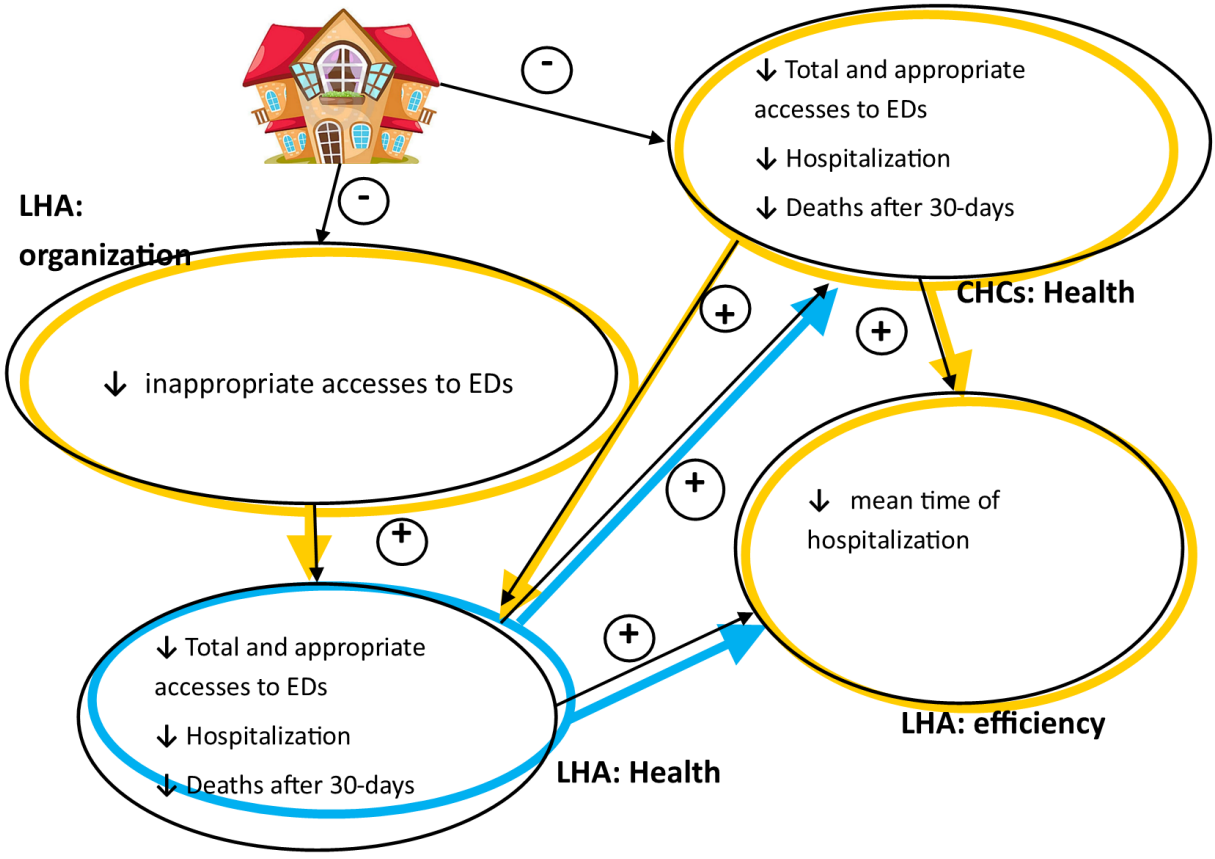
3.2.1. Study design

To reach this macro aim, an interrupted time series analysis (ITSA) with control was performed. Data analysed were about organisational, health, and economic outcomes. ITSA is a method used when a single unit is being studied, when the outcome is serially ordered as time series, and when multiple observations are captured in pre and post intervention periods. The study design is a quasi-experimental in which the intervention is expected to interrupt the level or the trend of the time series after its introduction. ITSA can be performed following a single model when preintervention data are compared with postintervention data of the same time series, whereas when treatment group's outcomes are compared to one or more control group's outcomes (multigroup model) the internal validity is further increased in reason of the controlling for omitted variables. Hypothesis of the study

is represented in figure 3. Following our hypothesis, the introduction of a CHC in a specific area would cause effects on several outcomes on different levels:

- direct effects on health of CHC area with reduction of total and appropriate accesses to emergency departments (ED), hospitalisation, and mortality (aim 3.3);
- direct organisational effects visible at Vercelli's ASL with reduction of improper accesses to EDs (aim 3.1);
- indirect health effects at Vercelli's ASL level: reduction of improper accesses to EDs lead to a less overcrowding of this care setting improving quality of care with positive consequences on health of the population (reduction of hospitalization, total and appropriate accesses to EDs, mortality);
- indirect efficiency effects at Vercelli's ASL level: the improvement of health of population living in CHCs area implies an improvement of efficiency at ASL level for a reduction of hospitalizations, ED accesses, mean time of hospitalizations; similarly, improvement in organisational outcomes affects health of total population living in Vercelli's ASL with major efficiency visible, for example, with the reduction of mean time of hospitalization.

Figure 3 Flow chart of hypothesis driven the evaluation study of impact of CHCs in Vercelli's ASL



For this purpose, we performed both single and multigroup model ITSA analysis on organizational, economic and health outcomes.

3.2.2. Data sources and data extraction

Data were extracted from the following sources:

- Hospital Discharge Cards (HDC) to identify ordinary hospitalizations and day hospital hospitalizations (in Italian "Flusso SDO")
- Registry of the assistance delivered in Emergency departments (in Italian "Flusso C2") for EDs accesses
- AURA registry for personal data

Data were extracted from "Flusso SDO" considering the main diagnosis of discharge through the ICD9-CM codes. Main diagnosis was used to identify:

- Number of days of hospitalizations obtained from the difference between discharge date and hospitalization date considering all causes and for diabetes, heart failure, and COPD.
- Number of dead persons at 30 days after the first hospitalization for all causes and for diabetes, heart failure, and COPD.

To identify discharged people with heart failure as main diagnosis, we had selected the following ICD9-CM codes: 428, 40201, 40211, 40291, 39891, 40401, 40403, 40411, 40413, 40491, 40493, 4254, 4255, 4259, 4160, 4168, 4169. People with diabetes were selected through the codes 250, 648, 7751, whereas people with COPD using codes 492, 494, 496, 49120, 49121, 49122, 4918, 4919, 4932.

From the "Flusso C2" we selected all accesses to EDs and accesses with the white and green triage codes without successive hospitalizations, considered as inappropriate accesses. Number of appropriate EDs accesses (red and yellow triage codes with and without successive hospitalizations) were obtained with the difference between total and improper accesses.

3.2.3. Intervention

The Decree of Health Ministry on 10th July 2007 define the Community Health Centres as polyfunctional structures in which multidisciplinary teams (i.e., GPs, specialists, nurses, social workers) work in integrated way to assure a unique point of entry for social-health services, to use shared programs, for the promotion of citizen participation (i.e., associations of patients and families), to coordinate care and assistance, to promote health for the life course, to collaborate with hospitals and other health structures.

Thus, the CHC was founded to reconvert the primary care and territorial health services in a model centred on the coordination and integration of the care provided by GPs with the specialistic care, nursing activity, diagnostic activity, home/residential social-health assistance.

The CHCs provides three types of services: need assessment, guide to the services, and take charge of patient; planning and integrated management of home assistance; health and therapy education about chronic diseases, prevention, and health promotion. These types of services are

planned to assure integration and continuity of care and assistance (during the day, in the health centre, at home, in the residential structures, and during the transition from hospital to home).

In Piedmont, the Regional Deliberation no.26-1653 on 29th June 2015 established three types of CHCs:

- Functional CHC when integration is performed between social-health professionals operating in different structures and organisations;
- Structural CHC when multidisciplinary teams work in integrated way and share the same structure;
- Mixed CHC when both the above types are implemented.

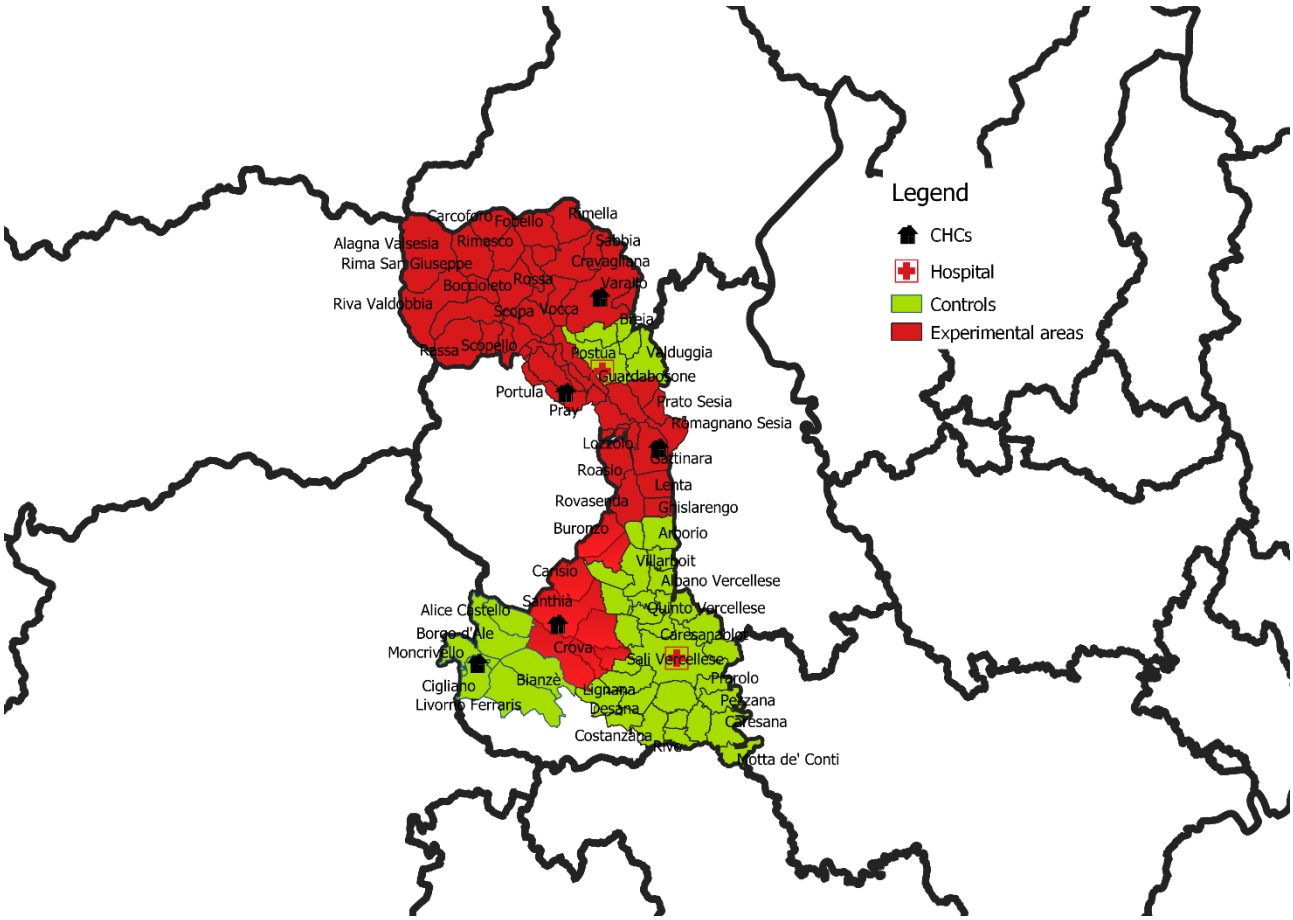
The intervention analysed is the opening of the five structural CHCs in 2018 following the Deliberation of General Director of Vercelli's ASL no. 34/2017 related to the CHC's experiment (Fig. 4). However, today the CHC of Cigliano is also in implementation and at the end of 2019 no GPs opened their medical office in this CHC. So, Cigliano was excluded from experimental area for the lack of primary care in the structure.

For this reason, the intervention group(s) is composed by data of population resident in municipalities belonging to CHCs of Santhià, Gattinara, Varallo, and Coggiola (Table 5). Data extracted were stratified by five-year age classes from 0 to 89 years. Subjects with 90 years and more were considering all together. Experimental areas were represented in red on the map of Vercelli's ASL (Fig. 4).

Table 5 List of municipalities by CHCs. Table shows the municipalities belonging to the Vercelli's CHCs considered experimental areas for this study.

CHC	Municipalities
Santhià	Santhià, Balocco, Buronzo, Carisio, Croova, Salasco, San Germano, Tronzano
Gattinara	Gattinara, Sostegno, Lozzolo, Serravalle e frazioni, Grignasco, Romagnano, Lenta, Roasio, Ghislarengo, Prato Sesia, Rovasenda
Varallo	Varallo, Alagna, Riva Valdobbia, Mollia, Campertogno, Piode, Pila, Scopello, Scopa, Balmuccia, Vocca, Carcoforo, Rima, Rimasco, Boccioleto, Rossa, Rimella, Fobello, Cervatto, Cravagliana, Sabbia, Rassa, Civiasco
Coggiola	Coggiola, Pray, Crevacuore, Ailoche, Caprile, Postua, Guardabosone, Portula

Figure 4 Experimental areas and controls: map of Vercelli's ASL



3.2.4. Control group

In simply models, controls were data pre-intervention about the CHC's population.

In the multigroup models, for control were used data about population resident in the rest of municipalities that not belonging to the experimental area: the area around Vercelli's Hospital in the south-east, the area around Borgosesia's Hospital in the north-east, and municipalities belonging to Cigliano's CHC (Table 6). Controls were represented in green on the map (Fig. 4).

Table 6 List of municipalities by control's areas. Table shows the municipalities belonging to the Vercelli's control areas of this study.

Control area	Municipalities
Cigliano's CHC	Cigliano, Borgo d'Ale, Moncrivello, Livorno Ferraris, Bianzè, Alice Castello
Vercelli's hospital	Albano, Arborio, Asigliano, Borgo Vercelli, Caresana, Caresanablot, Casanova Elvo, Collobiano, Costanzana, Desana, Formigliana, Greggio, Lignana,

Control area	Municipalities
	Motta dei Conti, Olcenengo, Oldenico, Pertengo, Pezzana, Prarolo, Quinto, Rive, Ronsecco, Sali V.se, San Giacomo V.se, Stroppiana, Vercelli, Villarboit, Villata, Vinzaglio
Borgosesia's hospital	Borgosesia, Cellio con Breia, Quarona, Tricerro, Valduggia

Data extracted were stratified by five-year age classes from 0 to 89 years. Subjects with 90 years and more were considering all together.

3.2.5. Outcomes

We analyzed as primary outcomes the following organisational and health outcomes: improper accesses to EDs, proper accesses to EDs, total accesses to EDs, all-causes hospitalization, hospitalization for heart failure, diabetes, and COPD, mortality at 30 days after discharge (for all-causes and for heart failure, diabetes, and COPD).

Secondary outcomes analyzed relating to efficiency measure and were the mean length of hospitalization in days (for all-causes and for heart failure, diabetes, and COPD).

3.2.6. Time unit in analyses

The time unit in analyses was the year in reason of the long-term expected effects. Data was collected from first year available (2015) to the last (2019) for a total of 5-year-time-series. Series was terminated in 2019 for the COVID-19 outbreak in 2020.

3.2.7. Analyses

First, descriptive analysis was performed to control distributions of outcomes between the different populations, as well as the presence of missing data and outliers.

Then, we performed a single model ITSA for all outcomes by the four experimental areas (Santhià, Gattinara, Varallo, and Coggiola). Single-group design was carried out also considering the total experimental area. With this first analysis, single model was used to assess the impact of CHCs in reducing organisational (improper accesses to EDs), health (accesses to EDs, hospitalization, mortality at 30 days), and economic outcomes (mean length of hospitalization). Regression models adjusted for autocorrelation was carried out to assess effects. This was chosen because the short time series did not permit to test different time lags in estimate of the effect. We used the Durbin-Watson d statistic that shows the quality of correction for the first-order autocorrelation. In addition, we specified to base the p on the autocorrelation of the residuals and added robust standard errors. Interruption in time series was fixed in 2018.

Add one or more control in the model help to control for third factors. For this reason, multigroup model was used to analyses effect of CHCs using one or more controls: Vercelli's hospital area, Borgosesia's hospital area, and Cigliano's CHC area. These analyses were performed not only for each CHC area, but also considering both all experimental areas together. Controls were tested for each outcome and CHC in order to choose the best control: the best control chosen was the area that reported the higher p-value in relation to the difference tests for intercepts and slopes of the curves (experiment and control). Sometimes, only an area reported this value, other times we used the mean value between the controls which better fitted to the experimental area considered.

With the multigroup models, we estimated the post-trend differences between each experimental area and one or more controls considering both observed and predicted values for each outcome. Also, these regression models were adjusted for autocorrelation. Interruption in time series was fixed in 2018.

For control the results by age confounding, all single and multigroup analyses were carried out for three age classes: young (0-34 years), adults (35-64 years), and old age people (65 years and more). We used as time unites the year, for that we did not need to control analyses for the seasonal bias.

4. Results

The paragraph 4.1 reports a brief description of the historical process leading to the opening of the five CHCs and their main characteristics using administrative data upgraded in the first semester of 2020 and information collected with the interviews to the directors (aim 1). Type of services and professionals were presented in the successive paragraph (4.2).

Results about integrated care of the CHCs were showed in the paragraph 4.3 (aim 2.1) using both administrative data of the ASL and data collected with the questionnaires submitted to the professionals. This paragraph reported results about the level of integrated care measured with the Longo's scale.

The level of continuity of care perceived by patients was introduced in paragraph 4.4 (aim 2.2), whereas the paragraph 4.5 discloses results about the evaluation of CHCs' effects on organisational (aim 3.1), health (aim 3.2), and economic outcomes (aim 3.3) carried out with ITSA analyses.

4.1. The Community Health Centres of Vercelli's ASL

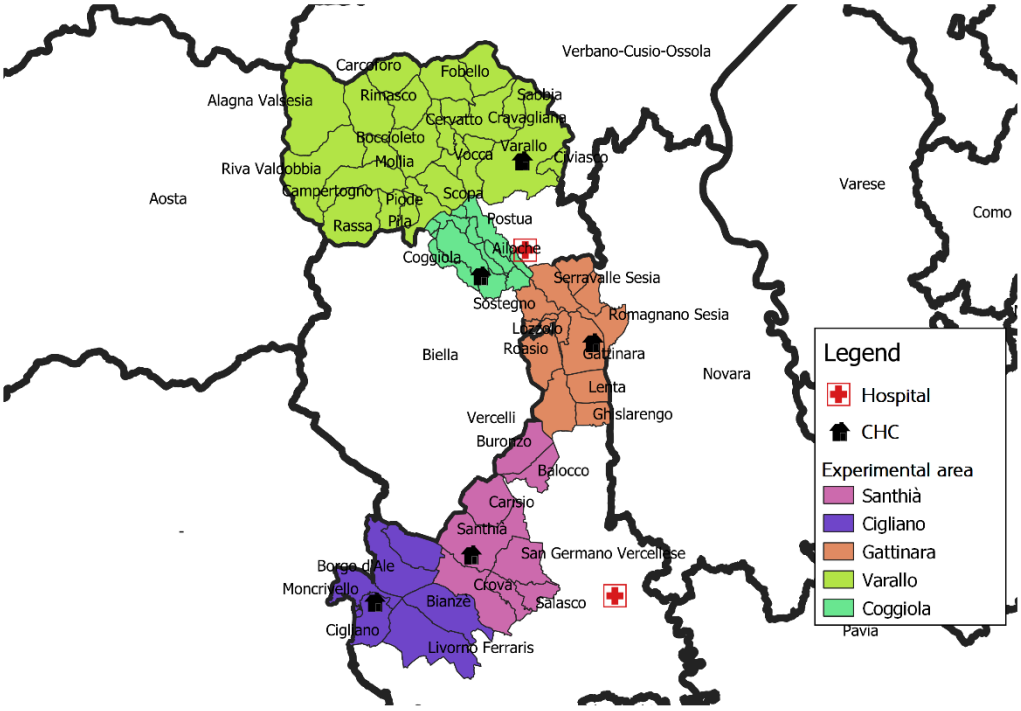
The Vercelli's ASL counted a total of 166,690 inhabitants mainly resident in municipalities around Vercelli city (40%), whereas the 48% of population live in municipalities belonging to the five CHCs (year 2019). Excluding the Southern area of Santhià and Vercelli, the remaining territory is mainly mountainous and with mobility limitation for the lack of adequate road and public transports networks.

Locations of the five CHCs were planned in relation to the availability of physical structures in good condition, and the need to assure accessibility to health services in all territory of ASL. Therefore, the

closure of the five small hospitals during the 90ies led to some problems related to the equal access to the public health services among inhabitants living near and far to the remained hospitals.

So, the structures for the implementation of CHCs were found in these five small ex-hospitals located in Cigliano (at the border whit Torino's province in the south-west), Santhià (in the south), Gattinara (in the middle of territory), Coggiola (in the north-west), and Varallo (in the north-east). Fig. 4 shows the geographic distribution of the five CHCs, whereas Table 6 reported the list of municipalities served by CHCs.

Figure 5 CHC's areas in Vercelli's ASL



The five structures were converted in local health centres with various specialistic physicians and diagnostic laboratories. After the experimentation of the Primary Care Groups, during the 2012 the health centre of Santhià was converted to a Primary Care Centre (PCC): a small number of GPs opened their medical office here transforming the structures in a preliminary type of CHC with the meeting in the same place of primary and specialistic care workers. In 2017, Vercelli's ASL established the opening of the five CHCs, and in the beginning of 2018 four of the five structures identified began their experience as CHC.

