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# Strategic Intelligence Monitor on Personal Health Systems Phase 3 (SIMPHS3)

*ARIA (Italy)  
Case Study Report*

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**Abstract**

The ARIA case emerged from an idea of some pulmonology specialists, who have been dedicated for some time to the care and follow up of patients with acute and chronic respiratory failure caused by neuromuscular, neurological and reb cage diseases. These specialists are members of the Italian Association of Muscular Dystrophy Patients (UILDM) and belong to the Arcispedale Santa Maria Nuova (Santa Maria Nuova General Hospital) and to the San Sebastiano Hospital, within the Local Health Unit of Reggio Emilia

The basic idea underpinning the ARIA case is that telecare can play an important and powerful role in the care of patients with chronic diseases. In particular, it can contribute to the delivery of services that benefit patients in terms of independent living and quality of life through improved collaboration amongst caregivers and health workers, while simultaneously helping to cut the cost of the regional healthcare system.

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## Preface

The Strategic Intelligence Monitor on Personal Health Systems (SIMPHS) research started in 2009 with the analysis of the market for Remote Patient Monitoring and Treatment (RMT) within Personal Health Systems (PHS). This approach was complemented in a second phase (SIMPHS2) with the analysis of the demand side, focusing on needs, demands and experiences made with PHS by healthcare producing units (e.g. hospitals, primary care centres), healthcare professionals, healthcare authorities and patients amongst others.

Building on the lessons learnt from SIMPHS2 as well as on the European Innovation Partnership on Active and Healthy Ageing initiative, SIMPHS3 aims to explore the factors that lead to successful deployment of integrated care and independent living, and define best operational practices and guidelines for further deployment in Europe. This case study report is one of a series of case studies developed to achieve these objectives.

The outcomes of SIMPHS2 are presented in a series of public reports discussing the role of governance, innovation and impact assessment in enabling integrated care deployment. In addition, through the qualitative analysis of 27 Telehealth, Telecare and Integrated Care projects implemented across 20 regions in eight European countries investigated in SIMPHS2, eight facilitators have been identified, based on Suter's ten key principles for successful health systems integration.

The eight main facilitators identified among these as necessary for successful deployment and adoption of telehealth, telecare and integrated care in European regions are:

- Reorganisation of services
- Patient focus
- Governance mechanisms
- Interoperable information systems
- Policy commitment,
- Engaged professionals
- National investments and funding programmes, and
- Incentives and financing.

These eight facilitators have guided the analysis of the cases studied in SIMPHS3 and a graphical representation with arrows whose length represents the relative importance of each facilitator is presented in each case study.

In addition to the above facilitators analysed in each case report, a specific section is dedicated to the analysis of care integration. It should be noted that the definition of vertical and horizontal integration used in this research is taken from the scientific literature in the field of integrated care<sup>1</sup> and differs from the one mentioned in the European Innovation Partnership on Active and Healthy Ageing Strategic Implementation Plan<sup>2</sup>. We define horizontal integration as the situation where similar organisations/units at the same level join together (e.g. two hospitals) and vertical integration as the combination of different organizations/units at different level (e.g. hospital, primary care and social care).

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<sup>1</sup> Kodner, D. (2009). All together now A conceptual Exploration of Integrated Care.

<sup>2</sup> [http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/steering-group/operational\\_plan.pdf](http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/steering-group/operational_plan.pdf) (page 27)

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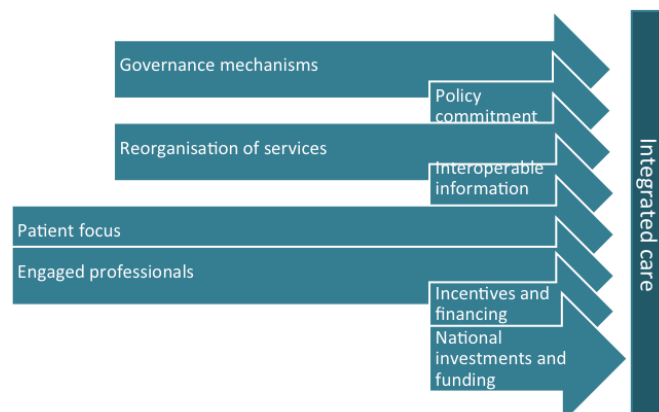
## Case outlook

The ARIA case emerged from an idea of some pulmonology specialists, who have been dedicated for some time to the care and follow-up of patients with acute and chronic respiratory failure of neuromuscular, neurological and rib cage diseases. These specialists who are members of the Italian Association of Muscular Dystrophy Patients (UILDM), belong to the Arcispedale Santa Maria Nuova (Santa Maria Nuova General Hospital) and to the San Sebastiano Hospital, within the Local Health Unit of Reggio Emilia.