Table 7 shows the number of actual and potential user bases by CHC, in the first semester of 2020. Data showed that three CHCs had registered during this time a smaller number of real users than the

potentiality of service. The less used in relation its potentiality is Cigliano, for which only the 7,9% of potential users had really accessed to the CHC, followed by Gattinara (23,9%) and Santhià (63,6%) (Table 5). By contrast, the remained CHCs registered an optimal number of users.

Table 7 Municipalities, residents, and user base by CHCs of Vercelli's ASL

	Municipalities	Residents*	Size of building (mq)	User base of CHC**	Potential user base of CHC**	Real user / potential user
Cigliano	Cigliano, Borgo d'Ale, Moncrivello, Livorno Ferraris, Bianzè, Alice Castello	10,852	1,445	1,335	16,790	7.9%
Santhià	Santhià, Balocco, Buronzo, Carisio, Croova Salasco, San Germano, Tronzano	15,893	5,283	10,074	15,829	63.6%
Gattinara	Gattinara, Lozzolo, Serravalle, Lenta, Roasio, Ghislarengo, Rovasenda, Grignasco, Romagnano, Prato Sesia, Sostegno	16,754	15,327	7,006	29,324	23.9%
Coggiola	Guardabosone, Postua, Coggiola, Pray, Crevacuore, Ailoche, Caprile, Portula	7,861	1,364	7,194	7,194	100.0%
Varallo	Varallo, Sabbia, Alagna Valsesia, Riva Valdobbia, Mollia, Campertogno, Piode, Pila, Scopello, Scopa, Balmuccia, Vocca, Carcoforo, Rima, Rimasco, Boccioleto, Rossa, Rimella, Fobello, Cervatto, Cravagliana, Rassa, Civiasco	29,173	3,618	11,022	11,022	100.0%

* Administrative data, year 2019 ** Administrative data, first semester of 2020

Although CHCs were promoted by Piedmont Region in response to the Financial Lay no. 296/2016, the opening of CHCs in Vercelli's ASL did not only pursue a regional policy, but also a local strategy. The policy of ASL of Vercelli aimed to an improvement of accessibility of health services in all territory, the promotion of social-health integration to assure more suitable management of chronic diseases, and the supply of care continuity.

4.2. Services and professionals across health and social assistance: the CHCs during the 2020

Co-existence of primary and specialistic care is a key element characterising a CHC. Table 9 shows data about the number of clinics and laboratories by each CHC. Santhià and Gattinara CHCs presented a better supply of services and care with 7 and 4 GPs ambulatories and 8 and 7 specialist ambulatories, respectively. All CHCs has a nursing ambulatories, blood and radiology laboratories, and a good supply of services for booking and manage social-health service use (Table 8). While GPs entered in CHCs with their ambulatories with the opening during 2018, in Cigliano's CHC the GP ambulatory was opened only at the end of the 2019.

Moving specifically attention to the services, primary care is today delivered by all CHCs. As opposed to GPs for adults, paediatricians were present in all CHCs except for Cigliano (Table 9). Except for Coggiola, continuity of assistance during the 24 hours of the working day was assured (Cigliano and Varallo were opened for 22 hours), 12 hours during non-working days. Considering medical and nursing ambulatories, Santhià counted the biggest number of ambulatories and laboratories, followed by Gattinara and Varallo (Table 9).

Santhià and Gattinara were the two CHCs bigger than the other three, with many second level specialist ambulatories. Cardiology, surgery, family counselling, dermatology, diabetology, geriatrics, nephrology and dialysis, neurology, ophthalmology, odontology, otolaryngologist, orthopaedics, radiology, physiotherapy, and urology were the specialist ambulatories in Santhià and Gattinara. By contrast, the type of specialist ambulatories decreased considering Varallo, that had nine specialities (family counselling, dermatology, diabetology, ophthalmology, odontology, otolaryngologist, pneumology, physiotherapy, and urology); Cigliano with six specialities (cardiology, dermatology, neurology, ophthalmology, odontology, and orthopaedics), and Coggiola which had only the family counselling and dermatology ambulatory.

While nursing ambulatories and social assistance is delivered by all CHCs, activities of Family and Community Nurses (FCN) had recently starting in Santhià (2019), and since 2020 also in Varallo and Coggiola. Chronic management of diabetes, heart failure, COPD, dementia, and chronic kidney diseases were based on specific diagnostic and care pathways called *Diagnostic and Care Programs for Chronic diseases* (DCPC). DCPC for heart failure was the first integrated and multidisciplinary program which started in 2018. On the other hand, Geriatric Assessment Unit (GAU) aimed to the social-health assistance for specific social-health condition related to ageing, as well as other teams for the multidimension assessment of specific condition operated in the CHCs (i.e., for handicapped and disable people, minor people) (Table 8).

Although the Central Booking Centre for Vercelli's ASL was not again opened in Coggiola and Varallo, all five CHCs had opened the Unique Social-Health Point (USHP). Patients were generally taken charge by GPs or USHP. In Santhià, FCN activities of case management had represented another access point for chronic and frailty persons to the ASL social-health services. This service was born during the 2018 in the Santhià's CHC as experimental intervention in study by the Public Health teams of University of Eastern Piedmont. Successively, this service was opening also in Coggiola and Varallo (in 2020).

Table 8 Services and activities by CHCs (data of first semester of 2020)

	Information point, need assessment, and guide to services	Administrative services	Central Booking Centre	Taking charge (by)	Diagnostic and Care Programs for Chronic (DCPC)	GPs' delivered primary care		Nursing clinics	Family and Community Nursing (FCN)	Unique Social-Health Point (USHP)	Social assistance	Geriatric Assessment Unit (GAU)	Other Multidimension Assessment Units (disable, child)	118 service
						Adult	Child							
Santhià	Yes	Yes	Yes	GP, FCN, USHP	Diabetes, Heart Failure, Dementia, COPD, Chronic Kidney Diseases	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cigliano	Yes	Yes	Yes	GP, USHP	Diabetes, Heart Failure, Dementia, COPD, Chronic Kidney Diseases	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No
Gattinara	Yes	Yes	Yes	GP, USHP	Diabetes, Heart Failure, Dementia, COPD, Chronic Kidney Diseases	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Varallo	Yes	Yes	No	GP, USHP	Diabetes, Heart Failure, Dementia, COPD, Chronic Kidney Diseases	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Coggiola	Yes	Yes	No	GP, USHP	Diabetes, Heart Failure, Dementia, COPD, Chronic Kidney Diseases	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Besides, psychology service had been delivered only in Santhià, Gattinara, and Varallo, whereas the first two CHCs had also a daily psychiatric centre.

Finally, specific protocols for coordination of activities with Emergency Departments had been active from the opening of the five CHCs. CHCs had not hospitalization service, but in three of them there was the 118 service.

Table 9 Number of ambulatories by type of care/assistance in the five CHCs (data of first semester of 2020)

	No. of GPs ambulatories (number)	No. of specialist ambulatories (number)	No. of nursing ambulatories (number)	Diagnostic laboratories (number)
Cigliano	1	5	1	Blood test (1)
Santhià	7	8	1	Blood test (1) Radiology (4)
Gattinara	4	7	1	Blood test (1) Radiology (5)
Coggiola	1	1	1	Blood test (1)
Varallo	3	4	1	Blood test (1)

Table 10 presents the distribution of professionals by type for each CHC. Data showed that Santhià, followed by Gattinara and Varallo, had a great number of health professionals, especially nurses and specialist physicians. Although the absolute numbers were not high, in Coggiola GPs represented about the 30% of professionals herein working and in Varallo they were 17%. Social workers were present in all CHCs, whereas psychologists only in Santhià, Coggiola, and Varallo.

Among social-health professionals, Social-Health Operators (SSO) were only in Santhià and Gattinara. Moreover, X-ray technologists were present in CHCs with clearly the radiology, obstetrical service was not present in Cigliano and physiotherapists worked everywhere except for Coggiola and Cigliano. Finally, professional educators were in Santhià and Gattinara , whereas speech therapists in Gattinara and Varallo.

Data did not change during the years (2018-2020), except for Santhià, Varallo, and Gattinara where nurses respectively increased of 3, 2, and 2 units since their opening (from 2018 to 2020). Along with nurses increasing, also GPs number grew from 2 to 6 and specialist physicians from 15 to 17 in Gattinara's CHC.

Table 10 Number of social and health professionals by CHC (updated first semester of 2020)

	GPs	%	GPs in networking with CHC	%	Pediatricians	%	Nurses	%	Specialist physicians	%	Psychologists	%	Social-Health professionals (Social worker, Social-Health	%	Other non-medical professionals	%	Total
Cigliano	1	6.3%	0	0.0%	0	0.0%	7	43.8%	7	43.8%	0	0.0%	1	6.3%	0	0.0%	**16**
Santhià	8	9.6%	3	3.6%	2	2.4%	29	34.9%	18	21.7%	2	2.4%	4	4.8%	17	20.5%	**83**
Gattinara	6	9.4%	0	0.0%	2	3.1%	18	28.1%	17	26.6%	2	3.1%	4	6.3%	15	23.4%	**64**
Coggiola	5	31.3%	4	25.0%	1	6.3%	2	12.5%	2	12.5%	0	0.0%	1	6.3%	1	6.3%	**16**
Varallo	7	17.1%	7	17.1%	1	2.4%	9	22.0%	9	22.0%	2	4.9%	1	2.4%	5	12.2%	**41**

* This table does not show administrative and management professionals

As for communication, GPs and paediatricians normally communicated with ASL by means the Coordination Office of District Activities. The monthly meetings had been involving delegates of the different groups of GPs. In addition, the "Io Scelgo la Salute" portal is used to connect with the District of ASL, whereas the management of chronic patients is made by the "Galileo" management software. Finally, Cigliano, Santhià, and Varallo used the electronic medical record "Millewin".

4.3. The level of professional integration in the Vercelli's CHCs

In spite of the recurring reminders, few professionals answered completely to the questionnaire. Overall, only 37 among GPs, nurses, specialist physicians, and other professionals (out of 220) completed the survey. Distribution of respondents and main characteristics of participants by CHCs are showed in Table 9. Most respondents came from in Santhià, Varallo, and Gattinara. Only one participant answered from Cigliano's CHC and four from Coggiola.

However, the final sample resulted quite equally distributed for participants' gender, with a slightly non-significant prevalence of men (20 men vs. 17 women) (p=0.741). The mean age of participants was high and no statistical differences were found between participants from the five CHCs (p=0.231).

Mean weekly hours worked by survey participants in CHCs ranged from 5 (Varallo and Coggiola) to 22 (Santhià) and differences between CHCs were statistically significant (p=0.002) (Table 9). The higher mean value for Santhià was likely associated to the presence of nurses among participants: considering mean weekly hours worked by professionals, nurses declared the major number of hours spent on work-related activities in Santhià CHCs (mean 32 hours ±8.94). Contrary to professionals from Santhià and Coggiola where participants worked in CHC structures in the past 10 years, in Gattinara respondents worked in CHC from just 3 years on average (Table 11). While no differences emerged

between total years of work (p=0.649), professionals of Santhià and Coggiola declared a number significantly higher of job years in the two CHCs (p=0.024).

Finally, among respondents, GPs were the most frequent professionals (N=18), especially in Varallo and Gattinara followed by nurses (N=6) mainly from Santhià, specialist physicians (N=5) always from Santhià, and paediatricians (N=3) from Varallo and Santhià (Table 11). No differences were observed between professional distributions for the five CHCs (p=0.145).

Table 11 Characteristics of participants by CHC. Table shows the distributions of participants for each CHCs, mean age, sex, hours, and years worked, and types of professionals.

	Santhià		**Cigliano**		**Gattinara**		**Varallo**		**Coggiola**		**P-value**
	N	**mean (±SD)/%**	**N**	**mean (±SD)/%**	**N**	**mean (±SD)/%**	**N**	**mean (±SD)/%**	**N**	**mean (±SD)/%**	
Total participants	12		1		9		11		4		
Age		54.2 (±8.48)		58		50.9 (±11.50)		58.1 (±6.82)		61.5 (±3.11)	0.231*
Women	6	50.0%	0	0.0%	5	55.6%	5	45.5%	1	25.0%	0.741**
Men	6	50.0%	1	100.0%	4	44.4%	6	54.5%	3	75.0%	
Weekly hours worked		21.9 (±12.56)		8		12.8 (±9.58)		5.1 (±4.41)		5.2 (±1.5)	0.002*
Years worked		20.7 (±12.56)		29		24.8 (±14.85)		16.3 (±11.92)		20.7 (±13.20)	0.649*
Years worked in CHCs		9.9 (±11.20)		-		3.5 (±3.62)		5.9 (±4.85)		9.0 (±4.0)	0.024*
Professionals											
GP	1	8.3%	0	0.0%	5	55.6%	8	72.7%	4	100.0%	0.145**
Paediatrician	1	8.3%	0	0.0%	0	0.0%	2	18.2%	0	0.0%	
Specialist physician	3	25.0%	1	100.0%	1	11.1%	0	0.0%	0	0.0%	
Nurse	5	41.7%	0	0.0%	1	11.1%	0	0.0%	0	0.0%	
Psychologist	1	8.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
Social assistant	0	0.0%	0	0.0%	1	11.1%	0	0.0%	0	0.0%	
Educator	1	8.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
Laboratory technician	0	0.0%	0	0.0%	1	11.1%	0	0.0%	0	0.0%	
Medical student	0	0.0%	0	0.0%	0	0.0%	1	9.1%	0	0.0%	
Total professionals	**12**		**1**		**9**		**11**		**4**		

* P-value of ANOVA test; ** P-value of Chi-squared test

Table 12 shows the main indicators used to measure integration of care. Data showed that Santhià's professionals declared a higher yearly mean of contacts by telephone, e-mail, and face-to-face contacts. By contrast, Coggiola's professionals reported a higher percentage of patients managed in common with other professionals, whereas Gattinara's workers a higher percentage of common patients with other professionals working in this CHC. Although data appears to be different between CHCs, these differences did not result significant (Table 12).

Observing scores of integration scale (Table 13), professional scores resulted enough high with scores>3 of the 5-piont-scale. Even though the higher value resulted for Varallo (2.60 ±0.89), no statistical differences emerged between the overall scores by CHCs (p=0.473). Communication among professionals, that was measured as yearly number of contacts by phone, e-mail and face-to-face, results very low for all CHC. By contrast, the sharing of care programs among professionals was at medium level with Varallo reporting the highest one. No significantly differences emerged between CHCs and partial scores (Table 13).

Table 12 Indicators of integration between professionals by CHCs. Table shows some indicators measured with questionnaire about the integration with other professionals. Number of yearly contacts by type were obtained through the mean of sums of the contacts number declared by participants for each type of patients met during the last 12 months. Percentage of patient's management shared with other professionals and with other professionals employed in the same CHC were expressed as mean value of mean percentages declared for each type of patients.

	Santhià		**Cigliano**		**Gattinara**		**Varallo**		**Coggiola**		
	Mean	(±SD)	Mean	(±SD)	Mean	(±SD)	Mean	(±SD)	Mean	(±SD)	P-value *
Number of yearly contacts by telephone	53.75	184.63	0.00	0.00	3.33	8.29	2.18	5.34	0.00	0.00	0.764
Number of yearly contacts by e-mail	12.08	41.86	0.00	0.00	0.00	0.00	7.27	22.51	0.00	0.00	0.864
Number of yearly face-to-face contacts	35.17	101.10	0.00	0.00	1.22	2.73	3.45	7.70	0.00	0.00	0.641
Patients' management shared with other professionals (%)	30.47	33.90	0.00	0.00	22.59	20.65	26.20	17.70	54.88	27.90	0.351
Patients' management shared with other professionals in the CHC (%)	16.08	18.36	0.00	0.00	27.37	25.48	18.03	14.91	18.61	24.41	0.814

* P-value of ANOVA test

Table 13 Total score index and partial scores of integration level by CHC. Table shows scores about integration level scale submitted to the professionals. Scores were presented by CHC and range from 1 (low level of professional integration) to 5 (high level of professional integration). Scores were calculated as presented in the Methods paragraph.

	Santhià		**Cigliano**		**Gattinara**		**Varallo**		**Coggiola**		**P-value***
	Score	**(±SD)**	**Score**	**(±SD)**	**Score**	**(±SD)**	**Score**	**(±SD)**	**Score**	**(±SD)**	
Communication among professionals (number of yearly contacts by phone, e-mail, and face-to-face)	1.33	1.15	-	-	1.00	0.00	1.00	0.00	1.00	0.00	0.475
Sharing level of care and programmes among professionals	3.4	0.89	-	-	3.47	0.45	4.32	0.95	3.62	1.23	0.402
Sharing level of databases among professionals	1.8	1.09	-	-	2.79	0.78	3.9	1.17	3.47	1.38	0.057

	Santhià		Cigliano		Gattinara		Varallo		Coggiola		P-value*
	Score	(±SD)	Score	(±SD)	Score	(±SD)	Score	(±SD)	Score	(±SD)	
Professional integration score	**2.4**	**0.55**	**-**	**-**	**2.60**	**0.89**	**3.00**	**0.71**	**2.33**	**0.58**	**0.473**

* P-value of Kruskal-Wallis test for mean differences between ordinal (scores) and categorial variables.

Finally, Tables 14 and 15 present indicators about integration (Table 14) and the score index (Table 15) for GPs and nurses. Number of yearly contacts with other professionals were higher for nurses than GPs, and face-to-face contacts were significantly higher (p=0.039). Contrary to the major value of mean contacts declared by nurses, not difference emerged between the total scores of these two professional types (p=0.658).

Table 14 Indicators of integration between professionals for GPs and nurses. Table shows some indicators measured with questionnaire about the integration with other professionals. Number of yearly contacts by type were obtained through the mean of sums of the contacts number declared by participants for each type of patients met during the last 12 months. Percentage of patients' management shared with other professionals and with other professionals employed in the same CHC were expressed as mean value of mean percentages declared for each type of patients.

	GPs		Nurses		P-value*
	Mean	(±SD)/%	Mean	(±SD)/%	
Number of yearly contacts by telephone	2.00	5.97	106.67	261.28	0.089
Number of yearly contacts by e-mail	0.00	0.00	24.17	59.20	0.083
Number of yearly face-to-face contacts	0.78	2.04	69.83	140.00	**0.039**
Common patients with other professionals (%)	28.49	26.49	40.00	29.43	0.525
Common patients with other professionals in the CHC (%)	19.11	22.44	36.25	9.92	0.232

* P-value of ANOVA test

Table 15 Total score index and partial scores of integration level by professionals: a focus on GPs and nurses. Table shows scores about integration level scale submitted to the professionals. Scores were presented by the two professionals more represented in this sample, General Practitioners and Nurses. Scores range from 1 (low level of professional integration) to 5 (high level of professional integration). Scores were calculated as presented in the Methods paragraph.

	GPs		Nurses		P-value*
	Score	(±SD)	Score	(±SD)	
Communication among professionals (number of yearly contacts by phone, e-amil, and face-to-face)	1.00	0.00	1.67	1.63	0.076
Sharing level of care and programmes among professionals	3.75	0.89	3.00	0.00	0.143
Sharing level of databases among professionals	3.19	1.08	1.67	1.15	0.059
Professional integration level	**2.54**	**0.69**	**2.33**	**0.58**	**0.658**

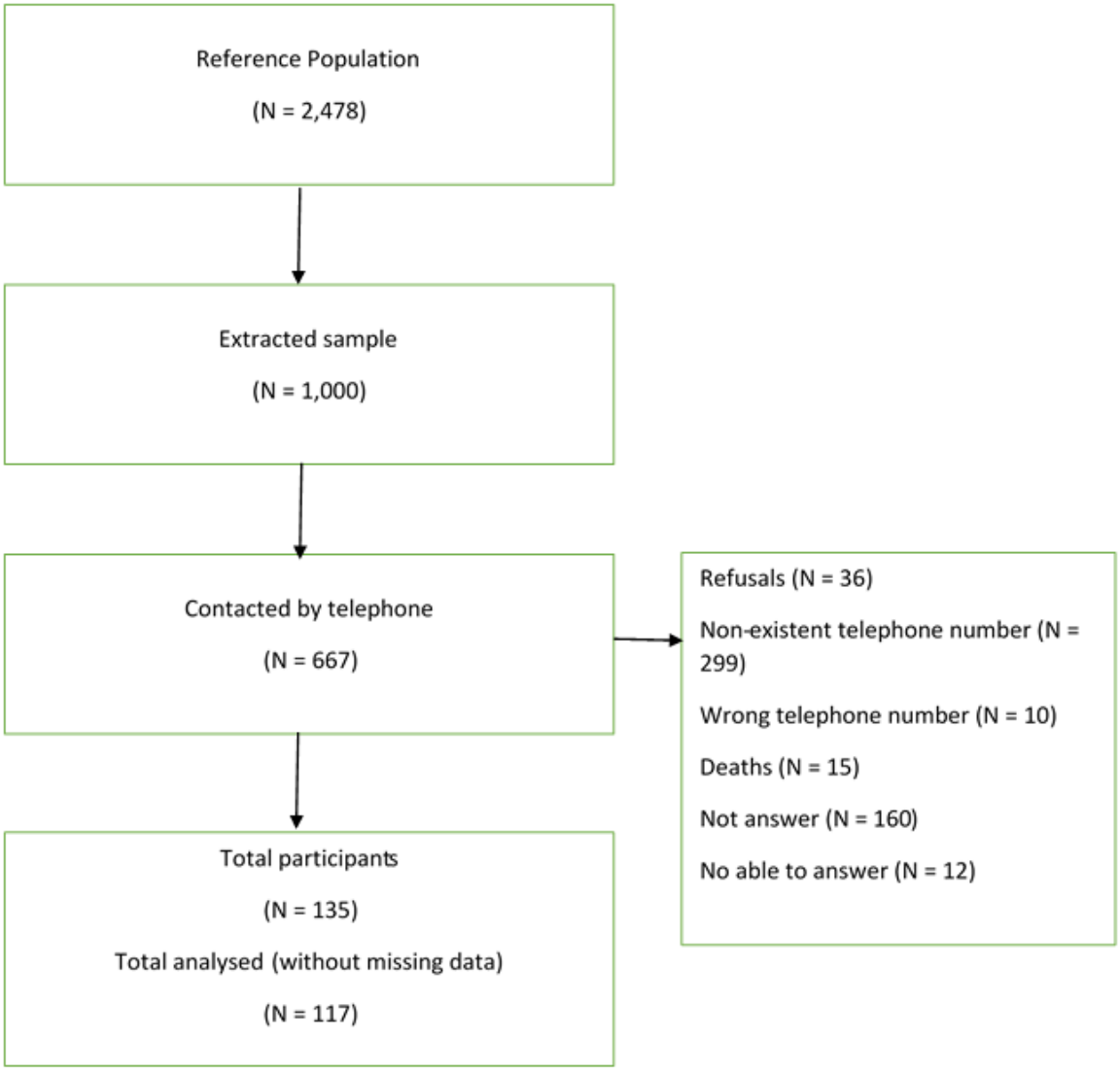
* P-value of Kruskal-Wallis test for mean differences between ordinal (scores) and categorial variables.