The basic idea underpinning the ARIA case is that telecare can perform an important and powerful role in the care of patients with chronic diseases. In particular, it can contribute to services that help patients to live independently. These services also give patients better quality of life by improving collaboration amongst caregivers and health workers, and at the same time they help to cut regional healthcare costs. The patients themselves are the focal point of the integrated care process. However, if their health conditions so require, the caregivers and family members can act on their behalf and communicate health care information to the telecare operators on a daily basis. The telecare operators, in turn, can communicate risk conditions promptly to the various health care professionals on the basis of a predefined health risk protocol. This protocol is established by the pulmonologists on the basis of the communicated information. The predefined intervention procedures, which are agreed among all the health care actors involved, allow an immediate response to the patients' needs, as well as immediate recovery actions. After almost six years' experience with this service, the continuous monitoring of clinical conditions of highly fragile outpatients has made it possible to identify several benefits, such as

- Greater relief/comfort for patients and their families;
- The provision of useful clinical decision-making support to the patients' GPs;
- a significant reduction in hospital admissions for acute respiratory diseases;
- and a reduction in regional healthcare costs.

The key driver of this integrated care process is the engagement of patients, their family members and carers. Also the strong commitment of the pulmonologists and GPs, who provide the services on a voluntary base, has contributed to the success of this case. Another main driver is the governance mechanism that steers the ARIA service management process. It enables close collaboration between the two local hospitals and the Local Health Unit. This driver is complemented by the reorganisation of the service that was undertaken by the governance actors through the implementation of telecare services, and a process of thorough re-thinking of the traditional hospital-centred services provided to the target patients.



# 1 Background

## 1.1 Italian social and health care services

The Italian healthcare system offers universal access to a uniform level of care throughout Italy, as established through the Servizio Sanitario Nazionale (Italian National Health Service, INHS) in 1978. The central government controls the distribution of tax revenue for publicly-financed health care (INHS) and defines a national minimum statutory benefits package to be offered to all residents in every region (livelli essenziali di assistenza, LEAs). Health care is financed primarily through a corporate tax pooled nationally and allocated back to the regions, typically to the source region (there are large interregional gaps in the corporate tax base, leading to financing inequalities). In addition, a fixed proportion of national value-added tax (VAT) revenue is collected by the central government and redistributed to regions unable to raise sufficient resources. Universal access to a uniform level of care is compromised by considerable variations in coverage and service quality across regions in the North and South. The system provides a full spectrum of services, ranging from visits to GPs, specialised in-patient treatments, post-operative rehabilitation to ambulatory care and outpatient treatment. Drugs and medicines are largely covered by the INHS. A decisive change in the health care system took place when a major reform of the constitution (Constitutional Law No. 3 of 18<sup>th</sup> October 2001) altered the roles and responsibilities of the state and the regions. It ruled that national authorities must ensure that the general principles and objectives of healthcare provision are met and that these authorities retain the responsibility to define the basic benefits package (LEAs) to be uniformly provided throughout the country. The regional authorities, on the other hand, retained considerable power to legislate on a regional level and allocate funding. Both national and regional authorities can enact major policy decisions in inter-institutional "State-Regions Conferences", in which representatives from both authorities participate to deliberate on relevant issues.

The INHS is organised at three levels: national, regional and local. At the national level, the Ministry of Health is the central body of the INHS in charge of coordination of the services covering human health, occupational health and safety, and food hygiene and safety. The Ministry has the authority to pass laws concurrently with the regions, and it has regulatory authority over the regions with regard to safeguarding health, occupational health and safety, regulation of the professions, nutrition and scientific research. Agreements between the state and the regions establish the financial resources for a three-year period and the essential levels of care (LEAs).