4.4. The level of continuity of care perceived by patients

Out of 1,000 eligible people of the random sample selected (see paragraph 3.1.4) and contacted by postal letter, 667 were contacted by telephone but only 135 accepted to participate. Many subjects were not reached for the non-existent numbers of telephone (Fig. 6) o because they did not

answer to the call although the repeated calls. Only 36 persons actually contacted refused participation, whereas 12 were not able because with dementia or psychiatric diseases, and other 15 persons because dead. Thus, 135 subjects participated to the survey, but only 117 patients were included in the analysis: for 18 participants there were excessive missing data, so they were excluded from analysis.

Figure 6 Flow chart of participation to the patient survey



Their social-demographic characteristics are shown in Table 16. Most of participants were residents in municipalities of CHCs of Gattinara and Sathià. Mean age was rather high (64 years ±12.4), with no differences among CHCs (p=0.307). Mainly women participated to the survey and no differences emerged between sex distribution among all five CHCs (p=0.061). Over 70% of the sample were classified as at low level of frailty, percentages ranged from Santhià (64.5%) to Gattinara (81.1%) but differences were not statistically significant (p=0.408).

Besides, the 39% of participants had an exemption for diabetes, the 35% had one type of exemption for disabled people, the 24% for hypertension with organ damage, the 13% for tumor, and 47% had also other type of exemptions (which were not considered for this study).

Table 16 Characteristics of participants for each CHC. Table shows distribution of participants and their main characteristics for each CHC.

	Santhià		Cigliano		Gattinara		Varallo		Coggiola		P-value	All	
	N / mean	(±SD)/%	N / mean	(±SD)/%	N / mean	(±SD)/%	N / mean	(±SD)/%	N / mean	(±SD)/%		N / mean	(±SD)/%
Total participants	31		17		37		17		15			117	
Age	66.2	±10.78	63.6	±12.56	62.1	±12.81	60.6	±15.10	68.3	±10.40	0.307*	64.0	±12.40
Women	18	58.1%	12	70.6%	33	89.2%	11	64.7%	11	73.3%	0.061**	85	72.6%
Men	13	41.9%	5	29.4%	4	10.8%	6	35.3%	4	26.7%		32	27.4%
Frailty level													
Low	20	64.5%	13	76.5%	30	81.1%	12	70.6%	10	66.7%	0.408**	85	72.6%
Middle	11	35.5%	3	17.6%	7	18.9%	4	23.5%	5	33.3%		30	25.6%
High	0	0.0%	1	5.9%	0	0.0%	1	5.9%	0	0.0%		2	1.7%
Exemptions													
Hypertension	8	25.8%	3	17.6%	12	32.4%	4	23.5%	1	6.7%	0.360**	28	23.9%
Asthma	3	9.7%	1	5.9%	2	5.4%	4	23.5%	1	6.7%	0.281**	11	9.4%
Diabetes	15	48.4%	5	29.4%	14	37.8%	8	47.1%	4	26.7%	0.519**	46	39.3%
Tumour	4	12.9%	2	11.8%	9	24.3%	0	0.0%	0	0.0%	0.059**	15	12.8%
Disabled people	10	32.26%	11	64.7%	12	32.4%	4	23.5%	8	53.3%	0.061**	42	35.9%
Other exemptions	20	64.5%	10	58.8%	20	54.1%	3	17.6%	2	13.3%	0.001**	55	47.0%
Setting of the most frequent visits													
CHC	14	45.2%	2	11.8%	3	8.1%	8	47.1%	1	6.7%	**0.029****	28	23.9%
Hospital	1	3.2%	3	17.6%	5	13.5%	0	0.0%	0	0.0%		9	7.7%
Specialistic ambulatory	0	0.0%	0	0.0%	1	2.7%	0	0.0%	0	0.0%		1	0.9%
GP's ambulatory	15	48.4%	9	52.9%	23	62.2%	8	47.1%	13	86.7%		68	58.1%
Home	1	3.2%	2	11.8%	3	8.1%	1	5.9%	1	6.7%		8	6.8%
Other	0	0.0%	1	5.9%	2	5.4%	0	0.0%	0	0.0%		3	2.6%

*P-value of ANOVA test; ** P-value of Chi-squared test

Finally, the most frequent locations of visits were the CHCs and GP's ambulatories for Santhià and Varallo sub-samples, GP's ambulatories for the other three CHCS. Differences between locations between CHCs were statistically significant.

Indicators measured for continuity of care were synthesized in Table 17. Differences between CHCs emerged for the number of time patient spoke with health professionals to solve a health question or need (p=0.038). Patients of Cigliano declared the greatest yearly number of time (42 times during the last year). Number of times the patient has been contacted by the ASL ranged from 5 to about 2 times. The number of blood tests from 11 to1.6, whereas the number of times the patient has seen a health professional ranged from 17 to 9 (Table 17).

Table 18 presents results about total score and partial scores of the continuity of care scale. The smallest values obtained for all CHCs were related to the intensity level of relationship between patient and physicians: all scores were slightly higher than one. In addition, accessibility was better for Santhià and the worst for Gattinara, quality of patient-physicians relationship was very high in Varallo, and the level of integration perceived was lower in Gattinara and higher in Santhià. Overall, total scores about continuity of care perceived by patients were all around a medium-high level (3 points), with the supremacy of Varallo (3.09 ±0.13). By contrast, the lowest score emerged from patients of Gattinara group (2.78 ±0.37). Differences among scores were statistically significant, except for the level of integration among professionals perceived by patients.

Table 17 Indicators of continuity of care by CHCs. Table shows main indicators measured with questionnaire about the continuity of care submitted to the patient sample. Indicators were referred to the last 12 months.

	Santhià		**Cigliano**		**Gattinara**		**Varallo**		**Coggiola**		
	Mean	(±SD)	Mean	(±SD)	Mean	(±SD)	Mean	(±SD)	Mean	(±SD)	P-value *
Number of time patient spoke with health professionals	17.97	20.35	42.52	87.00	10.73	11.90	11.62	9.72	11.87	7.15	**0.038**
Number of times the patient has been contacted by the ASL	4.13	6.23	5.12	7.28	1.81	3.93	2.37	2.31	1.8	1.78	0.097
Number of blood tests	2.61	3.44	10.59	30.08	1.65	2.51	2.41	2.45	2.67	6.03	0.124
Number of times the patient has seen a health professional	13.64	16.56	17.18	16.47	9.11	9.37	9.65	6.06	9.5	5.83	0.159

* P-value of ANOVA test

Table 18 Total score index and partial scores of the continuity of care perceived by patients for each CHC. Table shows scores about continuity of care scale submitted to the patients. Scores were presented by CHC and range from 1 (low level of continuity of care perceived) to 5 (high level of continuity of care perceived). Scores were calculated as presented in the Methods paragraph.

	Santhià (N=31)		**Cigliano (N=17)**		**Gattinara (N=37)**		**Varallo (N=17)**		**Coggiola (N=15)**		**P-value***
	Score	(±SD)	Score	(±SD)	Score	(±SD)	Score	(±SD)	Score	(±SD)	
intensity level of relationship between physicians and patient	1.25	0.68	1.65	1.22	1.08	0.28	1.00	0.00	1.00	0.00	**0.027**
Health service: accessibility	4.84	0.37	4.41	0.71	4.00	0.94	4.82	0.53	4.60	0.63	**0.001**
the quality of relationships between physicians and patient respect to the communication process	4.84	0.37	4.71	0.47	4.61	0.60	5.00	0.00	4.87	0.35	**0.050**
the level of integration among professionals perceived by patients	4.48	0.63	4.35	0.93	4.17	0.78	4.47	0.62	4.47	0.91	0.377
Total score index	**3.08**	**0.22**	**3.02**	**0.42**	**2.78**	**0.37**	**3.09**	**0.13**	**3.06**	**0.21**	**0.002**

* P-value of Kruskal-Wallis test for mean differences between ordinal (scores) and categorial variables

Finally, scores were also calculated by exemptions, frailty level, and gender of patients. Table 19 shows the total scores of continuity of care perceived by patients for each CHCs. No differences emerged between scores calculated by gender, frailty levels, and exemptions except for hypertension among residents in Varallo's area. Among this group, people with an exemption for hypertension for organ damage reported a score greater than people without this type of exemption (3.20 ±0.00 vs. 3.05 ±0.13) and difference was statistically significant (p=0.039) (Table 19).

Table 19 Total score index of the continuity of care perceived by patients for each CHC, type of exemptions, level of frailty, and gender. Table shows scores about continuity of care scale submitted to the patients. Scores were presented by CHC, type of exemptions, level of frailty, and gender. Scores range from 1 (low level of professional integration) to 5 (high level of professional integration). Scores were calculated as presented in method paragraph.

		Santhià			**Cigliano**			**Gattinara**			**Varallo**			**Coggiola**		
		Score	(±SD)	p-value**	Score	(±SD)	p-value**	Score	(±SD)	p-value**	Score	(±SD)	p-value**	Score	(±SD)	p-value**
Total score index by exemptions *																
Diabetes	Yes	3.04	0.19	0.361	3.12	0.44	0.552	2.85	0.33	0.369	3.06	0.15	0.361	3.13	0.11	0.486
	No	3.12	0.24		2.98	0.43		2.73	0.40		3.12	0.10		3.03	0.23	
Disables	Yes	3.15	0.24	0.119	3.00	0.49	1.000	2.74	0.39	0.432	3.20	0.00	0.088	3.00	0.28	0.248
	No	3.03	0.19		3.03	0.37		2.81	0.37		3.07	0.13		3.13	0.10	
Hypertension	Yes	3.15	0.23	0.540	3.13	0.50	0.605	2.68	0.37	0.351	3.20	0.00	**0.039**	3.00	0.14	0.332
	No	3.06	0.21		3.00	0.42		2.83	0.37		3.05	0.13		3.04	0.22	
Total score index by frailty levels																
Low		3.04	0.20	0.240	3.01	0.42	0.242	2.79	0.35	0.666	3.07	0.13	0.517	3.00	0.24	0.101
Medium		3.14	0.24		2.87	0.42		2.71	0.46		3.13	0.11		3.16	0.09	
Total score index by gender																
Women		3.15	0.22	0.089	3.08	0.45	0.257	2.74	0.37	0.069	3.08	0.14	0.629	3.04	0.25	0.874
Men		3.00	0.18		2.88	0.33		3.13	0.23		3.12	0.11		3.10	0.11	

* Persons included could have more than one exemption among that considered in the study; ** P-value of Kruskal-Wallis test for mean differences between ordinal (scores) and categorial variables

4.5. Effects of CHCs estimated with ITSA analysis

In this section results of ITSA analysis about efficacy evaluation on organizational, health, and economic outcomes of the opening of CHCs in Vercelli's ASL will be presented.

4.5.1. Organisational outcome: inappropriate accesses to emergency departments

Santhià. Both models (pre-post and treated-control differences) presented reported significant effects of CHC on the inappropriate accesses to EDs which decreased among old age people, with a greater effect size when Santhià was compared to control (-88 accesses in Santhià respect to Cigliano area). So, for old age people the CHC in Santhià was associated to a considerable decrease of inappropriate accesses compared to the baseline period and to fewer accesses after the intervention started compared to the control. No effects emerged for the other two age classes (Table 20).

Table 20 Effects of Santhià's Community Health Centre on improper emergency department accesses by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) of ED accesses with white/green triage codes. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Santhià area (no differences between curves at baseline).

	single model				multigroup model				
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**	**Controls***
≥65 years	**-56.81**	**-84.33**	**-29.38**	**0.024**	**-88.54**	**-115.23**	**-61.84**	**0.005**	C
35-64 years	44.31	-187.44	276.07	0.249	-27.07	-298.90	244.77	0.821	B, C
0-34 years	-154.67	-387.87	78.53	0.075	-213.36	-2360.00	1932.67	0.821	B, V

* B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area

Gattinara. Considering single models, CHC of Gattinara is associated to a reduction of inappropriate accesses in old age people and adults in comparison to pre-intervention. Among adults, reduction of inappropriate accesses respect to the period before the intervention was about double respect to the reduction observed in elderly (-60.3 and -33.9, respectively). When time series of Gattinara was compared to controls, multigroup models did not report any differences in all populations considered (Table 21).

Table 21 Effects of Gattinara's Community Health Centre on improper emergency department accesses by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) of ED accesses with white/green triage codes. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Gattinara area (no differences between curves at baseline).

	single model				multigroup model				
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**	**Controls***
≥65 years	**-33,93**	**-38,27**	**-29,58**	**0,006**	-48,27	-1080,00	982,96	0,915	C, V

	single model				multigroup model				
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**	**Controls***
35-64 years	**-60,33**	**-118,27**	**-239**	**0,048**	-58,50	-322,83	205,82	0,617	B, C
0-34 years	-5,39	-144,44	133,67	0,709	-87,93	-2470,00	2298,64	0,933	C, B

* B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area

Varallo. Although estimates were all negative, no differences emerged observing pre-post and treated-control differences for Varallo's area (Table 22). No effects of the CHC opening were observed for this area.

Table 22 Effects of Varallo's Community Health Centre on improper emergency department accesses by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) of ED accesses with white/green triage codes. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Varallo area (no differences between curves at baseline).

	single model				multigroup model				
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**	**Controls***
≥65 years	-280.68	-728.26	166.89	0.080	-158.41	-776.96	460.14	0.587	B, C, V
35-64 years	-175.68	-429.17	77.8	0.072	-91.16	-229.82	47.49	0.105	B
0-34 years	-353.23	-968.84	262.37	0.087	-207.16	-426.18	11.86	0.055	B

* B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area

Coggiola. Although estimates were all negative, except for young people, no effects of the CHC emerged from pre-post and treated-control differences for this population (Table 23).

***Table 23* Effects of Coggiola's Community Health Centre on improper emergency department accesses by age classes: single and multigroup models.** Table shows pre-post differences (single model) and treated-control differences (treated-control differences) of ED accesses with white/green triage codes. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Coggiola area (no differences between curves at baseline).

	single model				multigroup model				
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**	**Controls***
≥65 years	-84.24	-214.6	46.12	0.077	-64.63	-1100.00	967.19	0.886	C, V
35-64 years	-18.76	-179.54	142.02	0.378	-45.17	-955.45	865.11	0.916	B, C, V
0-34 years	-29.16	-97.24	38.91	0.116	49.49	-204.53	303.50	0.659	C, B

* B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area

All experimental area. Considering all population of the experimental areas, introduction of CHCs was not associated to a significantly reduction of inappropriate accesses for all age classes respect to the pre-intervention trend. Notwithstanding, significantly reductions emerged in experimental area for all age classes when experimental data were compared to the total control area (multigroup model in Table 24). Old age people registered the largest reduction (-542 accesses), followed by young people (-472 accesses), whereas adults reported the smallest reduction (-265 accesses).

Table 24 Effects of the four Community Health Centres on improper emergency department accesses by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) of ED accesses with white/green triage codes. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control used is the sum of data about the three control areas considered in the study (Cigliano, Vercelli, and Borgosesia data).

	single model				multigroup model			
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**
≥65 years	-445.65	-1060.00	145.46	0.066	**-541.77**	**-796.73**	**-286.81**	**0.012***
35-64 years	-210.46	-450.91	29.99	0.057	**-265.18**	**-477.6**	**-52.76**	**0.033***
0-34 years	-542.46	-1460.00	377.33	0.084	**-472.57**	**-891.76**	**-53.37**	**0.04***

* baseline difference in levels between treated and controls is statistically significant (p-value<0.05)

4.5.2. Health outcomes: hospitalization, hospitalized people, accesses to emergency departments, and mortality

Santhià. Pre-post-differences were not significant for hospitalizations in all the three age groups in comparison to the baseline but considering in the model the control area, effectiveness of CHC emerged especially for old age people (Table 25). In over-65ies, the treated-control differences after a year of CHC opening showed the reduction of hospitalization number for diabetes (-12.3), hospitalized persons for diabetes (-9.5), hospitalization number and hospitalized persons for COPD (-5.0 and -4.7, respectively), and hospitalization for heart failure (-3.3).

Among old age people, the CHC appeared to be less effective in hospitalization reduction (no differences emerged for many outcomes related to hospitalizations). In comparison to controls, effect size for the elderly was smaller than adults for diabetes hospitalization and persons involved (-11.1 and -7.7, respectively) and for heart failure was positive in favour to control area (hospitalizations for heart failure increased of 15.8 in intervention group). Similarly, also in the younger the CHC had a lower effect, with a slight reduction of hospitalization for diabetes (-4.1).

Adult people living in these municipalities registered less accesses to EDs with red/yellow triage codes (-92.4) in comparison to the control. Observing results in Table 26, Santhià's CHC appeared to be effective mainly in accesses to EDs for young people for which the single model showed a decrease of persons who had had at least one access (pre-post: -98.4), whereas the multigroup model reported the effectiveness of CHC for red/yellow codes accesses (treated-control: -27.1).

Although the intervention had no effect in the elderly's hospitalization, for this age group there was the highest reduction of mortality at 30 days after hospitalization for heart failure in both the model: respect to the pre-intervention, one year later mortality decreased of 138 units; on the other hand, compared to the control, population in the intervention area registered a reduction of 105 death for the same outcome.

Table 25 Effects of Santhià's Community Health Centre on hospitalizations, ED accesses, and mortality at 30 days after hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for all- causes hospitalizations and for specific causes (diabetes, heart failure, and COPD), ED accesses (total and with red/yellow triage codes), and mortality at 30 days after hospitalization. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Santhià area (no differences between curves at baseline).

	Single model				**Multigroup model**				
	Pre-post diff.	**95% CI**		**P-Value**	**Treated-Control diff.**	**95% CI**		**P-Value**	**Controls [a]**
≥65 years									
Hospitalisation	184.92	-490.07	859.91	0.178	-42.61	-476.50	391.28	0.823	B, C
Hospitalized persons	121.43	-272.56	515.42	0.159	-1.82	-240.76	237.11	0.986	B, C
Hospitalisation for heart failure	-0.70	-18.08	16.68	0.698	**15.85**	**0.07**	**31.63**	**0.049**	B, C, V
Hospitalized persons for heart failure	2.01	-18.26	22.29	0.426	11.80	-1.78	25.39	0.083	B, C, V
Hospitalisation for diabetes	-3.79	-11.03	3.45	0.095	**-11.09**	**-17.47**	**-4.71**	**0.017**	C
Hospitalized persons for diabetes	-3.43	-9.23	2.36	0.084	**-7.66**	**-12.49**	**-2.83**	**0.021**	C
Hospitalisation for COPD	-4.85	-13.54	3.84	0.089*	-8.67	-25.12	7.78	0.151	V
Hospitalized persons for COPD	-4.85	-13.54	3.84	0.089*	-8.88	-22.93	5.16	0.113	V
Access to emergency departments	-4.42	-86.98	78.15	0.620	-60.90	-962.31	840.52	0.885	B, C, V
Persons accessed to emergency department	27.84	-1.13	56.81	0.052	-48.56	-657.85	560.73	0.865	B, C, V
Access to emergency departments (red/yellow triage codes)	52.39	-2.65	107.43	0.052	-56.27	-586.46	473.92	0.809	C, V
Mortality at 30 days after hospitalisation	-15.12	-62.97	32.72	0.155	11.32	-9.32	31.96	0.142	C
Mortality at 30 days after hospitalisation for heart failure	**-137.96**	**-186.63**	**-89.3**	**0.018**	**-105.37**	**-133.53**	**-77.21**	**0.000**	B, V
35-64 years									
Hospitalisation	161.70	-306.16	629.56	0.142	25.45	-229.52	280.43	0.820	B, C
Hospitalized persons	126.86	-175.87	429.60	0.118	53.22	-92.01	198.45	0.415	B, C
Hospitalisation for heart failure	-1.21	-8.45	6.03	0.280	**-3.28**	**-6.14**	**-0.42**	**0.039**	C
Hospitalized persons for heart failure	1.86	-9.72	13.45	0.289	2.15	-1.89	6.19	0.149	C
Hospitalisation for diabetes	-0.28	-3.18	2.61	0.431	**-12.30**	**-19.23**	**-5.36**	**0.017**	V
Hospitalized persons for diabetes	0.07	-4.27	4.42	0.863	**-9.51**	**-14.63**	**-4.39**	**0.015**	V
Hospitalisation for COPD	-0.57	-6.36	5.23	0.431	**-5.00**	**-7.77**	**-2.22**	**0.016**	V
Hospitalized persons for COPD	-1.28	-4.18	1.61	0.112	**-4.72**	**-6.91**	**-2.52**	**0.011**	V
Access to emergency departments	13.98	-159.83	187.80	0.493	-55.64	-351.10	239.81	0.669	B, C

	Single model				Multigroup model				
	Pre-post diff.	**95% CI**		**P-Value**	**Treated-Control diff.**	**95% CI**		**P-Value**	**Controls [a]**
Persons accessed to emergency department	2.80	-121.76	127.37	0.823	-37.15	-221.53	147.23	0.648	B, C
Access to emergency departments (red/yellow triage codes)	-30.33	-88.27	27.61	0.095	**-92.36**	**-142.92**	**-41.80**	**0.016**	B
Mortality at 30 days after hospitalisation	-1.2	-12.08	9.68	0.394	-0.42	-4.79	3.96	0.828	B, V
Mortality at 30 days after hospitalisation for heart failure					-179.1	-424.35	66.15	0.088	B
0-34 years									
Hospitalisation	22.61	-129.48	174.70	0.310	-60.73	-195.99	74.53	0.193	B
Hospitalized persons	17.78	-66.24	101.79	0.227	-33.34	-125.63	58.95	0.260	B
Hospitalisation for diabetes					**-4.07**	**-5.55**	**-2.60**	**0.007***	C
Hospitalized persons for diabetes					**-4.07**	**-5.55**	**-2.60**	**0.007***	C
Access to emergency departments	-153.55	-418.62	111.52	0.086	-228.01	-2480.00	2027.98	0.818	B, V
Persons accessed to emergency department	**-98.36**	**-196.85**	**0.14**	**0.050**	-41.98	-257.47	173.51	0.659	B, V
Access to emergency departments (red/yellow triage codes)	1.12	-30.75	32.99	0.733	**-27.06**	**-46.92**	**-7.20**	**0.028**	B
Mortality at 30 days after hospitalisation					**-6.37**	**-7.14**	**-5.61**	**0.000**	C, V

a. B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area; *Pre-post difference estimates are the same when hospitalized persons had only one hospitalisation during the period in analysis (2015-2019)

Gattinara. Similar to Santhià, many outcomes about hospitalizations in the adult population (35-64 years) registered a reduction after the opening of CHC. Table 26 shows results for pre-post intervention and treated-control differences. No effects emerged for old age people: the only effective estimate reported a decrease of few hospitalizations for diabetes (with a reduction about 3 compared to the control population). By contrast, the major effects on hospitalization reduction were observed for young people (0-34 years) for who all-causes hospitalizations decreased of 70 in comparison to the control.

The number of persons who accessed an ED dropped among adults in Gattinara's area during the period 2015-2019 after the intervention (-42 persons), whereas among the other two groups no effects emerged for both estimates (pre-post and treated-control differences). The accesses with red/yellow triage codes had grown considering pre-post difference, in favour to pre-intervention period;

however, treated-control difference was negative and in favour to CHC (with a reduction of 52 accesses respect to the control population). Red/yellow triage accesses to EDs decreased in all age classes but more in old age people (-87 accesses in comparison to controls) respect to the other two populations.

Finally, mortality registered a reduction among over-65 years old: compared to the pre-intervention period, mortality at 30 days after hospitalization for heart failure dropped to 147 deaths; in addition, older people living in this area (Gattinara) registered 73 deaths less than in the control population. The major effect on mortality after hospitalization for heart failure emerged for adults (-334 deaths respect to their peers of control); notwithstanding, mortality after all-cause hospitalizations increased in Gattinara after CHC opening (+13 deaths) and compared to the control (+17 deaths) among this age group. Minor effects were registered for young people in the comparison with the control, but both types of mortality decreased in favour of the CHC.

Table 26 Effects of Gattinara's Community Health Centre on hospitalizations, ED accesses, and mortality at 30 days after hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for all- causes hospitalizations and for specific causes (diabetes, heart failure, and COPD), ED accesses (total and with red/yellow triage codes), and mortality at 30 days after hospitalization. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Gattinara area (no differences between curves at baseline).

	Single model				Multigroup model				
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**	**Controls [a]**
≥65 years									
Hospitalisation	194.35	-486.43	875.14	0.171	-34.68	-469.66	400.3	0.856	B, C
Hospitalized persons	95.18	-342.26	532.62	0.221	-39.25	-286.87	208.38	0.719	B, C
Hospitalisation for heart failure	3.22	-9.81	16.26	0.196	13.32	-9.71	36.34	0.214	B, C
Hospitalized persons for heart failure	2.87	-8.72	14.45	0.196	11.73	-4.99	25.45	0.141	B, C
Hospitalisation for diabetes	1.79	-5.45	9.03	0.196	**-2.73**	**-5.32**	**-0.13**	**0.041**	B, C, V
Hospitalized persons for diabetes	1.07	-3.27	5.42	0.196	-1.35	-3.94	1.24	0.28	B, C, V
Hospitalisation for COPD	6.66*	-12.17*	25.49*	0.139*	2.84	-14.56	20.23	0.556	V
Hospitalized persons for COPD	6.66*	-12.17*	25.49*	0.139*	2.63	-12.51	17.77	0.533	V
Access to emergency departments	-60.134	-145.59	25.33	0.071	-115.88	-1020.00	785.55	0.784	B, C, V
Persons accessed to emergency department	-33.4	-95.69	28.88	0.093	-30.96	-77.68	15.77	0.104	C
Access to emergency departments (red/yellow triage codes)	-26.21	-116.01	63.6	0.168	**-87.34**	**-156.22**	**-18.46**	**0.032**	B

	Single model				Multigroup model				
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**	**Controls [a]**
Mortality at 30 days after hospitalisation	2.12	-27	31.24	0.524	10.27	-5.31	25.86	0.105	B
Mortality at 30 days after hospitalisation for heart failure	**-147.42**	**-204.4**	**-90.44**	**0.019**	**-73.01**	**-103.88**	**-42.13**	**0.001**	C, B
35-64 years									
Hospitalisation	87.32	-358.8	533.46	0.243	-43.2	-293.34	206.94	0.695	B, C
Hospitalized persons	93.44	-223.77	410.66	0.166	16.04	-133.01	165.08	0.806	B, C
Hospitalisation for heart failure	-1.21*	-8.45*	6.03*	0.28*	-5.57	-13.25	2.12	0.13	B, V
Hospitalized persons for heart failure	-1.21*	-8.45*	6.03*	0.28*	**-3.57**	**-6.07**	**-1.07**	**0.025**	B
Hospitalisation for diabetes					**-6.43***	**-8.39***	**-4.47***	**0.005**	B
Hospitalized persons for diabetes					**-6.43***	**-8.39***	**-4.47***	**0.005**	B
Hospitalisation for COPD	0.72*	-2.18*	3.61*	0.196*	**-3.72**	**-5.91**	**-1.52**	**0.018**	V
Hospitalized persons for COPD	0.72*	-2.18*	3.61*	0.196*	**-2.72**	**-4.91**	**-0.52**	**0.033**	V
Access to emergency departments	-50.61	-105.65	4.43	0.054	-189.76	-2030.00	1646.69	0.814	C, V
Persons accessed to emergency department	**-41.8**	**-69.33**	**-14.28**	**0.033**	-108.89	-1360.00	1139.89	0.842	C, V
Access to emergency departments (red/yellow triage codes)	**9.72**	**6.82**	**12.61**	**0.015**	**-52.31**	**-98.92**	**-5.70**	**0.040**	B
Mortality at 30 days after hospitalisation	**13.1**	**0.07**	**26.12**	**0.049**	**16.81**	**10.35**	**23.27**	**0.008**	C**
Mortality at 30 days after hospitalisation for heart failure	-154.68	-780.16	470.81	0.196	**-333.78**	**-657.82**	**-9.73**	**0.047**	B
0-34 years									
Hospitalisation	-18.58	-101.15	63.98	0.214	**-70.40**	**-126.86**	**-13.94**	**0.033**	C
Hospitalized persons	3.01	-114.31	120.34	0.799	-27.65	-89.66	34.35	0.327	C, B
Hospitalisation for diabetes	-2.07	-6.42	2.27	0.104	**-7.89**	**-13.21**	**-2.57**	**0.010**	B, V
Hospitalized persons for diabetes	-1.72	-4.61	1.18	0.084	**-3.74**	**-6.27**	**-1.20**	**0.010**	C, B
Access to emergency departments	-1.42	-181.03	178.19	0.936	-91.07	-2610.00	2428.23	0.934	C, V
Persons accessed to emergency department	-37.82	-182.67	107.03	0.186	30.32	-187.57	248.21	0.752	C, B
Access to emergency departments (red/yellow triage codes)	3.97	-36.59	44.53	0.431	**-24.21**	**-45.81**	**-2.60**	**0.040**	B

	Single model				Multigroup model				
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**	**Controls [a]**
Mortality at 30 days after hospitalisation					**-3.14**	**-3.91**	**-2.38**	**0.000**	C, V

a. B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area; *Pre-post difference estimates are the same when hospitalized persons had only one hospitalisation during the period in analysis (2015-2019); *** baseline difference in levels between treated and controls is statistically significant (p-value<0.05)

Varallo. Results for hospitalizations for Varallo were similar to Gattinara and Santhià. CHC resulted most effective for hospitalization reduction for specific causes (heart failure, diabetes, and COPD) in adult population in comparison to control groups; effects in old age people were visible only for hospitalization for diabetes and number of persons hospitalized for this condition when analysis considered the control. No effects were registered in young people on hospital-related-outcomes (Table 27).

Accesses to EDs decreased for adults and young people: the reduction in young was considerably bigger than reduction registered among adults (-228 and -94 accesses respect to their control groups, respectively for young and adults). Among adults, accesses also decreased considering the pre-post-intervention estimate (-117 accesses), whereas among young people there was also a reduction of accesses with red/yellow triage codes (-21 accesses in comparison to the control).

Finally, mortality after hospitalization for heart failure was reduced in this area after CHC opening dropped respect to the pre-intervention trend (single model: -67.7 95% CI -70.2 to -65.2) among over-65een, but no effect emerged considering the control group. Indeed, in comparison to the controls mortality after all-causes hospitalization was increased in Varallo's population even if it was a little increase (+2 deaths).

Table 27 Effects of Varallo's Community Health Centre on hospitalizations, ED accesses, and mortality at 30 days after hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for all- causes hospitalizations and for specific causes (diabetes, heart failure, and COPD), ED accesses (total and with red/yellow triage codes), and mortality at 30 days after hospitalization. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Varallo area (no differences between curves at baseline).

	Single model				Multigroup model				Controls [a]
	Pre-post diff.	**95% CI**		**P-Value**	**Treated-Control diff.**	**95% CI**		**P-Value**	
≥65 years									
Hospitalisation	491.8	-991.44	1975.04	0.148	115.67	-425.06	656.41	0.649	B, C, V
Hospitalized persons	246.89	-581.64	1075.42	0.164	34.96	-323.82	393.75	0.835	B, C, V
Hospitalisation for heart failure	42	-55.05	139.05	0.114	**41.13**	**5.99**	**76.26**	**0.028**	B, V
Hospitalized persons for heart failure	20.69	-38.7	80.07	0.141	21.96	-6.11	50.03	0.107	B, V

	Single model				Multigroup model				Controls [a]
	Pre-post diff.	**95% CI**		**P-Value**	**Treated-Control diff.**	**95% CI**		**P-Value**	
Hospitalisation for diabetes	0.09	-24.53	24.71	0.971	**-8.32**	**-14.51**	**-2.14**	**0.015**	B, V
Hospitalized persons for diabetes	-0.06	-15.99	15.87	0.970	**-5.23**	**-8.67**	**-1.78**	**0.006**	B, C, V
Hospitalisation for COPD	-4.21	-11.45	3.03	0.086	-1.32	-27.70	25.05	0.909	B, V
Hospitalized persons for COPD	-1.21	-8.45	6.03	0.280	-4.15	-10.07	1.78	0.095	B
Access to emergency departments	-223.47	-581.25	134.3	0.080	-210.56	-1110.00	693.58	0.621	B, C, V
Persons accessed to emergency department	-55.58	-264.16	153	0.183	-86.68	-697.39	524.03	0.762	B, C, V
Access to emergency departments (red/yellow triage codes)	57.21	-32.6	147.01	0.078	-3.92	-72.80	64.95	0.829	B
Mortality at 30 days after hospitalisation	-25.80	-69.32	17.72	0.084	-5.06	-17.58	7.47	0.371	C, V
Mortality at 30 days after hospitalisation for heart failure	**-67.74**	**-70.25**	**-65.23**	**0.002**	-22.87	-47.36	1.62	0.063	B, V
35-64 years									
Hospitalisation	320.14	-853.12	1493.41	0.179	6.61	-421.39	434.62	0.974	B, C, V
Hospitalized persons	209.7	-646.35	1065.75	0.798	-8.98	-337.09	319.13	0.953	B, C, V
Hospitalisation for heart failure	1.67	-37.44	40.78	0.683	**-10.71**	**-20.51**	**-0.90**	**0.035**	B, C, V
Hospitalized persons for heart failure	5.88	-25.99	37.75	0.257	-3.23	-11.87	5.42	0.432	B, C, V
Hospitalisation for diabetes	**3.36***	**1.91***	**4.81***	**0.021***	**-8.66**	**-15.54**	**-1.77**	**0.032**	V
Hospitalized persons for diabetes	**3.36***	**1.91***	**4.81***	**0.021***	**-6.22**	**-11.15**	**-1.29**	**0.032**	V
Hospitalisation for COPD	1.07*	-3.27*	5.42*	0.196*	**-3.36**	**-5.81**	**-0.91**	**0.028**	V
Hospitalized persons for COPD	1.07*	-3.27*	5.42*	0.196*	-2.36	-4.81	0.09	0.054	V
Access to emergency departments	**-116.79**	**-221.08**	**-12.5**	**0.045**	**-94.30**	**-165.91**	**-22.69**	**0.030**	B
Persons accessed to emergency department	-43.83	-111.91	24.24	0.077	-79.21	-811.38	652.97	0.818	B, C, V
Access to emergency departments (red/yellow triage codes)	58.89	-90.3	208.09	0.125	-3.13	-71.86	65.59	0.863	B
Mortality at 30 days after hospitalisation	-1.44	-3.03	0.11	0.054	**2.01**	**0.09**	**3.94**	**0.046**	V
Mortality at 30 days after hospitalisation for heart failure					70.90	-900.77	1042.57	0.524	B
0-34 years									
Hospitalisation	6.73	-307.59	321.05	0.831	-117.99	-446.09	210.12	0.448	B, C, V
Hospitalized persons	-12.76	-240.17	214.65	0.606	-103.64	-357.74	150.45	0.392	B, C, V

	Single model				Multigroup model				Controls [a]
	Pre-post diff.	**95% CI**		**P-Value**	**Treated-Control diff.**	**95% CI**		**P-Value**	
Access to emergency departments	-345.79	-935.32	243.74	0.085	**-227.89**	**-433.82**	**-21.97**	**0.041**	B
Persons accessed to emergency department	-163.12	-519.44	193.21	0.108	-95.54	-235.35	44.28	0.099	B
Access to emergency departments (red/yellow triage codes)	7.45	-18.62	33.52	0.171	**-20.73**	**-39.61**	**-1.86**	**0.042**	B
Mortality at 30 days after hospitalisation	3.63	-2.44	9.70	0.083	**2.04**	**1.61**	**2.48**	**0.000**	B, V

a. B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area; *Pre-post difference estimates are the same when hospitalized persons had only one hospitalisation during the period in analysis (2015-2019)

Coggiola. Table 28 report data about effect evaluation of single and multigroup models for Coggiola's area. No effects emerged in old age people for hospitalization-related outcomes. After the introduction of CHC, the population of Coggiola in the experiment registered a reduction in hospitalizations for diabetes, COPD, and in the number of hospitalized persons for both diseases, in comparison to the control only for the population aged 35-64. However, the differences were rather smaller than the difference emerged for hospitalized persons for all-causes among young people (-40 hospitalized persons in the experimental group in comparison to the control).

The Analysis did not report any effects of the CHC's opening on ED accesses, except for red/yellow triage codes that grew by 33 units after CHC's opening in comparison to the pre-intervention period, among the adult population.

Finally, among the elderly, mortality after all-cause hospitalizations grew by 11 deaths after the intervention, considering pre-post difference, whereas the treated-control difference was higher and in favour of the control (+26 deaths for the experimental population vs. control). Considering mortality after hospitalizations for heart failure, a major iatrogenic effect emerged with +141 deaths in the experimental area in comparison to the control. Also, result for young people showed a negative impact of CHC on mortality at 30 days after all-cause hospitalization (treated-control difference: 8.4 95% CI 7.6 to 9.1) (Table 28).

Table 28 Effects of Coggiola's Community Health Centre on hospitalizations, ED accesses, and mortality at 30 days after hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for all- causes hospitalizations and for specific causes (diabetes, heart failure, and COPD), ED accesses (total and with red/yellow triage codes), and mortality at 30 days after hospitalization. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Coggiola area (no differences between curves at baseline).

	Single model				**Multigroup model**				
	Pre-post diff.	**95% CI**		**P-Value**	**Treated -Control diff.**	**95% CI**		**P-Value**	**Controls [a]**
≥65 years									
Hospitalisation	135.01	-467.55	737.58	0.215	-81.19	-386.86	224.47	0.371	C
Hospitalized persons	116.27	-248.75	481.28	0.154	7.52	-160.15	175.20	0.865	C
Hospitalisation for heart failure	1.37	-20.35	23.10	0.569	7.78	-6.11	21.66	0.137	C
Hospitalized persons for heart failure	2.30	-15.08	19.68	0.342	4.63	-9.86	19.12	0.303	C
Hospitalisation for diabetes	8.73	-14.44	31.91	0.131	1.73	-4.02	7.48	0.500	B, C
Hospitalized persons for diabetes	6.30	-11.08	23.68	0.136	1.22	-4.32	4.75	0.619	B, C
Hospitalisation for COPD	-3.07	-7.42	1.27	0.070*	-6.89	-23.15	9.36	0.209	V
Hospitalized persons for COPD	-3.07	-7.42	1.27	0.070*	-7.10	-20.92	6.71	0.157	V
Access to emergency departments	-42.54	-93.23	8.16	0.059	-165.49	-1660.00	1333.25	0.801	C, V
Persons accessed to emergency department	-28.6	-63.36	6.17	0.061	-124.30	-1180.00	926.56	0.788	C, V
Access to emergency departments (red/yellow triage codes)	41.7	-37.96	121.37	0.095	8.66	-25.29	42.60	0.387	C
Mortality at 30 days after hospitalisation	**11.25**	**2.38**	**20.12**	**0.039**	**26.52**	**8.72**	**44.41**	**0.023**	V
Mortality at 30 days after hospitalisation for heart failure	29.55	-260.14	319.25	0.418	**141.51**	**52.62**	**230.40**	**0.007**	C, B
35-64 years									
Hospitalisation	5.61	-146.48	157.70	0.721	-91.07	-220.46	38.32	0.094	C
Hospitalized persons	5.72	-94.23	105.66	0.600	-29.38	-505.16	446.41	0.888	C, V
Hospitalisation for heart failure					-1.97	-6.40	2.45	0.350	B, C, V
Hospitalized persons for heart failure	-0.36	-1.81	1.09	0.196	-1.46	-6.13	3.20	0.482	B, V
Hospitalisation for diabetes	-0.21	-7.45	7.03	0.776	**-4.64**	**-7.78**	**-1.50**	**0.024**	B
Hospitalized persons for diabetes	1.79	-5.45	9.03	0.196	**-7.79**	**-13.27**	**-2.31**	**0.026**	V
Hospitalisation for COPD	-1.36*	-2.81*	0.09*	0.053*	**-4.07**	**-5.17**	**-2.98**	**0.004**	C
Hospitalized persons for COPD	-1.36*	-2.81*	0.09*	0.053*	**-3.07**	**-4.17**	**-1.98**	**0.007**	C
Access to emergency departments	14.61	-124.44	153.67	0.409	-101.53	-1650.00	1449.70	0.881	B, V

	Single model				Multigroup model				
	Pre-post diff.	**95% CI**		**P-Value**	**Treated -Control diff.**	**95% CI**		**P-Value**	**Controls [a]**
Persons accessed to emergency department	1.52	-65.11	68.15	0.82	-55.68	-1300.00	1193.22	0.919	C, V
Access to emergency departments (red/yellow triage codes)	**33.37**	**11.65**	**55.1**	**0.033**	-15.13	-188.87	158.61	0.853	B, C, V
Mortality at 30 days after hospitalisation	-9.11	-32.57	14.35	0.127	-1.76	-8.05	4.53	0.553	B, C, V
Mortality at 30 days after hospitalisation for heart failure					160.71	-57.82	379.25	0.126	C, V
0-34 years									
Hospitalisation	26.33	-31.61	84.27	0.109	-61.16	-579.64	457.32	0.788	C, V
Hospitalized persons	4.67	-34.44	43.78	0.371	**-39.48**	**-77.65**	**-1.30**	**0.047**	C
Access to emergency departments	-20.72	-114.87	73.43	0.219	-179.52	-2700.00	2339.37	0.871	C, V
Persons accessed to emergency department	6.76	-49.52	63.46	0.361	-99.28	-1390.00	1191.66	0.861	B, V
Access to emergency departments (red/yellow triage codes)	8.45	-17.62	34.52	0.152	-3.51	-18.62	11.60	0.423	C
Mortality at 30 days after hospitalisation					**8.38**	**7.61**	**9.14**	**0.000**	C, V

a. B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area; *Pre-post difference estimates are the same when hospitalized persons had only one hospitalisation during the period in analysis (2015-2019)

All experimental areas. Analysis on the whole/total experimental population considered all together was shown in Table 29. Trends and estimates of effects were like the results reported for each CHC singly analysed. Among older people aged 65 years and over, the introduction of CHCs in Vercelli's ASL had not had any effects on the reduction of hospitalizations (for all-causes and for specific ones). Hospitalizations for diabetes and COPD were fewer among adult people in the control group model, with hospitalization and persons hospitalized for diabetes with smaller values than for COPD. However, the major effects of CHCs emerged on hospitalizations regarding young people.