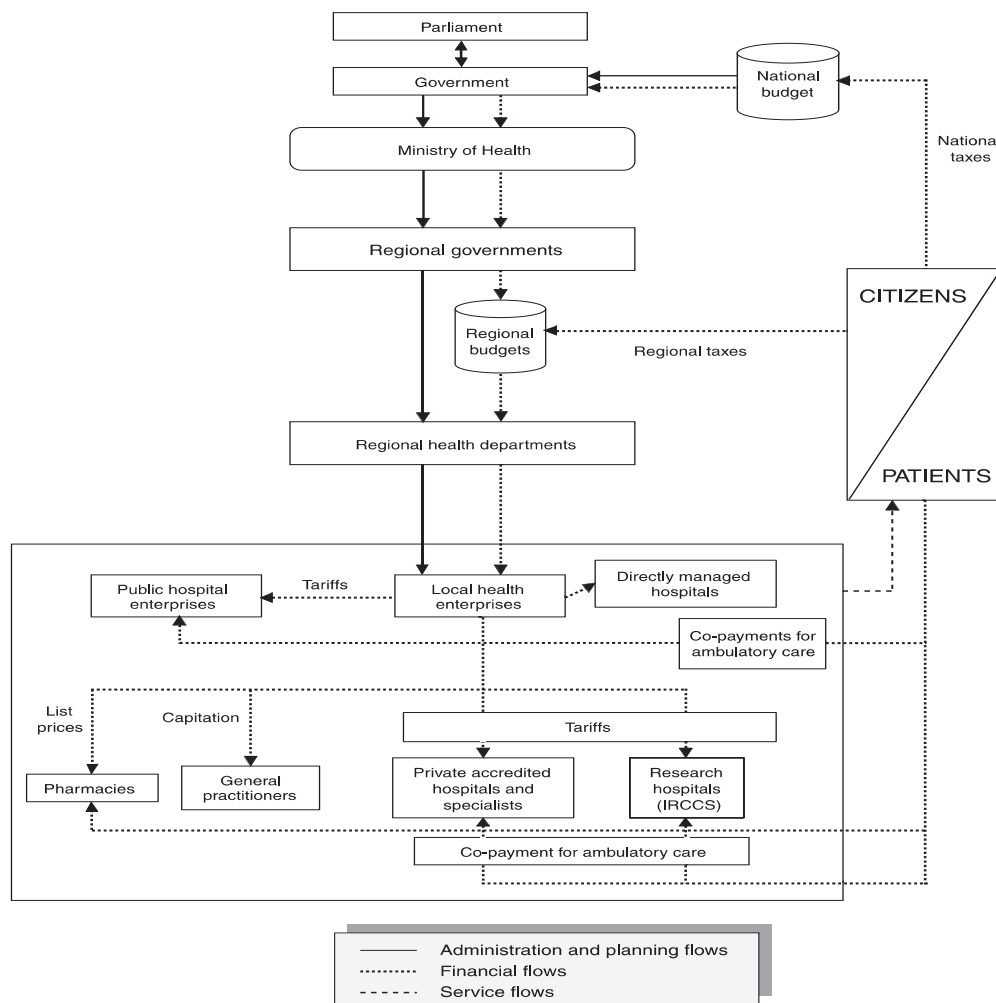
At a regional level, according to national laws and the general indications of the Ministry of Health, there are 19 regions and two autonomous provinces. These are responsible for the organisation and delivery of health services in their areas in terms of health education and promotion, disease prevention and care.

At the local level, the health system is organised in local health units (Aziende Sanitarie Locali, ASL), which have public juridical status and operate autonomously with regard to organisation, administration, management of assets, accounts, general management and technology. Medical care and services are provided in each area by public or accredited private hospitals and health centres. The ASL territorial facilities, in turn, are organised in districts. These human health districts provide, amongst others the following services: health education, information and advice to help residents make informed choices, primary health care, home health care, health certificates, prevention and control of infectious



diseases, hygiene in confined environments, food hygiene, health protection for mothers and children, and assessment of interventions for the disabled. Hospitals provide all clinical care including day-care medicine, surgery and ambulatory services, while the ASL is responsible for the health status of the population living in the area. Furthermore, the ASLs are responsible for investigating the population's health needs and assessing the most common risk factors for acute and chronic diseases in the area so that they can plan the health services required to respond to the population's health demands. In addition, they pay the hospitals and other local authorities for the services they provide, and evaluate the effectiveness, safety and cost-benefit ratios of the health services provided according to standards of quality. Figure 1 depicts the Italian health care system.

**Figure 1 Overview of the Italian health care system**



Note: IRCCS: National Institutes for Scientific Research.

Source: Scalzo et al. (2009)

Social care is delivered at local level. Each municipality can opt to provide services directly or to outsource them to an external market provider. The Italian social services have recently come under particular government scrutiny to improve their levels of efficiency and effectiveness. Under Law n8328/2000 and decree-law n8207/2001, new institutional settings for social care organisations were defined and the reforms also created a new institutional actor, the ASL, to improve the way social services were provided. The ASL

should be a more efficient and flexible type of organisation, where professionals can achieve their maximum potential by adopting private sector management styles. Most of the social care services in several Italian regions are now provided through ASLs as autonomous entities, which are usually owned by the municipalities themselves.

## 1.2 The Reggio Emilia province

The Reggio Emilia province is one of the nine provinces of the Emilia-Romagna region in Italy. It is about 2,293 km<sup>2</sup> and has a population of 530,300 inhabitants, with a density of about 231 inhabitants per km<sup>2</sup>, slightly above the regional average. It is located in the North of Italy, with the Lombardy region on its Northern borders and Tuscany on its Southern borders. The province has an annual GDP of more than €16 billion (representing about 10% of the total annual GDP of Emilia Romagna region), and an annual GDP per capita of €30,444. The average age of the population in the province is about 43 years old, in line with the average trend for the whole region. Individuals above the age of 64 make up about 19% of the total population, 3% less than the average for the whole region (RER, 2014). This rate, however, increases at a yearly rate of 0.5%, against less than 0.2% for other age classes. Therefore, population ageing is an important and growing phenomenon, in line with the rest of the Emilia-Romagna region and Italy as a whole, which lies above the EU28 average with more than 17.5% of its population aged 64+.

The health system in the Reggio-Emilia province is organised in 5 public hospitals located in the main municipalities of the province and a series of private clinics that, all together, provide about 2,400 beds in total. The following table summarises the main figures for Emilia-Romagna and its regional health system.