Accesses to EDs have decreased in all age populations, especially when CHCs were compared to the control territory. The major reduction was registered among older people (-672 accesses in CHCs' territory in comparison to control), but also the decline of accesses in adult and young people was quite consistent (-322 and -480, respectively). Although red/yellow triage codes rose after the intervention in relation to the baseline trend among old age people, in comparison to the control the estimate was in favour to CHCs (-130 accesses). Less reduction was contrary registered among adults, whereas no effects emerged for young people about this outcome.

Finally, the overall analysis showed ambiguous effects of CHCs on mortality among the three age groups: mortality after hospitalization for heart failure collapsed after the intervention in relation to the baseline (with a reduction of 67 deaths) among the elderly, whereas treated-control difference decreased less (-35 deaths). No effects emerged on mortality for young and iatrogenic effects were registered for population with 35-64 years (for both outcomes in the multigroup models.

Table 29 Effects of the four Community Health Centres on hospitalizations, ED accesses, and mortality at 30 days after hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for all- causes hospitalizations and for specific causes (diabetes, heart failure, and COPD), ED accesses (total and with red/yellow triage codes), and mortality at 30 days after hospitalization. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control used is the sum of data about the three control areas considered in the study (Cigliano, Vercelli, and Borgosesia data).

	Single model				**Multigroup model**			
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**
≥65 years								
Hospitalisation	1006.08	-2440.00	4447.66	0.167	-123.38	-2030.00	1782.67	0.807
Hospitalized persons	579.76	-1450.00	2604.73	0.171	-101.32	-1230.00	1032.13	0.738
Hospitalisation for heart failure	45.89	-103.30	195.09	0.159	46.36	-50.72	143.43	0.177
Hospitalized persons for heart failure	27.86	-80.77	136.50	0.189	16.06	-67.52	99.64	0.495
Hospitalisation for diabetes	6.82	-40.98	54.62	0.321	-3.33	-19.78	13.12	0.476
Hospitalized persons for diabetes	3.88	-27.99	35.75	0.365	-2.63	-13.95	8.70	0.423
Hospitalisation for COPD	-5.48	-35.90	24.94	0.262	-11.39	-37.99	15.21	0.207
Hospitalized persons for COPD	-2.48	-32.90	27.94	0.489	-8.60	-32.95	15.76	0.268
Access to emergency departments	-330.56	-907.06	245.93	0.087	**-672.02**	**-916.48**	**-427.56**	**0.007****
Persons accessed to emergency department	-89.74	-424.34	244.85	0.182	**-335.37**	**-448.91**	**-221.83**	**0.006****
Access to emergency departments (red/yellow triage codes)	**125.09**	**100.46**	**149.71**	**0.010**	**-130.25**	**-140.75**	**-119.76**	**0.0004****
Mortality at 30 days after hospitalisation	-12.75	-46.65	21.16	0.131	2.21	-17.20	21.63	0.672
Mortality at 30 days after hospitalisation for heart failure	**-67.01**	**-101.21**	**-32.81**	**0.026**	**-34.86**	**-57.45**	**-12.28**	**0.022**
35-64 years								
Hospitalisation	574.78	-1660.00	2814.12	0.189	-178.25	-1390.00	1030.08	0.59
Hospitalized persons	435.72	-1140.00	2011.66	0.176	-89.50	-965.37	786.39	0.703
Hospitalisation for heart failure	-0.75	-54.34	52.85	0.888	-8.54	-26.85	9.78	0.183
Hospitalized persons for heart failure	6.18	-43.07	55.43	0.357	2.39	14.47	19.24	0.604
Hospitalisation for diabetes	0.86	-10.72	12.45	0.517	**-15.30**	**-25.86**	**-4.73**	**0.025**

	Single model				Multigroup model			
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Control difference**	**95% CI**		**P-Value**
Hospitalized persons for diabetes	3.22	-9.81	16.26	0.196	**-11.51**	**-20.51**	**-2.50**	**0.031**
Hospitalisation for COPD	-0.13	-11.72	11.45	0.907	**-7.72**	**-14.00**	**-1.43**	**0.034**
Hospitalized persons for COPD	-0.85	-9.54	7.84	0.431	**-5.72**	**-10.62**	**0.81**	**0.037**
Access to emergency departments	**-138.80**	**-263.37**	**-14.24**	**0.045**	**-322.17**	**-523.33**	**-121.01**	**0.02***
Persons accessed to emergency department	**-81.31**	**-118.97**	**-43.65**	**0.023**	-110.58	-283.22	62.05	0.11*
Access to emergency departments (red/yellow triage codes)	71.66	-44.22	187.53	0.081	**-56.99**	**-96.23**	**-17.74**	**0.025****
Mortality at 30 days after hospitalisation	1.06	-0.39	2.51	0.068	**4.79**	**3.88**	**5.71**	**0.002***
Mortality at 30 days after hospitalisation for heart failure	60.92	-270.43	392.27	0.257	**129.77**	**9.73**	**249.80**	**0.043**
0-34 years								
Hospitalisation	37.09	-569.83	644.00	0.580	-500.86	-1080.00	75.12	0.065
Hospitalized persons	12.70	-455.16	480.56	0.789	-393.40	-832.53	45.74	0.061
Hospitalisation for diabetes	**-6.36**	**-7.81**	**-4.91**	**0.011**	**-24.22**	**-28.18**	**-20.27**	**0.001****
Hospitalized persons for diabetes					**-20.87**	**-24.79**	**-16.94**	**0.002****
Access to emergency departments	-521.47	-1460.00	418.59	0.090	**-480.45**	**-924.43**	**-36.46**	**0.043***
Persons accessed to emergency department	-292.32	-835.50	250.85	0.092	-249.52	-551.39	52.35	0.071*
Access to emergency departments (red/yellow triage codes)	**20.98**	**0.71**	**41.26**	**0.048**	-7.88	-37.62	21.86	0.372**
Mortality at 30 days after hospitalisation	-0.01	-2.56	2.54	0.970	0.39	-0.63	1.42	0.241*

* baseline difference in levels between treated and controls is statistically significant (p-value<0.05); ** baseline differences in levels and slopes between treated and controls are statistically significant (p-value<0.05)

4.5.3. Secondary outcome: mean length of hospitalizations

Santhià. Population in experimental area of Santhià who had a hospitalization registered a considerable reduction of mean length of hospitalization for heart failure among adult people (-40 days for person in comparison to the control), whereas among old age people the decline was most inferior (only just higher than 1 day less respect to baseline, and 2 days per person in comparison to the control) (Table 30).

Slightly higher was the reduction of mean days of hospitalization for diabetes among young people (-3 days in comparison to the control), whereas mean days of hospitalization for COPD were about 7 days more than the mean days in the control group in elderly and much bigger among adult people (treated-control difference: 52.8 95% CI 46.9 to 58.8). Among this last age class, also mean

days for all-causes hospitalization resulted in favour of control even if the difference was small (+3 days).

Table 30 Effects of Santhià's Community Health Centre on mean length of hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for mean days of hospitalization (for people hospitalized), for all-causes and for diabetes, heart failure, and COPD. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Santhià area (no differences between curves at baseline).

	Single model				**Multigroup model**				
	Pre-post diff.	**95% CI**		**P-Value**	**Treated - Controls diff.**	**95% CI**		**P-Value**	**Control[a]**
≥65 years									
Mean days of hospitalisation	**-1.13**	**-1.14**	**-1.13**	**0.0001**	**-1.95**	**-3.01**	**-0.89**	**0.016**	V
Mean days of hospitalisation for heart failure	-2.37	-4.92	0.17	0.054	**-1.73**	**-2.59**	**-0.86**	**0.013**	B
Mean days of hospitalisation for diabetes	1.61	-7.95	11.17	0.278	-6.26	-13.49	0.97	0.065	C
Mean days of hospitalisation for COPD					**6.73**	**3.73**	**9.72**	**0.022**	B
35-64 years									
Mean days of hospitalisation	2.99	-5.80	11.78	0.145	**3.42**	**0.41**	**6.44**	**0.039**	C
Mean days of hospitalisation for heart failure	-35.75	-154.04	82.54	0.162	**-39.52**	**-69.93**	**-9.10**	**0.018**	C, V
Mean days of hospitalisation for diabetes					1.17	-2.91	5.26	0.493	B, V
Mean days of hospitalisation for COPD					**52.84**	**46.92**	**58.76**	**0.0001**	B, C*
0-34 years									
Mean days of hospitalisation	0.890	-9.47	11.26	0.471	-1.09	-3.96	1.78	0.424	B, C, V
Mean days of hospitalisation for diabetes					**-3.37**	**-5.70**	**-1.05**	**0.025**	V

a. B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area; * baseline differences in levels and slopes between treated and controls are statistically significant (p-value<0.05)

Gattinara. In Gattinara, no effect of CHC emerged among old age people. Respect to the pre-intervention trend, mean days of hospitalization had grown of 1 and mean days of hospitalization for heart failure rose of 17 in population with 35-64 years.

For this area, the only effect was visible for mean days for all-cause hospitalization observed in young population. Results showed a hardly decline of mean days respect to the pre-intervention trend, whereas when CHCs' area was compared to the control, the reduction reached a value of 2.5 days (Table 31).

Table 31 Effects of Gattinara's Community Health Centre on mean length of hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for mean days of hospitalization (for people hospitalized), for all-causes and for diabetes, heart failure, and COPD. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Gattinara area (no differences between curves at baseline).

	Single model				Multigroup model				
	Pre-post diff.	**95% CI**		**P-value**	**Treated - Control diff.**	**95% CI**		**P-value**	**Control [a]**
≥65 years									
Mean days of hospitalisation	1.95	-0.15	4.06	0.054	1.22	-1.01	3.45	0.236	B, V
Mean days of hospitalisation for heart failure	-1.77	7.78	4.24	0.166	-1.06	-9.92	7.80	0.786	C, V
Mean days of hospitalisation for diabetes	7.21	-34.07	48.49	0.27	9.75	-30.07	37.57	0.801	C, V
Mean days of hospitalisation for COPD					-0.81	-25.41	23.80	0.749	V
35-64 years									
Mean days of hospitalisation	**1.35**	**0.76**	**1.94**	**0.022**	-1.85	-4.26	0.57	0.081	B
Mean days of hospitalisation for heart failure	**16.92**	**9.16**	**24.68**	**0.023**	5.56	-6.17	17.30	0.178	V
Mean days of hospitalisation for diabetes	-1	-33.06	31.06	0.76	-2.30	-14.72	10.11	0.508	V
0-34 years									
Mean days of hospitalisation	**-1.41**	**-1.49**	**-1.33**	**0.003**	**-2.50**	**-4.42**	**-0.56**	**0.031**	B
Mean days of hospitalisation for diabetes	1	-0.46	2.46	0.073	0.00	-1.75	1.75	1.000	B*

a. B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area; * baseline difference in levels between treated and controls is statistically significant (p-value<0.05)

Varallo. Data about Varallo showed a fair decline of mean days of hospitalization for COPD among population over-65 years that was confirmed by analysis with control. In multigroup analysis, also mean days of hospitalization for diabetes resulted less for experimental population in comparison to the control (Table 32).

Despite the increasing of mean days for COPD respect to the baseline trend, in comparison to control also the adult population registered fewer mean days of hospitalization for this disease with the opening of CHC in Varallo. However, mean days of hospitalization for all-causes increased of about 2 days in this population in comparison to the control.

Among young people of Varallo, the analysis did not show any effect of the CHC on the mean length of hospitalizations.

Table 32 Effects of Varallo's Community Health Centre on mean length of hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for mean days of hospitalization (for people hospitalized), for all-causes and for diabetes, heart failure, and COPD. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Varallo area (no differences between curves at baseline).

	Single model				**Multigroup model**				
	Pre-post diff.	**95% CI**		**P-Value**	**Treated - Control diff.**	**95% CI**		**P-Value**	**Control [a]**
≥65 years									
Mean days of hospitalisation	1.09	-1.74	3.91	0.128	0.12	-1.92	2.17	0.896	B, C, V
Mean days of hospitalisation for heart failure	2.53	-4.57	9.64	0.138	0.26	-8.8	9.32	0.947	C, V
Mean days of hospitalisation for diabetes	-3.65	-9.01	1.71	0.07	**-11.52**	**-18.23**	**-4.8**	**0.018**	C
Mean days of hospitalisation for COPD	**-12.65**	**-18.61**	**-6.68**	**0.024**	**-11.28**	**-19.61**	**-2.95**	**0.015**	C, V
35-64 years									
Mean days of hospitalisation	1.5	-3.68	6.67	0.169	**1.93**	**0.11**	**3.74**	**0.045**	C
Mean days of hospitalisation for heart failure					-23.02	-68.33	22.28	0.098	V
Mean days of hospitalisation for diabetes	0.95	-8.23	10.12	0.415	-1.55	-13.86	10.75	0.355	B
Mean days of hospitalisation for COPD	**13.84**	**10.46**	**17.22**	**0.012**	**-8.00**	**-14.04**	**-3.96**	**0.025**	C*
0-34 years									
Mean days of hospitalisation	1.56	-1.19	4.32	0.088	0.48	-1.66	2.62	0.433	B

a. B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area; * baseline differences in levels and slopes between treated and controls are statistically significant (p-value<0.05)

Coggiola. Quite the totality of outcomes related to the mean length of hospitalization reported no differences compared to the pre-intervention trend and to the control, after the introduction of CHC in Coggiola (Table 33). Adult people registered some effect in favour of the experimental area when hospitalization was for diabetes (-6 days for intervention group in comparison to the control) and for all-causes (-4 days).

By contrast, among old age people mean length of hospitalization for heart failure increased respect to the control group (+ 3 days) (Table 33).

Table 33 Effects of Coggiola's Community Health Centre on mean length of hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for mean days of hospitalization (for people hospitalized), for all-causes and for diabetes, heart failure, and COPD. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control(s) chosen for multigroup analysis are the best for Coggiola area (no differences between curves at baseline).

	Single model				Multigroup model				
	Pre-post diff.	**95% CI**		**P-Value**	**Treated - Control diff.**	**95% CI**		**P-Value**	**Control [a]**
≥65 years									
Mean days of hospitalisation	0,37	-4,07	4,82	0,480	-0,98	-3,55	1,59	0,398	B, V
Mean days of hospitalisation for heart failure	3,20	-1,41	7,81	0,072	**3,48**	**0,70**	**6,27**	**0,021**	B, V
Mean days of hospitalisation for diabetes	8,53	-15,47	32,54	0,139	8,49	-12,36	29,35	0,368	B, V
Mean days of hospitalisation for COPD	-3,09	-18,64	12,45	0,240	-0,65	-5,96	4,67	0,653	B
35-64 years									
Mean days of hospitalisation	-0,41	-8,44	7,62	0,632	**-3,61**	**-7,24**	**0,02**	**0,050**	B*
Mean days of hospitalisation for heart failure	12,73	-58,97	84,43	0,266	-12,02	-35,63	11,59	0,268	C, V
Mean days of hospitalisation for diabetes					**-6,45**	**-11,90**	**-1,00**	**0,025**	B, C, V
Mean days of hospitalisation for COPD					-22,57	-67,25	22,12	0,278	B, C, V
0-34 years									
Mean days of hospitalisation	3,45	-0,78	7,68	0,061	2,37	-0,03	4,77	0,050	B

a. B = Borgosesia's area, C = Cigliano's area, V = Vercelli's area; * baseline difference in levels between treated and controls is statistically significant (p-value<0.05)

All experimental area. Considering all experimental areas (Table 34) in comparison to the totality of control areas, CHCs were efficient for hospitalization for COPD among old age people, and for heart failure among adults for which the mean days were rather fewer (-19 days) than the control.

Despite some efficiency emerged, mean days for heart failure among elderly were higher of 2 days in experimental area than the control, mean days for COPD were very higher than the control (+29 days). Also, among young people the mean days for diabetes had slightly increased (+1 day).

Table 34 Effects of the four Community Health Centres on mean length of hospitalization by age classes: single and multigroup models. Table shows pre-post differences (single model) and treated-control differences (treated-control differences) for mean days of hospitalization (for people hospitalized), for all-causes and for diabetes, heart failure, and COPD. Time series ranged from 2015 to 2019. Interruption was fixed in 2018. Estimates are presented for age classes. Estimates are adjusted for autocorrelation using Prais-Winsten and Cochrane-Orcutt regression. Control used is the sum of data about the three control areas considered in the study (Cigliano, Vercelli, and Borgosesia data).

	Single model				**Multigroup model**			
	Pre-post difference	**95% CI**		**P-Value**	**Treated-Controls difference**	**95% CI**		**P-Value**
≥65 years								
Mean days of hospitalisation	0.68	-1.63	3.00	0.166	-0.66	-2.46	1.14	0.255
Mean days of hospitalisation for heart failure	1.45	-1.84	4.74	0.112	**1.99**	**0.84**	**3.14**	**0.017***
Mean days of hospitalisation for diabetes	1.05	-13.55	15.65	0.529	**6.7**	**1.59**	**11.72**	**0.03**
Mean days of hospitalisation for COPD	**-3.17**	**-4.2**	**-2.15**	**0.016**	**-4.25**	**-7.48**	**-1.03**	**0.03**
35-64 years								
Mean days of hospitalisation	1.56	-3.12	6.24	0.147	0.69	-1.01	2.41	0.222
Mean days of hospitalisation for heart failure	-10.19	-31.18	10.8	0.102	**-18.76**	**-27.84**	**-9.69**	**0.012**
Mean days of hospitalisation for diabetes	-0.99	-5.07	3.09	0.2	-2.71	-7.42	2.01	0.132
Mean days of hospitalisation for COPD	10.96	-6.27	28.2	0.078	**29.28**	**23.44**	**35.12**	**0.002***
0-34 years								
Mean days of hospitalisation	0.99	-3.07	5.04	0.199	0.11	-1.43	1.65	0.785
Mean days of hospitalisation for diabetes	**1.06**	**0.37**	**1.75**	**0.032**				

* baseline difference in levels between treated and controls is statistically significant (p-value<0.05)

5. Discussion

The objective of this study is the evaluation of the impact of the implementation of the health policy based on building of health proximity structures, Community Health Centres, in the areas of the ASL of Vercelli more distant from the two hospitals. To better understand the meaning of this policy, a description of the temporal process of the implant of CHCs was carried out.

Together with health outcomes, the evaluation included the measure of the level of integration of care and the level of continuity of care perceived by patients in relation to the five CHCs.

In summary, this mixed-method study was composed by the following elements:

i) a survey aimed to describe CHC intervention carried out by gathering administrative documents and by interviewing the main stakeholders of the ASL, the professionals working in the CHCs, and a sample of patients living in the CHC's areas;

ii) analysis of effectiveness of the intervention on health, organizational and economic outcomes, by applying an Interrupted Time Series Analysis on administrative data.

In order to better answer to health and social needs of isolated populations, the Vercelli's ASL opened CHCs in isolated territories. CHCs are multifunctional structures in which multidisciplinary teams (i.e., GPs, specialists, nurses, social workers) work in integrated way to assure a unique access for social and health services. This appened in 2018 following the Deliberation of General Director of Vercelli's ASL no. 34/2017. Five CHCs were opened in the structures leaved by five small hospitals closed during the 90ies in Santhià (South), Cigliano (South-West), Gattinara (center), Varallo (North-East), and Coggiola (North-West).

Once implemented the project, in 2020, the Vercelli's ASL was composed by two main hospitals (Vercelli and Borgosesia) and five CHCs (Santhià, Cigliano, Gattinara, Varallo, and Coggiola). The five CHCs cover about 15,000 inhabitants each (Coggiola is the smallest with 7,861 inhabitants and Varallo is the biggest with 29,173 inhabitants).

The results of the implementation of CHCs in the ASL of Vercelli was assessed by measuring three different dimensions: i) the level of integration among professionals, ii) the perception of the continuity of care among citizens and iii) the impact on health, social and organisation.

The measurement of the level of integration of care between professionals of CHCs appears to be acceptable. Integrated care indicators measured do not present statistical differences between CHCs: the higher numbers of yearly contacts (by types of contacts) were declared by professionals of Santhià, as well as the percentage of patients managed in common with other professionals (30%). By contrast, the higher percentage of patients managed in common with other professionals working in the same CHC was in Varallo (27%).

The total score for integrated scale ranged from 2.3 of Coggiola to 3 of Cigliano (it is a 5-point-scale ranging from 1 in case of low integration to 5 if integration is high). Looking at partial scores, the more critical aspect is for communication among professionals. The level of database sharing was acceptable (about 3), except for Santhià (1.8), whereas the highest scores were obtained for the sub-scale regarding to the level of care program sharing among professionals (all scores >3).

Despite the small number of interviews collected, results were coherent with Longo's survey which observed 14 ASL in Italy (from Abruzzo, Campania, Emilia-Romagna, Friuli Venezia-Giulia, Lazio, Liguria, Lombardia. Piemonte, Sardegna, Toscana, and Veneto). Scores of Vercelli's CHCs were slightly lower than scores obtained by the Longo and colleagues' study: total scores were around 3

in Longo (2012) (it was 3.24 for diabetes management, 3.06 for COPD, and 3.17 for tumour) [23], whereas our results showed scores a few lower than 3. Likely, the lower scores herein obtained were related to the higher participation of GPs and the lower participation of specialist physicians in our survey: specialist physicians obtained the highest scores for communication sub-scale in Longo (2012), data that we did not verify for the lack of this professional among participants.

However, since the Longo's study involved professionals of all ASLs, our results are not fully comparable with Longo's results. Besides, the main aim of CHCs is the integration of care and social assistance to manage chronic diseases. For this reason, we expected a higher level of integration between professionals sharing the same location compared with professionals working in different structures. Notwithstanding, not only the scores obtained in our study were just equal to Longo's study, but also the intensity level of communication given by the sum of contacts between professional resulted the lower in our study for all CHCs.

As for the survey involving citizens, the overall scores diverged between the CHCs and ranged from 2.78 in Gattinara to 3.09 in Varallo. Everywhere, the intensity level of physician-patient relationship was defined by patients at low mean level (practically 1), whereas the quality of the relationship was judged just meanly as equal as 5. Both sub-scores were statistically different between the five CHCs. Scores by exemption types, frailty levels, and gender did not differ from the global total scores, with Gattinara presented the lowest scores (under 3) and Varallo the highest ones. No differences emerged controlling scores by these factors, except for population of Varallo for who patients with an exemption for hypertension had a score higher than persons without this exemption (3.20 vs. 3.05).

Similar to integrated care scores, this data were sufficiently coherent with the study presented by Longo and colleagues (2012)[23]. Patients with diabetes totalized a mean score of 3.52 that was practically as equal as scores obtained interviewing Vercelli's patients with diabetes (our results ranged from 2.68 of Gattinara to 3.20 of Varallo). The other scores obtained for disabled and hypertension exemptions are not comparable with literature. But, considering that patients were interviewed during the COVID-19 outbreak (mainly in the first period) when many services were interrupted for the health emergency, likely several answers could be different in absence of COVID-19. Specially, the sub-scale related to the intensity level of physician-patient relationship perceived by patients could be higher than the observed score.

This is the first time, in our knowledge, that an organisational innovation at the level of community care of this ambition was submitted to a formal evaluation, with the objective of measuring the health, social and economic impact.

Our study suggests that the implementation of a cluster of four (one CHC was considered as control since the implementation was very late to include in the analyses as intervention area) CHCs to cover

the population less close to the main health structures of the ASL can have an effect on health and organisational outcomes.

Overall, the introduction of the four CHCs in Vercelli's ASL lead to a considerable reduction of inappropriate accesses to EDs (with white/green triage codes) in comparison to the control in all age classes considered (-542, -265, and -472 in elderly, adults, and young, respectively). Also, the accesses to EDs for severe conditions (red/yellow triage codes) registered a fall in all age classes. The biggest reduction involved the over-65ies (-672 and -130, respectively).

In relation to other health outcomes, CHCs reduced hospitalizations for diabetes and COPD among adult and young populations, whereas no apparent effects emerged in old age people.

Mortality at 30 days after hospitalization also dropped even if only in elderly for both the estimates (pre-post and treated-control), whereas among adults it appeared to increase in comparison to controls.

As for economic impact, CHCs reduced mean days of hospitalization for heart failure in adult population (-19 days).

Unfortunately, our results showed no effects or less effects of CHCs for all outcomes considered in old age population, except for mortality at 30 days after hospitalization for heart failure which fallen after CHCs' opening only in this age class.

Considering that the main objective of CHC is to bring the management of chronic diseases close to the residence of citizens with high quality and low intensity care, it is important to identify the components or services of CHCs that need improvement. Likely, one year after the implementation of the CHCs is too early to establish the ineffectiveness of CHCs not only on the health outcomes, but also on economic ones. In reason of that, the small impact of the four Vercelli's CHCs on reduction of mean length of hospitalizations is explainable because it is an indirect effect of the health improvement of population.

Although the short time of the ITS analyses, these results are consistent with evidence. In literature, several studies showed effectiveness of Community Health Centres. Most studies were conducted in United States and observing the impact of the Patient Centred Medical Homes. Recently, a systematic review of 78 Randomized Controlled Trials and 7 quasi-experimental studies concluded with an improvement of various health indicators in population assisted by CHC respect to the standard care: quality of life, depression episodes, glycemia levels, LDL cholesterol level, and hospitalizations. Instead, there was a little decline of efficiency and cost-efficacy [57].

This project has several limitations that could compromise its ambition. The first is the nature of the evaluation, mainly based on observation. The best study design for a similar project should be an experiment, possibly with a randomisation of the attribution of the exposure. This solution was not possible in the context of this project, and probably very difficult to carry out in similar intervention,

due especially to their complexity and the need to have the simultaneous presence of several economic, political, administrative factors together with the preliminary availability to evaluate. But the methodological solutions taken by the study can be considered able to control for the main confounding factors and secular trend. These are the use a series of ITS analysis, comparing pre to post variables, and using as control group the population not covered by a CHC.

The second limitation of this study is the small size of sample of the survey involving professionals and citizens. Apart from the low rate of acceptance of the interview, a considerable high number of telephones obtained by the administrative files of ASL were wrong. So, many eligible patients were not reached by interviewers. Because of the limiting of the sample size, results about this survey cannot be extended to all patients with similar features to the participants.

However, this survey is a preliminary and unique attempt toward the measurement of integrated care in CHCs with a quantitative and standardized tool based on indicators of the main dimensions of the integrated care concept. The results obtained can nevertheless be useful as an indication of areas needing an urgent improvement in the future.

Another weakness of the study is the short observational time, in relation to the nature of the policy observed: the CHC is a complex intervention with undefined time limits related to the starting of the intervention. We know when CHCs opening with this label, but not all CHCs were fully implemented simultaneously in 2018 (Cigliano, for example). In contrast, Santhià had many characteristics of CHC before the Deliberation which formally opening the five CHCs in Vercelli's ASL. In reason of that, a longer time series is important to identify the best lag time when the effects of CHCs are not clear.

Unfortunately, data about ED accesses and hospitalization before 2014 were not available during the analyses. Besides, we must close the series in 2019 for the COVID-19 outbreak: data after the COVID-19 were biased for the health emergency. The risk of misrepresentation of impact of CHCs were too high. Thus, we chose to use only the period from 2015 to 2019. The short time series limited possibility of sensibility analysis to identify the model more fitted with data observed for Vercelli's ASL varying the time lags of effects and observing potential effects on long time.

The same weakness affects the evaluation of the level of integration of professionals. Professionals have not still "acquired" networking skills and the reason could be related to the short time of observation. But this could not be true because the CHC of Santhià who experienced the co-existence in the same place of primary and specialist care since the 2014 and where professionals declared the highest mean years of working in the CHC (about 9 years), but their professionals obtained a score enough low (2.4), especially for the intensity level of communication (so contacts) (1.33).

Although this was the first study aimed to measure the perception of continuity of care by patients involving Piedmont region, as well as Vercelli's ASL, the questionnaire was not submitted exclusively to a population which usually use the ASL, and questions regarded the patient-professional

relationship and not the health services of a CHC. For example, among participants from Cigliano, many declared that they did not use Cigliano's CHC but they went outside the CHC's territory for medical care (for example, in Santhià and Vercelli).

Moving the attention to the Italian experiences, the CHC model was implemented before in Emilia-Romagna and Tuscany regions. Today, CHCs are widespread in all national territory with high local differences. This could cause the increasing of disparity in health service access among regional population. Along with the study herein presented, only a cohort study evaluated impact of the CHCs of Emilia- Romagna and showed a reduction of accesses to EDs of 18% during a 10-years period (2009-2019), whereas the white triage codes had a fall of 10% [56]. Furthermore, this cohort showed a reduction of hospitalizations for conditions treatable in ambulatory and a major impact of these outcomes in population cared by GPs practicing in the CHCs respect to the other populations [56].

Strengths of this evaluation is related to the method used to evaluate a complex public health intervention. The ITSA model is a quasi-experimental study used in economy but widespread in public health policy assessment, recently [58–60]. The single ITSA model can analyse effect of an intervention (ranging from clinical therapy to national public health legislation) observing time series of a particular outcome of interest. At the specific time point (2018), series is interrupted by intervention (CHCs opening) and the model aim to estimate the difference between the trend observed with data and the hypothetical scenario where intervention had not taken place and the trend continue without change. The expected trend is the counterfactual scenario used as comparison for the evaluation. In the study herein presented, analysis is strengthened adding the control time series (Vercelli, Borgosesia, and Cigliano's territories) characterised by *standard care* permitting to control estimates for the omitted factors.

6. Conclusion

In the context of the B3 Action Group on Integrated Care of the European Innovation Partnership on active and healthy ageing, some factors enabling successful integrated care were identified from a review of European experiences [2]:

i) political support and commitment at different levels (e.g., collaborations between several sectors, introduction of a system of telemedicine, innovative legislation, or legal frameworks in support of integrated care implementation);
ii) governance at different levels (e.g., creation of a board for defining goals and outcomes, performance and evaluation framework, procedures and standards);
iii) stakeholder engagement;
iv) organisational change (e.g., healthcare structures, organisation of workflows, workforce development and resource allocation, redesign of professional roles and introduction of new roles);
v) effective national and local leadership;

vi) collaboration among stakeholders and trust;
vii) workforce education and training (redesign of professionals' roles or creation of new roles implying new skills and knowledge);
viii) focus on the patient / patient empowerment (patient involved in the decision-making processes and care plan are tailored to individual needs);
ix) financing and incentives aligned with network goals;
x) ICT infrastructure and solutions (e-Health services and other tools for sharing data, health information, and care plans; tools and infrastructure to measure and manage outcomes; tools for citizens);
xi) monitoring /evaluation systems to control impact of intervention on quality of care, costs, outcomes, accesses, and citizen experience.

Many studies revealed effectiveness of integrated care interventions on several health outcomes. A quasi-experimental study [61] showed a reduction in frailty scores in over 60ies living in community and participating to an social-health integrated intervention (in-depth assessment, personalised care plans and coordinated care) in comparison to a control group. A review of systematic reviews reported positive effects of integrated care programmes on quality of care [5]. The Organisation for Economic Co-operation and Development (OECD) reported costs for 835 million US dollars for preventable events related to non-communicable diseases which should be treated by general practitioners (GPs) rather than hospitals and EDs [62].

Despite the non-representative power of our results, the level of integration declared by professionals was not as high as the expected value for the CHC context. This worse with patients' scores that were lower respect to the score of professionals. Thus, CHCs represent a great opportunity to the networking practices and the multidisciplinary teams to manage complex social-health needs. If in health sector the integration is mainly visible with the sharing of care programs and databases, whereas the intensity level of contacts / communications between professionals is low, the situation for the social-health integration could be worst.

Critical aspects related to the social-health integration in Italy are well known. Traditionally, in Italy the legislative system favours the health respect to the social assistance. This is clearly visible with the different locations of the safeguard of health respect to the social assistance: the first is under the power of Regions but with reservation to the Italian State, the second is exclusively under the power of Regions. So, health and social assistance in Italy stay under different power slowing down the social-health integration process.

For research, it could be useful if the status of implementation of CHCs in terms of integrated care and continuity of care perceived by patients is constantly monitoring with, for example, a longitudinal study. This could increase our knowledge about the level of integration of CHCs permitting interventions to improve the level. Respect to the impact evaluation, results herein presented opened new questions about the impact of CHCs: if we used data about the population

that usually frequent the Vercelli's CHCs, were estimates the same? Or effects increased respect to our results? Do CHCs in the rest of Piedmont have the same impact registered in Vercelli's ASL? How many is the effect of CHCs in the different Italian regions? Lastly, CHCs were effectiveness in the control of COVID-19 outbreak? Are there differences in outcomes trends between territories with CHCs and territories without CHCs, with the same epidemic conditions?

So, although the limitations of the descriptive study, evaluation study results suggest that practically CHCs were models potentially effectiveness in health, organizational, and economic improvement. However, our results indicated that is not sufficiently opening structures where multi-professional team work to obtained integration of professionals and services. By contrast, it is necessary support and develop a networking culture aimed to strength coordination, communication, exchange of data and care plans and programs. Likely, intermediate professionals like the Community and Family Nurses could be resources to link and support coordination between, for example, GPs and specialist physicians.

Another point for clinical practice regarding data about impact evaluation is related to the low impact of CHCs in population over-65ies. Analyses by age classes permitted to identify the population for which improve health care and services at territory level.

In conclusion, for a successful integrated care it is necessary a unique governance and strategy for the entire network engaged, social participation, and intersectoral actions (health and social interventions). At organisational level, integrated care requires the management of support systems (clinical, administrative, and logistical systems), human resources working in network, information systems linking all network nodes, and a tracking and assessment system (for measurement of performance centred on health outcomes and satisfaction of users). Finally, at financial level, this system needs adequate funding and financial incentives [2].

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References

1. Longo, F., Salvatore, D., & Tasselli, S. (2009). *Misurare e valutare l'integrazione professionale e la continuità delle cure*. Milano: AboutPharma.

2. Expert Group on Health Systems Performance Assessment, European Commision, & Expert group on Health Systems Performace Assessment. (2017). *Tools and methodologies to assess integrated care in Europe*. Luxembourg.

3. WHO Regional Office for Europe. (2016). *Integrated care models: an overview*. Copenhagen.

4. Haggerty, J. L., Reid, R. J., Freeman, G. K., Starfield, B. H., Adair, C. E., & McKendry, R. (2003). Continuity of care: a multidisciplinary review. *BMJ (Clinical research ed.)*, *327*(7425), 1219–21. https://doi.org/10.1136/bmj.327.7425.1219

5. Ouwens, M., Wollersheim, H., Hermens, R., Hulscher, M., & Grol, R. (2005). Integrated care programmes for chronically ill patients: A review of systemic reviews. *International Journal for Quality in Health Care*, *17*(2), 141–146. https://doi.org/10.1093/intqhc/mzi016

6. Valentijn, P. P., Schepman, S. M., Opheij, W., & Bruijnzeels, M. A. (2013). Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. *International Journal of Integrated Care*, *13*(1). https://doi.org/10.5334/ijic.886

7. Valentijn, P. P., Vrijhoef, H. J. M., Ruwaard, D., Boesveld, I., Arends, R. Y., & Bruijnzeels, M. A. (2015). Towards an international taxonomy of integrated primary care: a Delphi consensus approach. *BMC Family Practice*, *16*(1), 64. https://doi.org/10.1186/s12875-015-0278-x

8. Valentijn, P. P., Boesveld, I. C., van der Klauw, D. M., Ruwaard, D., Struijs, J. N., Molema, J. J. W., … Vrijhoef, H. J. M. (2015). Towards a taxonomy for integrated care: A mixed-methods study. *International Journal of Integrated Care*, *15*(Jan-Mar 2015), 1–18. https://doi.org/10.5334/ijic.1513

9. Leutz, W. N. (1999). Five Laws for Integrating Medical and Social Services: Lessons from the United States and the United Kingdom. *The Milbank Quarterly*, *77*(1), 77–110. https://doi.org/10.1111/1468-0009.00125

10. Freeman, G., Shepperd, S., Robinson, I., Ehrich, K., & Richards, S. (2001). *Continuity of care: report of a scoping exercise for the National Co-ordinating Centre for NHS Service Delivery and Organisation NCCSDO*. London: NCCSDO.

11. Mendes, F. R. P., Gemito, M. L. G. P., Caldeira, E. do C., Serra, I. da C., & Casas-Novas, M. V. (2017). A continuidade de cuidados de saúde na perspetiva dos utentes. *Ciencia e Saude Coletiva*, *22*(3), 843–855. https://doi.org/10.1590/1413-81232017223.26292015

12. Reid, R., Haggerty, J., & McKendry, R. (2002). *Defusing the confusion: concepts and measures of continuity of healthcare*. Canadian Health Services Research Foundation.

13. Bahr, S. J., & Weiss, M. E. (2019). Clarifying model for continuity of care: A concept analysis. *International Journal of Nursing Practice*, *25*(2), 1–10. https://doi.org/10.1111/ijn.12704

14. Gulliford, M., Naithani, S., Morgan, M., Division of Health and Social Care Research King's College, & London. (2006). *Continuity of care in type 2 diabetes: patients', professionals' and carers' experiences and health outcomes*. London.

15. Hill, A. P., & Freeman, G. K. (2011). *Promoting Continuity of Care in General Practice*. London.

16. Holland, D. E., & Harris, M. R. (2007). Discharge Planning, Transitional Care, Coordination of Care, and Continuity of Care: Clarifying Concepts and Terms from the Hospital Perspective. *Home Health Care Services Quarterly*, *26*(4), 3–19. https://doi.org/10.1300/J027v26n04_02

17. RAND Europe, & Ernst & Young LLP. (2012). *National Evaluation of the Department of Health's Integrated Care Pilots*. Cambridge.

18. Kodner, D. L., & Spreeuwenberg, C. (2002). Integrated care: meaning, logic, applications, and implications – a discussion paper. *International Journal of Integrated Care*, *2*(4). https://doi.org/10.5334/ijic.67

19. Bousquet, J., Malva, J., Nogues, M., Mañas, L. R., Vellas, B., Farrell, J., … Mercier, J. (2015). Operational Definition of Active and Healthy Aging (AHA): The European Innovation Partnership (EIP) on AHA Reference Site Questionnaire: Montpellier October 20–21, 2014, Lisbon July 2, 2015. *Journal of the American Medical Directors Association*, *16*(12), 1020–1026. https://doi.org/10.1016/j.jamda.2015.09.004

20. European Commission. (2016). European innovation partnership on active and healthy ageing. Retrieved April 15, 2021, from https://ec.europa.eu/eip/ageing/repository/maturity-model-adoption-integrated-care-within-regional-healthcare-systems-b3-action_en.html

21. WHO. (2016). Maturity Model for Integrated Care. Retrieved November 22, 2018, from https://www.scirocco-project.eu/maturitymodel/information-ehealth-services/

22. Busetto, L., Luijkx, K., & Vrijhoef, H. J. M. (2017). Advancing integrated care and its evaluation by means of a universal typology. *International Journal of Care Coordination*, *20*(1–2), 41–44. https://doi.org/10.1177/2053434517705732

23. Longo, F., Salvatore, D., Tasselli, S., Mele, S., Monchiero, G., & Pinelli, N. (2012). *Il governo dei servizi territoriali: budget e valutazione dell'integrazione. Modelli teorici ed evidenze empiriche*. Milano: Egea.

24. Breslau, N., & Reeb, K. G. (1975). Continuity of care in a university-based practice. *Journal of*

medical education, *50*(10), 965–9.

25. Bice, T. W., & Boxerman, S. B. (1977). A quantitative measure of continuity of care. *Medical care*, *15*(4), 347–9.

26. Eriksson, E. A., & Mattsson, L. G. (1983). Quantitative measurement of continuity of care. Measures in use and an alternative approach. *Medical care*, *21*(9), 858–75.

27. Ejlertsson, G., & Berg, S. (1984). Continuity-of-care measures. An analytic and empirical comparison. *Medical care*, *22*(3), 231–9.

28. Steinwachs, D. M. (1979). Measuring provider continuity in ambulatory care: an assessment of alternative approaches. *Medical care*, *17*(6), 551–65.

29. Magill, M. K., & Senf, J. (1987). A new method for measuring continuity of care in family practice residencies. *The Journal of family practice*, *24*(2), 165–8.

30. Lou, W. (2001). A new measure for continuity of care: the Alpha index. *Health Services and Outcomes Research Methodology*, *1*(3–4), 277–89.

31. Chao, J. (1988). Continuity of care: incorporating patient perceptions. *Family medicine*, *20*(5), 333–7.

32. Drph, L., Starfield, B., & Xu, J. (2001). Validating the Adult Primary Care Assessment Tool. *J Fam Pract*, *50*(2), 161.

33. Safran, D. G., Kosinski, M., Tarlov, A. R., Rogers, W. H., Taira, D. H., Lieberman, N., & Ware, J. E. (1998). The Primary Care Assessment Survey: tests of data quality and measurement performance. *Medical care*, *36*(5), 728–39.