**Table 1 Emilia-Romagna health care system characteristics**

<b>Geographical coverage km<sup>2</sup></b>	2,293
<b>Inhabitants per km<sup>2</sup></b>	231
<b>Number of inhabitants</b>	530,300
<b>Life expectancy at birth, years</b>	76.8 males – 81.6 females
<b>Regional GDP (2012), billion €</b>	16
<b>Regional GDP per inhabitant (2012), €/inhabitants</b>	30,444
<b>General Practitioners, /1,000 inhabitants (2010)</b>	0.78
<b>Specialists /1,000 inhabitants (2010)</b>	3.67
<b>Regional Budget for health services management (2013), billion €</b>	1
<b>Health care professionals / 100,000 inhabitants</b>	386
<b>Regional health care budget, € per inhabitants (2013)</b>	1,888
<b>Hospital beds (2012)</b>	2,415
<b>Hospital beds/1,000 inhabitants (2012)</b>	4.5

Source: RER (2014)

## 1.3 The ARIA case

The ARIA case emerged from an idea of some pulmonology specialists, who have been a dedicated for some time to the care and follow-up of patients with acute and chronic respiratory failure of neuromuscular, neurological and rib cage diseases. These specialists are members of the Italian Association of Muscular Dystrophy Patients (UILDM) and belong

to the Arcispedale Santa Maria Nuova (Santa Maria Nuova General Hospital) and to the San Sebastiano Hospital, within the Local Health Unit in Reggio Emilia.

The case, which started in 2008, is evaluating the feasibility of an innovative home care follow-up programme that combines tele-monitoring and chest physiotherapy. The programme aims to prevent acute respiratory episodes and provide early treatment, in order to avoid or reduce hospitalisations and keep fragile patients in good clinical condition for as long as possible. The basic rationale underlying the ARIA case is that telecare can play an important and powerful role in the care of patients with chronic diseases. In particular, it can help patients to live independently and improve their quality of life, and at the same time contain regional healthcare costs.

## **2 Integrated care analysis**

### **2.1 Dimensions of integration**

ARIA's targets patients with neurological, neuromuscular and severe chest-wall diseases with chronic respiratory failure, who need mechanical ventilation. Treatment can include tracheostomies and supplementary oxygen. These patients generally have a very poor prognosis and are rarely free from respiratory complications. They usually face significant limitations to their social lives due to frequent hospital admissions for acute respiratory complications, which worsen their respiratory and global health condition even further and can lead to death.

The decision to offer these patients ARIA services was taken because pulmonary complications are the main cause of morbidity and mortality for patients with neuromuscular and severe rib-cage diseases. In fact, neurological, neuromuscular, and rib-cage diseases often affect patients suffering from acute respiratory failure, and usually result in hospitalisation for long periods.

To prevent these emergency situations, the ARIA initiative implemented an early home tele-monitoring system that detects when the clinical condition of these fragile patients worsens. They subsequently receive earlier medical and chest physiotherapy treatment at home, before their condition becomes critical. To implement this service, it was necessary to establish strong vertical integration among all the health care actors involved in the care process.

The patients themselves are the focal point of this integrated care process. However, if patients' health conditions so require, the caregivers and family members can act on their behalf and communicate health care information to the telecare operators on a daily basis. The telecare operators, in turn, communicate risk conditions promptly to the various health care professionals on the basis of a predefined health risk protocol established by the pulmonologists. The predefined intervention procedures, which are agreed by all the health care actors involved, allow an immediate response to patients' needs, as well as immediate recovery actions. These actions can be performed by a single health professional, e.g. the GP in charge of the patient, specialists from the hospital, physiotherapist, or caregiver, depending on the severity of the risk detected.

ARIA currently cares for twenty patients whose average age is 38.7 (minimum age is 17 and maximum age is 68). Of these patients, 11 are on mechanical ventilation, 3 are on both oxygen therapy and mechanical ventilation and 6 have a tracheostomy.

In order to receive ARIA services, patients must have reduced cough power (PCEF < 270 l/min), MEP < 40 cm H<sub>2</sub>O, CV < 1500 ml; adequate support at home from a caregiver; difficulty in getting to hospital (because it is too far, or because they have greatly reduced or no personal physical mobility); and mechanical home ventilation. There are also some criteria that may exclude patients from receiving to the ARIA services. These comprise bulbar muscular impairment, lack of cooperation of family members, and a lack of motivation on the side of relatives.

## **2.2 Impact**

After almost six years' experience of the service, continuous monitoring of the clinical condition of fragile patients several benefits could be identified, such as greater relief/comfort for patients and families; provision of useful clinical decision-making support to the GPs; a significant reduction in hospital admissions for acute respiratory diseases; and a reduction in regional healthcare costs.

From the point of view of the local (and regional) health care system, the traditional long-term care of patients like those enrolled in the ARIA service is very expensive, as patients with these morbidities frequently need hospitalisation in intensive care settings for long periods.