34. Adair, C., Wild, T., Joyce, A., McDougall, G., Gordon, M., & Costigan, N. (2001). Development of a measure of perceived continuity of care for persons with severe mental illness. *Am J Epidemiology*, *153*, s101.

35. European Commision. (2017). *Tools and methodologies to assess integrated care in Europe*. Luxembourg.

36. Iannello, P., & Mottini, A. (n.d.). L ' accesso " improprio " al pronto soccorso : l ' influenza di alcuni fattori individuali. *Ricerche di Psicologia*, *2*(2014), 325–339.

37. Kellermann, A. L. (2006). Crisis in the emergency department. *The New England journal of medicine*, *355*(13), 1300–3. https://doi.org/10.1056/NEJMp068194

38. Chalfin, D. B., Trzeciak, S., Likourezos, A., Baumann, B. M., Dellinger, R. P., & DELAY-ED study group. (2007). Impact of delayed transfer of critically ill patients from the emergency department to the intensive care unit. *Critical care medicine*, *35*(6), 1477–83.

https://doi.org/10.1097/01.CCM.0000266585.74905.5A

39. Tarnow-Mordi, W. O., Hau, C., Warden, A., & Shearer, A. J. (2000). Hospital mortality in relation to staff workload: A 4-year study in an adult intensive-care unit. *Lancet*, *356*(9225), 185–189. https://doi.org/10.1016/S0140-6736(00)02478-8

40. Bolsin, S. (2000). Hospital mortality and staff workload. *Lancet*, *356*(9238), 1356. https://doi.org/10.1016/S0140-6736(05)74268-9

41. Jha, A. K., Orav, E. J., Dobson, A., Book, R. A., & Epstein, A. M. (n.d.). Measuring efficiency: the association of hospital costs and quality of care. *Health affairs (Project Hope)*, *28*(3), 897–906. https://doi.org/10.1377/hlthaff.28.3.897

42. Rastelli G, Cavazza M, C. G., Rastelli, G., Cavazza, M., & Cervellin, G. (2010). Overcrowded ERs: analysis of the phenomenon and managing proposals. *Emergency Care Journal*, *6*(2), 25. https://doi.org/10.4081/ecj.2010.2.25

43. Moll van Charante, E. P., ter Riet, G., & Bindels, P. (2008). Self-referrals to the A&E department during out-of-hours: Patients' motives and characteristics. *Patient Education and Counseling*, *70*(2), 256–265. https://doi.org/10.1016/j.pec.2007.10.012

44. Bianco, A., Pileggi, C., & Angelillo, I. F. (2003). Non-urgent visits to a hospital emergency department in Italy. *Public health*, *117*(4), 250–5. https://doi.org/10.1016/S0033-3506(03)00069-6

45. McCusker, J., Roberge, D., Lévesque, J.-F., Ciampi, A., Vadeboncoeur, A., Larouche, D., & Sanche, S. (2010). Emergency department visits and primary care among adults with chronic conditions. *Medical care*, *48*(11), 972–80. https://doi.org/10.1097/MLR.0b013e3181eaf86d

46. Pitts, S. R., Niska, R. W., Xu, J., & Burt, C. W. (2008). National hospital ambulatory medical care survey: 2006 emergency department summary. *National Health Statistics Reports*, *7*(7), 1–38.

47. Aminzadeh, F., & Dalziel, W. B. (2002). Older adults in the emergency department: A systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Annals of Emergency Medicine*, *39*(3), 238–247. https://doi.org/10.1067/mem.2002.121523

48. Becchi, M. A., Bellelli, F., Clarizio, M., & Carulli, N. (2005). Caratteristiche dei pazienti ricoverati in un reparto per acuti di medicina interna. È l'ospedale il luogo più idoneo di cura? *Annali Italiani Medicina Interna*, *20*, 233–44.

49. Mussi, C., Pinelli, G., & Annoni, G. (2008). L'anziano e il Pronto Soccorso: il Triage Elderly and emergency department: the Triage. *Giornale di Gerontologia*, *56*, 109–117.

50. Bagaglia, C., & Polcri, C. (2016). *Il problema degli accessi "impropri" in Pronto soccorso: una questione di prospettive. Un'indagine antropologica sui percorsi dell'utenza e le esperienze*

degli operatori.

51. Salvi, F., Grilli, A., Morichi, V., Lucarelli, M., Macchiati, I., Marotti, E., … Tommaso, G. De. (2011). L'anziano in Pronto Soccorso: problemi, evidenze scientifiche e nuovi modelli di assistenza. *Giornale di Gerontologia*, *3*.

52. ISTAT. (2017). *Il sistema dei conti della sanità per l'Italia*.

53. ISTAT. (2018). Indicatori demografici. Stime per l'anno 2017., 1–15.

54. van Loenen, T., van den Berg, M. J., Westert, G. P., & Faber, M. J. (2014). Organizational aspects of primary care related to avoidable hospitalization: A systematic review. *Family Practice*, *31*(5), 502–516. https://doi.org/10.1093/fampra/cmu053

55. Lim, R., Anderson, H., Walters, M. I., Kaye, G. C., Norell, M. S., & Caplin, J. L. (1997). Femoral complications and bed rest duration after coronary arteriography. *American Journal of Cardiology*, *80*, 222–223. https://doi.org/10.1016/S0002-9149(97)00326-3

56. Nobilio, L., Berti, E., & Moro, M. L. (2020). *Valutazione di impatto delle Case della Salute su indicatori di cura 2009-2019*.

57. John, J. R., Jani, H., Peters, K., Agho, K., & Tannous, W. K. (2020). The Effectiveness of Patient-Centred Medical Home-Based Models of Care versus Standard Primary Care in Chronic Disease Management: A Systematic Review and Meta-Analysis of Randomised and Non-Randomised Controlled Trials. *International Journal of Environmental Research and Public Health*, *17*(18), 6886. https://doi.org/10.3390/ijerph17186886

58. Bernal JL, Cummins S, G. A. (2017). Interrupted time series regression for the evaluation of public health interventions: a tutorial. *Int J Epidemiol.*

59. Biglan A, Ary D, W. A. (2000). . The value of interrupted time-series experiments for communityi. intervention research.

60. Bhaskaran, K., Gasparrini, A., Hajat, S., Smeeth, L., & Armstrong, B. (2013). Time series regression studies in environmental epidemiology. *International Journal of Epidemiology*, *42*(4), 1187–1195. https://doi.org/10.1093/ije/dyt092

61. Yu, R., Tong, C., & Woo, J. (2020). Effect of an integrated care model for pre-frail and frail older people living in community. *Age and Ageing*, *49*(6), 1048–1055. https://doi.org/10.1093/ageing/afaa087

62. Huber M, Hennessy P, Lundsagaard J, Izumi J, K. W. (2005). *Long-term Care for Older People*. *OECD* (Vol. 324). https://doi.org/10.1787/9789264065369-ko

Appendix

A.1 Semi-structured interviews: the draft used for interview directors of Vercelli's ASL

La traccia sarà adattata durante la somministrazione in base alle peculiarità dell'intervistato e alla sua narrazione.

Quali obiettivi hanno portato alla riorganizzazione dell'ASL attraverso l'attivazione delle Case della Salute? (specificare rispetto a obiettivi di salute, organizzativi aziendali, economici aziendali, economici regionali, politici o altro)

Dalla Deliberazione del Direttore Generale 1034/2017 che ha portato all'attivazione delle Case della Salute nell'ASL di Vercelli, emergono una serie di programmi e azioni politiche (Piano Socio-Sanitario Regionale 2012-2015, Patto della Salite 2014-2016, programma delle attività territoriali distrettuali PAT per l'anno 2016) citati come razionale legittimante la delibera e quindi la politica stessa. Secondo lei, è corretto dire che la politica aziendale in questione (attivazione delle Case della Salute) persegue logiche di programma che coinvolgono più di una azienda a livello regionale? Potrebbe presentare queste logiche, sottolineando come sono perseguite dalla politica?

Secondo lei, la politica in oggetto persegue (anche) logiche aziendali, trasversali ai singoli programmi prima citati? Potrebbe presentare brevemente queste logiche e come tale politica intende perseguirle?

Osservando la linea temporale (vedi Fig. A1), *riuscirebbe a posizionare i momenti salienti che hanno portato all'attivazione delle 5 Case della Salute nel 2017, e quelli successivi alla loro implementazione o evoluzione?* (Avrei qui bisogno di capire l'evoluzione storica delle 5 Case della Salute, cosa c'era prima, in che forma e cosa è avvenuto nell'ultimo anno dalla Delibera aziendale che ha attivato le Case della Salute, saprebbe aiutarmi?)

Quali differenze vi sono tra i modelli organizzativi precedenti, come il CAP o i poliambulatori, e quelli attuali delle Case della Salute?

Quali differenze vi sono rispetto a prima del 2017 nelle modalità di offerta dei servizi territoriali di base e specialistici? Sono state creati nuovi servizi con l'attivazione delle Case della Salute? Quali? E nuove posizioni professionali? Quali?

Vi sono differenze nelle modalità di perseguire l'obiettivo dell'integrazione sociosanitaria, citata dalla stessa Costituzione come modalità per la tutela della salute e l'uguaglianza dei cittadini (art. 2 e 3 della Carta Costituzionale, 1948)?

Quali sono i principali attori coinvolti nell'implementazione delle Case della Salute e quali ruoli hanno nel processo di implementazione?

Come definirebbe le relazioni tra questi attori (collaborazione, cooperazione, negoziazione, conflittuali, ecc.)? Vi sono differenze tra le diverse Case della Salute (adattare alla capacità dell'intervistato di rispondere)

Quali sono state e sono le risorse disponibili alla loro attivazione e implementazione? (attenzione a distinguere tra risorse economico-finanziarie, infrastrutturali, sociali, politiche, capitale umano)

Quali sono state e sono le principali barriere e difficoltà all'implementazione secondo progetto e come sono state superate o si intende superarle? (attenzione a distinguere tra barriere/difficoltà economico-finanziarie, infrastrutturali, sociali, politiche, capitale umano)

Ci sono stati adattamenti in corso d'opera (nell'ultimo anno) rispetto alle schede progettuali presentate nella Delibera aziendale 1034/2017? Cosa è successo da renderli necessari? (difficoltà incontrate?)

Saprebbe dirmi se vi sono delle varianti territoriali al progetto iniziale nelle modalità di implementazione che portano a delle vere e proprie specificità locali? Come si è arrivati a queste varianti?

Dalla Delibera aziendale emerge una forma di raccordo con alcune strutture distrettuali e dipartimentali e interaziendali, potrebbe brevemente raccontare in che modo la Casa della Salute/la sua unità di riferimento, si raccorda con le strutture esterne (semplici e complesse) di tipo distrettuale, dipartimentale e interaziendale e per quali attività (attenzione alle attività nella gestione della cronicità/fragilità, prevenzione e promozione della salute)*?*

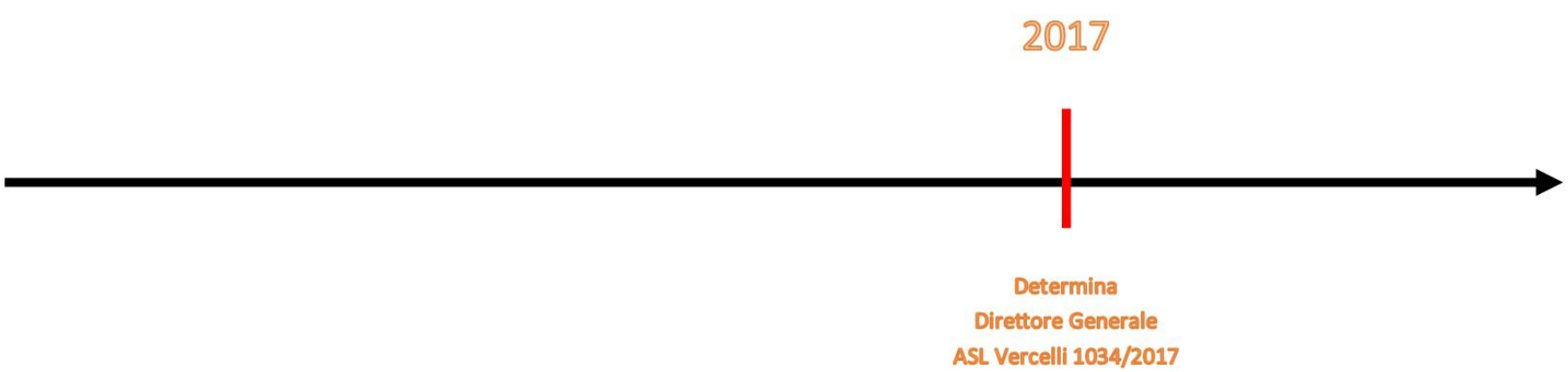
Vi è altresì un'interazione con strutture ospedaliere? Se sì, di che tipo e per quali prestazioni?

La Delibera aziendale 1034/2017 disciplina il raccordo dei MMG e specialisti delle Case della Salute con i servizi sociosanitari, i servizi aziendali ad elevata integrazione sociosanitaria e i servizi sociali degli enti gestori. In che modo avviene questo raccordo e per quali bisogni? È cambiato qualcosa rispetto alla realtà del CAP di Santhià e dei poliambulatori?

Con i MMG/PLS esterni alle Case della Salute, vi sono spazi di attività che prevendono una forma di raccordo e in che modo?

Potrebbe darmi un'opinione sulla politica aziendale in questione? Cosa ne pensa?

Come pensate di implementare il Piano cronicità della Regione nelle Case della Salute?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A.2 Questionnaire for professionals used in the *La Casa della Salute* study

Studio La Casa della Salute

Questionario per i professionisti operanti nelle Case della Salute: l'integrazione dei professionisti nella gestione della cronicità

Prima di procedere con la compilazione del questionario Le chiediamo di leggere attentamente l'informativa sulla privacy e di acconsentire al trattamento dei dati.

Informativa sull'utilizzo dei dati raccolti (art. 13 Reg UE 679/2016)

I dati raccolti all'interno dello studio *Osservazione del processo di implementazione delle Case della Salute nell'ASL di Vercelli* condotto dall'Università del Piemonte Orientale e dall'IRES Piemonte in collaborazione con l'Azienda Sanitaria Locale di Vercelli, saranno raccolti, conservati e trattati in forma anonima nel rispetto delle disposizioni del codice della privacy (D.Lgs. 196/2003 *Codice in materia di protezione dei dati personali*) e del GDPR (Regolamento UE 679/2016), e i risultati saranno presentati unicamente in forma aggregata.

I dati saranno archiviati presso l'Università del Piemonte Orientale e saranno accessibili dai ricercatori solo su approvazione e a scopo di ricerca scientifica. I dati saranno raccolti e trattati in forma anonima e saranno accessibili a terzi solo per motivi di ricerca e su autorizzazione del responsabile dello studio. Non saranno usati dati personali per prendere decisioni relative all'interessato (art. 105 c.1 D.Lgs. 196/2003), l'intervistato è stato informato degli scopi dello studio (art. 105 c.2 D.Lgs. 196/2003) e che la partecipazione è libera e volontaria. I Suoi dati saranno trattati sulla base del Suo espresso consenso (artt. 6, c.1 lett. "a" e 9, c.2, lett. "a" GDPR).

L'azienda ASL VC con sede legale in C.so Mario Abbiate n. 21, 13100 Vercelli, rappresentata dal Direttore Generale (e-mail: protocollo@aslvc.piemonte.it) e l'Università del Piemonte Orientale con sede legale via Duomo, 6 - 13100 Vercelli, nella persona del Magnifico Rettore sono Contitolari del trattamento dei dati richiesti. Lei ha il diritto di chiedere l'accesso ai dati personali che La riguardano, e la rettifica o la cancellazione degli stessi o la limitazione del trattamento dei dati personali che lo riguardano e di opporsi al loro trattamento, qualora rimangano identificabili inviando una e-mail all'ASL VC all'indirizzo sopra riportato, o accedendo agli uffici. Il responsabile della protezione dei dati dell'ASL VC è contattabile all'indirizzo dpo@aslvc.piemonte.it. il responsabile scientifico dello studio è il prof. Fabrizio Faggiano del Dipartimento di Medicina Traslazionale, Università del Piemonte Orientale e Dipartimento di Prevenzione, Servizio Osservatorio Epidemiologico dell'ASL VC.

Dichiaro di aver preso visione dell'Informativa e GDPR (Regolamento UE 679/2016) e acconsento al trattamento dei dati personali come espresso in tale informativa

Sì No (non procede con la compilazione del questionario)

Le ricordo che i dati raccolti saranno trattati in forma anonima e aggregata per soli scopi scientifici e di ricerca e non saranno usati per prendere decisioni relative la Sua persona o il Suo lavoro. Le ricordo inoltre che la sua partecipazione è libera e volontaria, che può interrompere la compilazione e salvare per riprenderla in un momento successivo, o che può ritirarsi non portando a termine la compilazione del questionario. Le chiediamo gentilmente di rispondere al questionario scegliendo tra le opzioni di risposta che più si avvicinano alla sua esperienza e situazione.

DATI SOCIO - ANAGRAFICI

1. Indichi la Casa della Salute di appartenenza:
    1. Santhià
    2. Gattinara
    3. Varallo
    4. Cigliano
    5. Coggiola
2. Lei è nato nell'anno …… [aaaa]
3. Lei è
    1. Donna
    2. Uomo
4. Lei è
    1. Medico ambulatoriale/specialistico [se sì, specificare]
    2. Medico di Medicina Generale
    3. Pediatra di Libera Scelta
    4. Infermiere [se sì, specificare l'ambito di intervento: ADI, centro diurno, centro psichiatrico, pediatria, medicina generale (MMG/PLS), infermieri di famiglia e comunità, infermiere ambulatoriale, prevenzione vaccinale, altro]
    5. Psicologo
    6. Logopedista
    7. Igienista dentale
    8. Dietista
    9. Ostetrica
    10. Fisioterapista
    11. Terapista occupazionale
    12. Tecnico della riabilitazione
    13. Tecnico della prevenzione ambiente e luoghi di lavoro
    14. Educatore professionale
    15. Assistente sociale
    16. Altro, specificare

ESPERIENZA LAVORATIVA

5. Nella Casa della Salute, Lei è responsabile/coordinatore di qualche servizio?
    1. Sì
    2. No
6. Se sì, specificare di quale servizio ……
7. [solo per MMG/PLS] Indichi il numero di assistiti/pazienti ……
8. Sotto quale dipartimento (funzionale, strutturale, interaziendale) o struttura aziendale o ente è strutturato (o con quale dipartimento / struttura / ente collabora)? [non per MMG/PLS]
    1. Prevenzione [se sì, specificare tra SISP, SIAN, SPRESAL, Medicina legale, Osservatorio epidemiologico, veterinaria]
    2. Assistenza ospedaliera / specialistica
    3. Emergenza / Urgenza
    4. Salute mentale
    5. Dipendenze
    6. Materno – infantile
    7. Medicina fisica / riabilitativa
    8. Laboratori
    9. Distretto [se sì, specificare tra residenzialità e cure domiciliare, gestione offerta ambulatoriale multi-specialistica, integrativa e protesica, cure palliative e hospice, diabetologia e malattie endocrine, dietologia e nutrizione clinica, altro]
    10. Servizio Sociale Aziendale
    11. Non sono dipendente / Non collaboro con l'ASL (enti gestori dei Servizi Sociali comunali, etc.)
    12. Altro, specificare……
9. Lavora anche presso altra struttura dell'ASL esterna alla Casa della Salute?
    1. Si
    2. No
10. Può indicare il numero di ore da Lei svolte in una settimana all'interno della Casa della Salute? (Pensi ad una settimana tipo)?

    ……
11. Può indicare l'anno in cui ha preso Servizio?……
12. Può indicare da che anno Lei lavora all'interno della struttura adesso denominata Casa della Salute (anche se prima coincidente con un'altra realtà aziendale, come ad esempio ospedale, CAP, etc.)?

    ……
13. [no per MMG/PLS e assistenti sociali] Prima del suo arrivo in tale struttura, preso quale servizio lavorava?
    1. Servizio territoriale diverso dalla Casa della Salute nella stessa ASL
    2. Servizio ospedaliero nella stessa ASL
    3. Struttura semplice / complessa di altra ASL della stessa provincia
    4. Struttura semplice / complessa di altra ASL, altra provincia
    5. Fuori regione

6. Non operavo ancora
7. Altro, specificare

14. [solo MMG/PLS] Prima del suo arrivo in tale struttura, dove praticava?
    1. In ambulatorio privato
    2. In ambulatorio privato condiviso con altri medici
    3. Non praticavo ancora
    4. Altro, specificare
15. [solo per MMG/PLS] Prima di entrare nella Casa della Salute, apparteneva a qualche forma associativa di MMG/PLS?
    1. Sì
    2. No
16. [solo per MMG/PLS] Se sì, a quale forma associativa apparteneva:
    1. Associazione di medici
    2. Rete di medici
    3. Gruppo di cure primarie
    4. Altro, specificare……
17. [solo per MMG/PLS] E adesso appartiene ad una forma di associazione con altri medici / pediatri?
    1. Sì
    2. No
18. [solo per MMG/PLS] Se sì, a quale forma di associazione appartiene?
    1. Associazione di medici
    2. Rete di medici
    3. Gruppo di cure primarie
    4. Alla stessa a cui appartenevo anche prima di entrare nella Casa della Salute
19. Pensando all'ultimo anno, è successo di aver assistito soggetti affetti dalle seguenti patologie / disturbi / condizioni sociosanitarie?
    1. Scompenso cardiaco …… Sì / No / Non tratto questa patologia
    2. BPCO/malattie respiratorie croniche…… Sì / No / Non tratto questa patologia
    3. Diabete…… Sì / No / Non tratto questa patologia
    4. Demenza…… Sì / No / Non tratto questa patologia
    5. Tumore in stato avanzato…… Sì / No / Non tratto questa patologia
    6. Soggetto con patologia psichiatrica…… Sì / No / Non tratto questa patologia
    7. Soggetto con problemi di dipendenza (da sostanze illegali, fumo, alcol, tabacco, gioco d'azzardo) …… Sì / No / Non tratto questo problema
    8. Disabile…… Sì / No / Non tratto questa patologia
    9. Anziano non autosufficiente…… Sì / No / Non tratto questa patologia
    10. Donna vittima di violenza…… Sì / No
20. Pensando ad un assistito tipo affetto da scompenso cardiaco, con quanti professionisti è entrato in contatto nell'ultimo anno per la gestione di questo tipo di problema? (Inserisca la somma di professionisti diversi con cui è entrato in contatto nell'ultimo anno, facendo attenzione a non contare più volte lo stesso professionista contattato per più soggetti affetti

da _____ [personalizzare in base al paziente al quale si riferisce la domanda]. Inserisca zero se non è entrato in contatto con nessun altro professionista. Esempio: se nell'ultimo anno avesse trattato 3 soggetti affetti da _____ [personalizzare in base al paziente al quale si riferisce la domanda] e fosse entrato in contatto con lo stesso professionista per tutti i 3 soggetti e con un altro professionista per solo 1 soggetto, deve inserire di aver contattato in totale 2 professionisti).

Per ogni professionista indicato, risponda alle seguenti domande (fino ad un massimo di 3 professionisti per ciascun paziente/assistito/condizione [da ripetere per ogni paziente su di cui l'intervistato ha indicato un numero >0 alla domanda 18, per Professionista A, B, C]:

21. Il Professionista A si occupa di (specialità o occupazione)
    ……
22. Il Professionista A lavora:

    1, Nel Suo servizio

    2, In un servizio del Suo stesso dipartimento / distretto / per il Suo servizio comunale, nella Casa della Salute

    3, In un servizio del Suo stesso dipartimento / distretto / per il Suo servizio comunale, fuori dalla Casa della Salute

    4, In altro dipartimento, nella Casa della Salute

    5, In altro dipartimento, fuori dalla Casa della Salute

    6, In un'altra ASL / azienda pubblica / servizio comunale

    7, In un'altra azienda privata o non-profit

    8, In uno studio privato

23. In quale Casa della Salute lavora il professionista A? [solo se hanno risposto 2, 4 alla domanda 22]
    1. Santhià
    2. Gattinara
    3. Varallo
    4. Cigliano
    5. Coggiola
24. Il Professionista A lavora in una struttura ospedaliera?
    1. Sì
    2. No
25. Se Lei ha assistito il paziente prima del Professionista A, Lei ha suggerito al paziente / assistito di contattare (non rispondere se non ha assistito il paziente prima del professionista A):
    1. Specificamente il Professionista A
    2. La struttura all'interno del quale il Professionista A lavora

3. un Professionista in grado di fornire quella tipologia di prestazione
4. il paziente / assistito si è rivolto al Professionista A senza una Sua indicazione
5. Non ho suggerito al paziente / assistito di contattare il Professionista A, ho contattato direttamente io il Professionista A

26. Lei e il Professionista A avete comunicato specificamente del paziente / assistito a cui si sta riferendo (è possibile più di una risposta):
    1. attraverso lettere portate dal paziente / assistito
    2. attraverso la cartella clinica / referti medici
    3. via telefono
    4. via e-mail
    5. durante un incontro faccia a faccia in cui avete discusso dello specificato paziente / assistito
    6. non ha avuto contatti con A, ma il paziente / assistito Le ha detto di averlo incontrato
27. Per parlare di qualsiasi argomento legato alla Sua professione, quante volte nell'ultimo anno stima che Lei abbia comunicato col Professionista A (escludendo incontri non lavorativi)?
    1. Via telefono……
    2. Via e-mail……
    3. Durante un incontro faccia a faccia……
28. Quante volte nell'ultimo anno Lei ha incontrato il collega per motivi non lavorativi?.....
29. Che percentuale di pazienti / assistiti con [personalizzare in base alla patologia/condizione] che Lei assiste è assistita anche:
    1. Dal Professionista A?.....
    2. Da altri professionisti nella stessa struttura in cui lavora il Professionista A?.....

Indichi, per favore il Suo grado di accordo con le seguenti affermazioni:

30. Il Professionista A e io siamo d'accordo sul seguire i protocolli/percorsi/programmi diagnostici-terapeutici:

per nulla d'accordo	poco d'accordo	d'accordo	abbastanza d'accordo	completamente d'accordo

31. Il Professionista A e io accediamo e apportiamo modifiche allo stesso database informatico sui pazienti / assistiti:

per nulla d'accordo	poco d'accordo	d'accordo	abbastanza d'accordo	completamente d'accordo

RIPETERE DOMANDE 20-30 PER TUTTE LE TIPOLOGIE DI ASSISTITI / PAZIENTI TRATTATI DALL'INTERVISTATO (domanda 19) FINO AD UN MASSIMO DI 3 PROFESSIONISTI PER PATOLOGIA

A.3 Questionnaire for patients used in the *La Casa della Salute* study

Studio La Casa della Salute

Questionario per i pazienti fragili residenti nei comuni afferenti alle Case della Salute dell'ASL di Vercelli: la percezione della continuità delle cure

1. Negli ultimi 12 mesi, circa quante volte ha parlato con il personale sanitario?.....
2. Negli ultimi 12 mesi quante volte l'ASL o un medico hanno contatto Lei via lettera o fax o telefono per fissare o ricordarLe un appuntamento?.....
3. Negli ultimi 12 mesi circa quante volte ha fatto esami del sangue?.....
4. Negli ultimi 12 mesi, circa quante volte ha visto il medico o infermiere che vede più spesso?.....
5. Negli ultimi 12 mesi, dove ha visto più spesso il medico o infermiere che vede con più frequenza?
    1. Presso un poliambulatorio / Casa della Salute dell'ASL
    2. Presso una struttura ospedaliera
    3. Presso un centro specializzato sulla Sua patologia / Suo problema
    4. Presso l'ambulatorio medico del Suo Medico di Medicina Generale
    5. Presso la Sua abitazione
    6. Altro, specificare
6. Se ha bisogno di consigli urgentemente, quanto tempo ci impiega per incontrare il medico o l'infermiere che vede più spesso? (indicare in giorni) .....
7. Come giudicherebbe la durata dell'attesa necessaria per parlare con un medico?

Eccessivamente elevata	Abbastanza elevata	Nella norma, accettabile	Abbastanza tempestiva	Molto tempestiva

8. Se ha un problema con la sua patologia è soddisfatto della risposta che trova nel territorio della Sua ASL?

Decisamente No	Tendenzialmente No	Non saprei	Tendenzialmente Sì	Decisamente Sì

9. Se ha bisogno di parlare con il Suo solito medico o infermiere, quanto facile è parlargli?

Molto difficile	Abbastanza difficile	Dipende da volta a volta	Abbastanza facile	Molto facile

10. È soddisfatto di come il medico o infermiere che La segue Le spiega le terapie e i test che Le prescrive?

Decisamente No	Tendenzialmente No	Non saprei	Tendenzialmente Sì	Decisamente Sì

11. Il medico o infermiere che La segue, La coinvolge nelle decisioni sulla Sua Patologia?

Per nulla	Poco	Dipende da decisione a decisione	Abbastanza	Molto

12. Il medico o infermiere che La segue ascolta quello che ha da dirgli?

Per nulla	Poco	Dipende da decisione a decisione	Abbastanza	Molto

13. Il medico o infermiere che La segue conosce la Sua storia clinica?

Per nulla	Poco	Dipende da decisione a decisione	Abbastanza	Molto

14. Il medico o infermiere che La segue prende le decisioni migliori per il Suo problema di salute?

Decisamente No	Tendenzialmente No	Non saprei	Tendenzialmente Sì	Decisamente Sì

15. Il medico o infermiere che La segue si preoccupa di Lei?

Decisamente No	Tendenzialmente No	Non saprei	Tendenzialmente Sì	Decisamente Sì

16. In generale, quanto bene è coordinata l'assistenza per il Suo problema di salute?

Molto male	Abbastanza male	Nella norma – accettabile	Abbastanza bene	Molto bene

17. Tutti Le danno le stesse informazioni e consigli?

Decisamente No	Tendenzialmente No	Non saprei	Tendenzialmente Sì	Decisamente Sì

18. Tutti conoscono la Sua storia clinica?

Decisamente No	Tendenzialmente No	Non saprei	Tendenzialmente Sì	Decisamente Sì

19. Tutti conoscono la Sua terapia?

Decisamente No	Tendenzialmente No	Non saprei	Tendenzialmente Sì	Decisamente Sì

20. Tutti condividono un piano concordato per il trattamento del Suo problema di salute?

Decisamente No	Tendenzialmente No	Non saprei	Tendenzialmente Sì	Decisamente Sì

21. Lei conosce la Casa della Salute di _____ [adattare in base alla residenza dell'intervistato]?
    1. Sì
    2. No
22. Il suo medico curante (o di famiglia) la visita in un ambulatorio nella Casa della Salute/poliambulatorio medico di_____ adattare in base alla residenza dell'intervistato]?
23. Si ricorda quanto tempo è passato dall'ultima volta che si è recato/a presso la Casa della Salute/poliambulatorio medico di_____ [adattare in base alla residenza dell'intervistato] per una visita medica o una prenotazione o il ritiro di referti di esami medici?
    1. Un mese o meno
    2. Tra i due e i sei mesi
    3. Tra i sei mesi e un anno
    4. Più di un anno
    5. Non sono mai stato nella Casa della Salute di _____ adattare in base alla residenza dell'intervistato]
24. [se non hanno risposto 5 alla domanda 23] Quanto ritiene di essere soddisfatto/a dell'assistenza ricevuta quando si reca presso la Casa della Salute/poliambulatorio medico di_____ adattare in base alla residenza dell'intervistato]

Per nulla	Poco	Dipende dalle situazioni	Abbastanza	Molto

A.4 Invitation letter sent to professionals for participation in the survey

Gentile collega,

l'Università del Piemonte Orientale e l'IRES Piemonte (Istituto di Ricerche Economiche e Sociali per il Piemonte), in collaborazione con l'Azienda Sanitaria Locale di Vercelli, stanno conducendo uno studio *La Casa della Salute* sull'impatto delle Case della Salute in termini di salute e organizzativo, ad un anno dalla loro attivazione. Al fine di poter collezionare dati volti alla valutazione d'impatto, si rende necessaria un'osservazione descrittiva dello stato delle attività delle Case della Salute di Santhià, Gattinara, Varallo, Coggiola e Cigliano.

Al fine di raccogliere informazioni in modo esaustivo, i ricercatori coinvolti concordano sull'importanza di rilevare informazioni intervistando anche gli operatori sociosanitari operanti in tali strutture sulle loro esperienze di lavoro nelle Case della Salute. Lo studio ha finalità di ricerca scientifica e non verrà usato con obiettivi di controllo della qualità del Suo operato professionale. I risultati di questo studio serviranno a descrivere in modo più preciso le realtà delle Case della Salute in osservazione al fine di valutarne l'impatto sulla salute della popolazione e sull'organizzazione aziendale.

Le chiediamo pertanto di partecipare allo studio, in modo anonimo, dedicando parte del suo tempo rispondendo al questionario on-line raggiungibile al link fornitoLe con questa e-mail.

Le ricordiamo che può interrompere la compilazione e salvare i dati già inseriti in qualsiasi momento, per riprendere la compilazione in un secondo momento. Le ricordiamo inoltre che la partecipazione è libera e volontaria, non prevede alcun compenso, e che può uscire dallo studio in qualsiasi momento prima della fine della compilazione.

I dati saranno raccolti e archiviati in modo anonimo presso l'Università del Piemonte Orientale e saranno accessibili dai ricercatori solo su approvazione e a scopo di ricerca scientifica. I dati saranno raccolti e trattati in forma anonima e saranno accessibili a terzi solo per motivi di ricerca e su autorizzazione del responsabile dello studio. Non saranno usati dati personali per prendere decisioni relative all'interessato (art. 105 c.1 D.Lgs. 196/2003), l'intervistato è stato informato degli scopi dello studio (art. 105 c.2 D.Lgs. 196/2003) e che la partecipazione è libera e volontaria. I Suoi dati saranno trattati sulla **base del Suo espresso consenso** (artt. 6, c.1 lett. "a" e 9, c.2, lett. "a" GDPR).

L’azienda ASL VC con sede legale in C.so Mario Abbiate n. 21, 13100 Vercelli, rappresentata dal Direttore Generale (e-mail: protocollo@aslvc.piemonte.it) e l’Università del Piemonte Orientale con sede legale via Duomo 6, 13100 Vercelli, nella persona del Magnifico Rettore sono **Contitolari del trattamento** dei dati richiesti. Lei ha il diritto di chiedere l'accesso ai dati personali che La riguardano, e la rettifica o la cancellazione degli stessi o la limitazione del trattamento dei dati personali che lo riguardano e di opporsi al loro trattamento, qualora rimangano identificabili inviando una e-mail all’ASL VC all’indirizzo sopra riportato, o accedendo agli uffici. Il responsabile della protezione dei dati dell’ASL VC è contattabile all’indirizzo dpo@aslvc.piemonte.it. il responsabile scientifico dello studio è il prof. Fabrizio Faggiano del Dipartimento di Medicina Traslazionale, Università del Piemonte Orientale e Dipartimento di Prevenzione, Servizio Osservatorio Epidemiologico dell’ASL VC.

Potrà per qualsiasi motivo ottenere maggiori informazioni telefonando al contatto presente al termine di questa informativa.

La ringraziamo fin d’ora per il tempo e la preziosa collaborazione che ci offrirà e Le ricordiamo che, se lo ritenesse necessario, può contattare la dott.ssa Silvia Caristia, responsabile della ricerca a livello locale al numero 0321 660682 / 011 6666443, o scrivendo alla seguente e-mail: silvia.caristia@med.uniupo.it

Cordialmente

Il Direttore di Distretto ASL Vercelli

Dott.ssa Francesca Gallone

A.5 Letter sent to GPs for its support in patient enrolment in the study

Vercelli, 30/10/2019

Gentile Dott./Dott.ssa,

l'Università del Piemonte Orientale e l'IRES Piemonte (Istituto di Ricerche Economiche e Sociali per il Piemonte), in collaborazione con l'Azienda Sanitaria Locale di Vercelli, stanno conducendo uno studio La Casa della Salute sulla valutazione dell'impatto delle Case della Salute in termini di salute, organizzativi ed economici, ad un anno dalla loro attivazione. Al fine di poter collezionare dati volti alla valutazione d'impatto, si rende necessaria un'osservazione descrittiva dello stato delle attività delle Case della Salute di Santhià, Gattinara, Varallo, Coggiola e Cigliano. I risultati di questo studio serviranno a descrivere in modo più preciso le realtà delle Case della Salute in osservazione al fine di valutarne l'impatto sulla salute della popolazione e sull'organizzazione aziendale.

Tra i partecipanti, lo studio si pone l'obiettivo di rilevare alcune informazioni intervistando anche alcuni assistiti sulla loro percezione della continuità delle cure offerte dal servizio sanitario locale.

A un campione di 1000 persone con più di 18 anni, affette da cronicità / fragilità del territorio dell'ASL di Vercelli, con più di 18 anni, verrà sottoposto un questionario telefonico. Le persone coinvolte verranno preventivamente informate di questa telefonata tramite una lettera, nella quale si fa riferimento alla possibilità di contattare l'Università per ricevere ulteriori informazioni. La riservatezza dei dati raccolti sarà rigorosamente garantita dal rispetto della normativa vigente sulla privacy. Tutte le informazioni saranno elaborate e presentate in modo da garantire l'anonimato degli intervistati.

La Sua preziosa collaborazione, nel favorire la compliance dei pazienti alla partecipazione allo studio, sarà fondamentale e indispensabile, e per questo La ringraziamo anticipatamente per il tempo e la preziosa collaborazione che ci offrirà. Le informazioni raccolte saranno successivamente diffuse tramite l'ASL di Vercelli e pubblicate.

Le ricordiamo che, se lo ritenesse necessario, può contattare la dott.ssa Silvia Caristia, telefono 0321 660682 / 011 6666443, e-mail: silvia.caristia@med.uniupo.it.

Cordialmente

Il Direttore Generale ASL Vercelli

Dott.ssa Chiara Serpieri

Il coordinatore del progetto

Prof. Fabrizio Faggiano

A.6 Invitation letter sent to patients for participation in the survey

Vercelli, 30/10/2019

Gentile Signora/e,

l'Università del Piemonte Orientale e l'IRES Piemonte (Istituto di Ricerche Economiche e Sociali per il Piemonte), in collaborazione con l'Azienda Sanitaria Locale di Vercelli, stanno conducendo uno studio La Casa della Salute sulla valutazione dell'impatto delle Case della Salute dell'ASL sulla popolazione. Al fine di poter collezionare dati volti alla valutazione d'impatto, si rende necessaria un'osservazione delle attività svolte dalle Case della Salute di Santhià, Gattinara, Varallo, Coggiola e Cigliano, ad un anno dalla loro attivazione. Tra i partecipanti allo studio, vi è un campione di residenti nella provincia di Vercelli con più di 18 anni, in particolare nei comuni afferenti alle Case della Salute dell'ASL.

Anche il Suo Medico di Medicina Generale è stato informato dell'iniziativa, e Le potrà fornire, se lo ritiene opportuno, ulteriori spiegazioni sul significato e sullo scopo di questa iniziativa. Potrà per qualsiasi motivo ottenere maggiori informazioni telefonando al contatto presente al termine di questa informativa.

Le scrivo per informarLa che il Suo nominativo è stato selezionato e che, per questo, nelle prossime settimane verrà contattata/o da un ricercatore del Dipartimento di Medicina dell'Università, il quale le proporrà un'intervista telefonica che durerà circa 15-20 minuti. Al momento della telefonata potrà, se lo vuole, concordare con il ricercatore un altro momento che Le sarà più comodo per rispondere alle domande. Se vorrà, potrà interrompere l'intervista in qualunque momento e non rispondere a specifiche domande.

I dati saranno archiviati presso l'Università del Piemonte Orientale e saranno accessibili dai ricercatori solo su approvazione e a scopo di ricerca scientifica. I dati saranno raccolti e trattati in forma anonima e saranno accessibili a terzi solo per motivi di ricerca e su autorizzazione del responsabile dello studio. Non saranno usati dati personali per prendere decisioni relative all'interessato (art. 105 c.1 D.Lgs. 196/2003), l'intervistato è stato informato degli scopi dello studio (art. 105 c.2 D.Lgs. 196/2003) e che la partecipazione è libera e volontaria. I Suoi dati saranno trattati sulla base del Suo espresso consenso (artt. 6, c.1 lett. "a" e 9, c.2, lett. "a" GDPR).

L'azienda ASL VC con sede legale in C.so Mario Abbiate n. 21, 13100 Vercelli, rappresentata dal Direttore Generale (e-mail: protocollo@aslvc.piemonte.it) e l'Università del Piemonte Orientale con sede legale via Duomo 6, 13100 - Vercelli, nella persona del Magnifico Rettore sono Contitolari del trattamento dei dati richiesti. Lei ha il diritto di chiedere l'accesso ai dati personali che La riguardano, e la rettifica o la cancellazione degli stessi o la limitazione del trattamento dei dati personali che lo riguardano e di opporsi al loro trattamento, qualora rimangano identificabili inviando una e-mail all'ASL VC all'indirizzo sopra riportato, o accedendo agli uffici. Il responsabile della protezione dei dati dell'ASL VC è contattabile all'indirizzo dpo@aslvc.piemonte.it.; il responsabile scientifico dello studio è il prof. Fabrizio Faggiano del Dipartimento di Medicina Traslazionale, Università del Piemonte Orientale e Dipartimento di Prevenzione, Servizio Osservatorio Epidemiologico dell'ASL VC.

I risultati di questo studio serviranno a descrivere in modo più preciso le Case della Salute in osservazione, tenendo conto anche dell'opinione della cittadinanza sui servizi offerti, al fine di valutare il loro impatto sulla salute della popolazione. In questo modo l'Azienda Sanitaria e i professionisti saranno in grado di orientare in modo più appropriato le proprie attività per migliorare le condizioni di salute della popolazione. Per questo motivo, è preziosa anche la Sua opinione e quindi la Sua partecipazione. Le ricordiamo che la partecipazione è libera e volontaria, e non sarà prevista nessuna forma di compenso.

La ringraziamo fin d'ora per il tempo e la preziosa collaborazione che ci offrirà e Le ricordiamo che, se lo ritenesse necessario, può contattare la dott.ssa Silvia Caristia, responsabile della ricerca a livello locale al numero 0321 660682 / 011 6666443, o scrivendo alla seguente e-mail: silvia.caristia@med.uniupo.it.

Cordialmente

Il Direttore Generale ASL Vercelli

Dott.ssa Chiara Serpieri

Il coordinatore del progetto

Prof. Fabrizio Faggiano