For example, the hospitalisation costs in the event of acute respiratory failure amount to €300 per day at the Pulmonology Unit in Santa Maria Nuova General Hospital at Reggio Emilia, one of the two local hospitals involved in ARIA services provision, and to €2,000 per day in an Intensive Care Unit (see also Vezzani, 2013). The average annual cost per patient involved in the ARIA case (including telecare services and house visits by the respiratory physiotherapist) amounts to only about €1,200 per year. In other words, the annual cost of the ARIA service per patient is less than the cost of one day in the intensive care unit or equivalent to the cost of four days in a pulmonary unit. If we consider that during the six years of implementation, a significant reduction in hospitalisations in intensive care units or the pulmonology unit has been achieved by the ARIA intervention (compared with hospitalisations for similar patients not taking part in the initiative), the leaders of the initiative have estimated an average savings of €12,000 per patient-year. It can therefore be assumed that substantial savings for regional health care can be achieved, especially if larger numbers of highly fragile patients were cared for in their own homes. However, these savings are merely hypothetical at the moment and would require structural changes to the traditional health care system in the province.

## **2.3 Drivers and Barriers**

Although ARIA service implementation is currently rather limited, bearing in mind the low number of patients involved, the following drivers have been identified.

Firstly, **the local hospitals and the local health unit have been strongly committed** to the ARIA initiative since its inception in early 2008. The promoter and lead organisation of the initiative was the General Hospital of Reggio-Emilia and more specifically, its Pulmonology Unit, both of which have played an active role in engaging all local health actors involved in the care process. However, beyond this leadership, it is important to emphasise that only with the direct involvement of the local health unit responsible for the management of the GPs, and the health professionals responsible for home care, was it possible to conceive and deploy the initiative. Together, these actors defined the ARIA home-care management process and the emergency risk procedure that is currently used

by patients, families and care professionals. These procedures allow the prompt assessment and communication of risk symptoms to the telecare operator. The role of the Regional Health Unit is currently rather limited, which underlines the local characteristics of the initiative.

Secondly, the **direct involvement of the patients, caregivers, family members and care professionals** has also been identified as a key driver. These individuals have been actively involved in the continuous monitoring of acute episodes to ensure prompt detection of possible worsening conditions of the patients and the need for hospitalisation. To achieve this, the pulmonologists involved in the initiative have set up special training procedures that empower patients, caregivers, and family members to detect and communicate risk symptoms promptly to the telecare operators, or that allow family members and care givers to provide immediate assistance to the patients where possible. They also trained patients in self-medication.

Lastly, the technology itself has been perceived as a driver. The use of **cutting-edge telecare systems** allows continuous monitoring in order to detect any worsening in the condition of patients. All the individuals involved in the initiative trust the system and feel confident in its use.

ARIA deployment has also been hampered by the following factors, which could be identified as the main **barriers**.

Firstly, there was a **lack of engagement of stakeholders in the implementation process, in terms of a shared vision and ownership of the service delivery process**.

This is an important barrier to wider deployment, which arises from the lack of strong vertical integration among primary care providers, social care organisations and secondary care units, beyond the initial care settings where ARIA has been implemented. In other words, as long as the service is limited to a small number of well-selected and committed health care professionals who provide the services on a voluntary basis, the reference organisations (e.g. local hospitals and local health care unit) fully support the delivery process. However, scaling-up the service would require that most of the health care professionals involved in the “traditional” care process agree with the new way of service delivery. This could induce possible resistance to change that in turn could hinder the diffusion of the process throughout region or province. This lack of engagement is closely related to the **level of integration between health and social care**. The services currently require vertical integration of primary and secondary care and are provided to a limited number of patients only. However, in the medium/long-term, wider uptake of the service would require an improvement of the overall quality of home care for patients and their families, and at the same time economic savings for the whole care system. These two goals, however, can be only be attained through stronger integration of health and social care. The current separation of political and economic responsibilities among health and social governmental departments could prove an obstacle to the realisation of the full potential of the initiative.

Secondly, **some difficulties with respect to recruitment and training of professionals and non-professionals care givers** could constitute an important obstacle to the scaling-up of the service and the sustainability of the initiative. In addition, it is worth mentioning the resistance to adopting the services and the technology by patients who have reached a certain age or have a level of disability that results in low technological readiness, and their families.

Lastly **incentives schemes** and **investment cost of the services** are recognised as inhibitors of the initiative. Currently, the few health care professionals involved in the initiative provide these services on a voluntary basis. However, the provision of telecare assistance to a larger number of patients by more primary and secondary care professionals would require a re-design of the reimbursement scheme to make it more outcome-oriented. Furthermore, the local hospitals would have to purchase a huge quantity of monitoring equipment (e.g. pulsoximeter) if the service were scaled up for more patients. This could be a significant barrier to the take-up of the service. Moreover, the services require that a telecare operator is contracted to gather health-related information from patients. This additional cost represents a further obstacle to the diffusion of the service at hospital level, since hospitals cannot take advantage of the generated savings (see Section 2.2) until reimbursement schemes are modified (see Section 2.8).

## **2.4 Organisation, health professional and patients**

Not only patients, their families and caregivers play an active role in the ARIA initiative. Currently it also involves specialists from the hospitals; general practitioners and nurses from primary care; home care professionals and telecare providers. In short/medium-term, local health hospitals and health units involved in the initiative are considering the extension of the services to involve neurologists and specialists in neuro-rehabilitation processes.

**Pulmonologists at the local hospitals** act as the gateway for the service. They select patients from those they have attended in their intensive care units. They also provide training to patients, their families and caregivers. Furthermore, they are in charge of defining an initial emergency admission risk profile for each patient and communicating updates to the telecare operators on the basis of patients' evolving health conditions. Lastly, they coordinate emergency interventions by the various actors involved in the care process according to how severe the risk episode is.

**GPs, nurses and professional carers in general, and chest physiotherapists** provide home care services following the care pathways established in close collaboration with the specialists.

The **Telecare provider** is in charge of patient health data, which is collected either by daily phone calls to the patients, relatives and caregivers or by daily automatic registration of pulse oximeter data. The telecare provider is then responsible for elaborating the evidence collected and communicating the patients' risk levels to the pulmonologists.

**Patients, their relatives and caregivers** play an active role in the daily monitoring of patients' vital signs and disease symptoms. They also give patients their medication and provide first-aid measures. Patients, relatives and caregivers therefore attend educational meetings at the hospital in order to learn how to register respiratory signs and symptoms. Each patient is given a clinical respiratory 10-item questionnaire and equipped with a pulse oximeter and a modem for the transmission of data to a telecare operator, who is in charge of alerting the pulmonologist in case of early signs of symptom deterioration.

## **2.5 Information and Communication Technologies**

The ARIA initiative makes use of relatively simple information and communication technology that comprises a pulse oximeter which is used to register daily the health condition of the patient from home and a modem for the transfer of the data to the telecare provider database for further handling. Patient data is currently only registered in

the telecare provider database and no integration with the hospital information system of the two local hospitals involved in the services is foreseen. However, the pulmonologists have web access to the database to consult the data and revise the patients' risk profiles according to their evolving health condition.

The system is not integrated within the regional health information system and the patient data and risk profiles are not automatically updated in the relevant GP's patient health care records. In the future, and provided that the service is taken up more widely, the data collected by the telecare provider will be shared through the regional hospital information system and recorded in patients' health care records managed by the hospital information system, and in patients' Electronic Health Records. These records will be available to all the actors in the process.

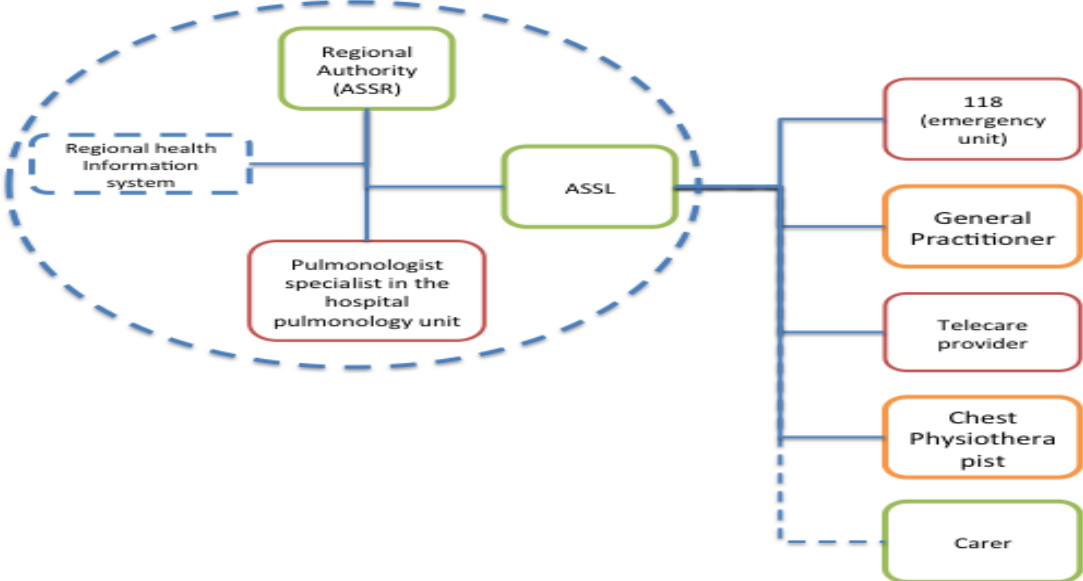
Communication between the telecare operator and the pulmonology units of the local hospitals about patients at low risk happens through daily e-mails. Situations that require a prompt decision by the pulmonologists are communicated over the phone at any time.

**2.6 Governance**

Despite the strong operational coordination described in the organisational process, the key actors governing the service are quite independent from each other. GPs and telecare operators do not depend on the local hospital that is responsible for the whole service delivery. This shows the clear separation of organisational responsibility for the services that rests with the pulmonology units of the two hospitals, and the administrative and contractual responsibility that rests with the local health trust as part of the regional health care authority.

This constitutes an important element that could justify the difficulties in re-designing the reimbursement contracts to align them with the Integrated Care service provided. The governance structure of the ARIA initiative is described in the following figure:

**Figure 2 Governance structure of the case study: ARIA example**



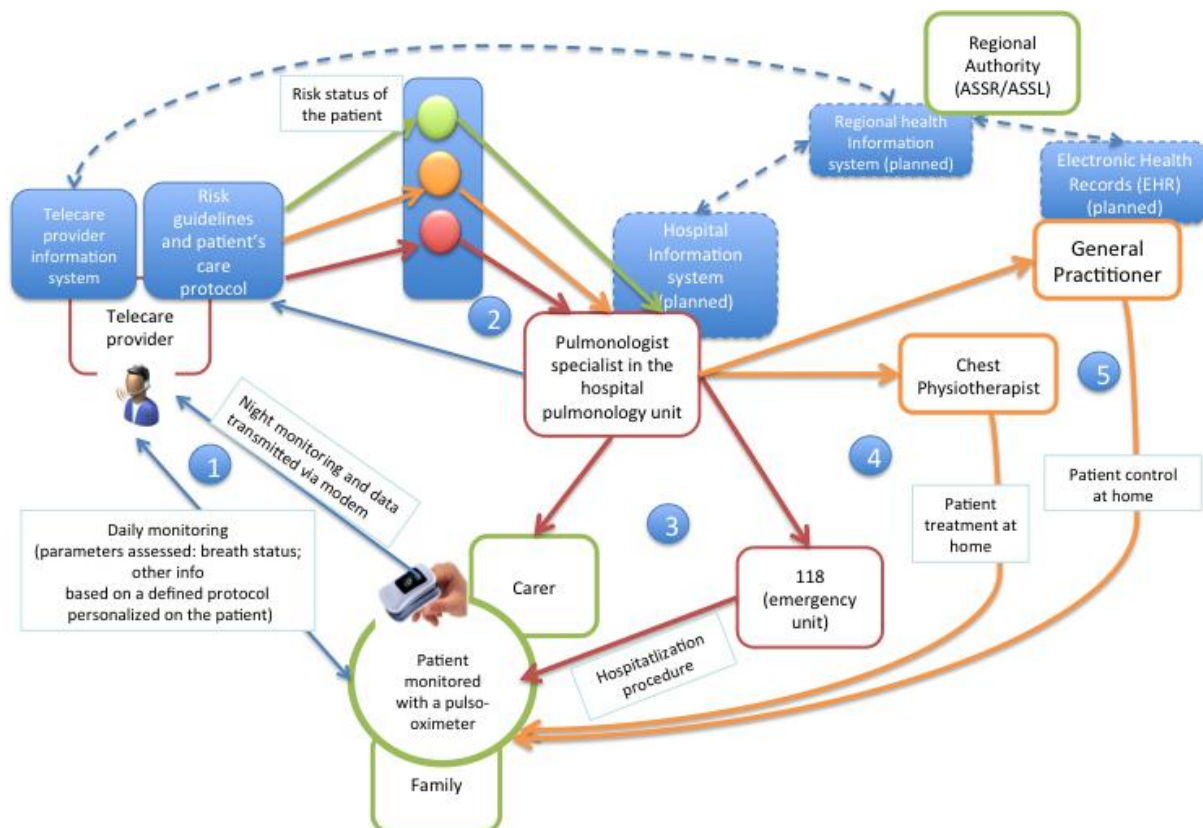
Source: Authors elaboration

## 2.7 Organisational processes

As noted earlier, ARIA targets patients suffering from acute respiratory impairment in neuro-muscular, neurological and rib cage diseases. The service aims to reduce hospitalisation and enable these patients to stay at home and maintain a higher level of social and work interaction. Other than the patient who is at the centre of the system, the main actors of the service are the pulmonologists who work in the pulmonology care unit of the hospitals where the patient is treated. They define and revise the patients' risk profiles, which serve as a reference for the telecare provider. The latter has to take these profiles and the symptoms of the disease into account when monitoring the patients' health conditions, and to send the emergency alerts back to the pulmonology units. In the ARIA service, the pulmonologists are also responsible for the patients' care protocols, which are personalised for each patient and followed by all actors providing any service within the care process.

The following figure shows how the different actors interact with each other and with the patient, and how ICT is used to provide the service.

**Figure 3 Organisational processes and ICT integration of the case study: ARIA example**



Source: Authors elaboration

Five sub-processes of care can be defined within the ARIA initiative:

- **Sub-process number 1** represents the interaction between the patient cared for at home by his relatives, the care staff and the telecare provider. The patient is monitored daily by means of a pulso oximeter. The data is transmitted to the telecare provider via a modem and constitutes the first signal for raising an alert in line with the personalised risk protocol. At the same time, the telecare provider



guarantees direct contact with the patient, the relatives, and the care professionals through a phone operator, strictly following the care protocol of a patient as defined by the specialist. The phone calls usually take place at least once a day and allow the telecare provider to gather a different set of information that helps define the level of risk for the patient.

- **Sub-process number 2** describes the interaction between the telecare provider and the pulmonologist. It is organised in two ways:
  - a. The pulmonologist periodically updates the risk guidelines and the care protocol of patients in accordance with the information received from the telecare provider. The pulmonologists can also monitor patient data by means of a personal password that allows him or her to enter the database of the telecare provider.
  - b. The telecare operator alerts the pulmonologist on the basis of the risk guidelines and the care protocol of each assisted patient.
- **Sub-process number 3** describes the “red alert process” and outlines how patients are helped when they face a high risk of respiratory blockage and quick hospitalisation is required. In these cases, the pulmonologist organises, often in agreement with the respective GP, the hospital admission process and the care of the patient, and at the same time helps the relatives or caregivers over the phone with first aid measures to apply to the patient.
- **Sub-process number 4** describes the “orange alert process” for when the patient is in need of help, but not at immediate risk of respiratory blockage. In this case, the pulmonologist alerts the physiotherapist and/or the GP to organise a home visit for a specific therapy.
- **Sub-process number 5** is merely about the recording of patient data in the telecare provider’s database, which is subsequently made available to the pulmonologist for consultation.

It is worth mentioning that the continuous interaction among the patient and telecare operator, and operator and pulmonologist effectively prevent avoidable hospital admissions, which implies important savings for the health care system. This interaction optimises the home visits undertaken by physiotherapist and/or GPs and allows better allocation of their working time. Furthermore, the continuous monitoring of the patient’s risk of a respiratory blockage allows a more effective emergency service and ultimately reduces the risk of death. Lastly, it also allows the pulmonary specialist to better plan the periodic substitution of the tracheostomy tube at the patient's home.

## **2.8 Reimbursement model and economic flow**

Reimbursement for GPs and the other health care providers of the Emilia-Romagna region is based on a capitation model. Health care professionals receive a fixed amount of money based on standard performance parameters agreed upon at national level, and partially adjusted by the Local Health Unit.

In addition, GPs receive a small sum as a coordination fee, which is granted with the participation in the ARIA initiative and registered as special activity, so it should be considered a fixed component of their income. However, it was commonly agreed among the experts consulted that there is a lack of innovation in the reimbursement model, which is mainly due to a lack of common outcome-oriented incentive schemes for the care managers and health care professionals involved.



### 3 Transferability

Given the results achieved by the ARIA initiative so far, its diffusion to all pulmonology and neurology wards in the Emilia-Romagna Region and its extension to patients with amyotrophic lateral sclerosis, quadriplegia and Gold stage IV COPD is being envisaged. From an organisational perspective, the ARIA case is highly transferable to other local health units in the Emilia-Romagna region, at least for the pathologies covered by its current version. This is because the home care process flow is very well-defined, and the risk alert procedure highly consolidated after six years of implementation. These considerations can be extended to all the Italian regional health care systems and to some extent to all the EU Member States. However, the transfer cost to other contexts could constitute an important obstacle to the transferability of the ARIA initiative.

The most favourable contexts for its transfer can be summarised as follows:

- **Regional or local contexts where telecare providers are already present.** Where the services of telecare providers are already being offered, ARIA should constitute a marginal cost for the health authority, which would be responsible for the contract with the telecare organisation.
- **Regional or local contexts where a re-organisation of the “traditional” health care system to a more integrated one is already underway.** In these contexts, it should be easy to turn the savings gained from the implementation of the ARIA service into benefits for the whole health care system, and guarantee the long-term sustainability of the services without creating additional costs.
- **Regional or local contexts where health care services are provided by private organisations.** Here, the greater flexibility of the organisation in charge of the health care service provision and its capability to immediately capitalise the savings should make it easy to establish shared-benefits agreements with all the health actors involved in the process and to implement the ARIA service even more effectively.

Beyond technical and economic considerations, the most critical success factors for the transferability of the ARIA service is a favourable institutional and cultural context, and the presence of a common strategic and operational management of local health and socio-sanitary systems at local level.

### 4 Conclusions

The ARIA case in the Reggio Emilia province in Italy is a patient-centred integrated care service which targets patients with chronic respiratory failure. The initiative was initiated in 2008, and currently cares for 20 patients who are being treated by the pulmonology units of two local hospitals of the province, and also GPs and physiotherapists at the Local Health Units. The promoters of the ARIA initiative were the Arcispedale S.Maria Nuova - IRCCS of Reggio Emilia and S. Sebastiano Hospital Rehabilitation Unit. Both had the knowledge, capability and vision to start the initiative and motivate the other main players. One of the main objectives of the initiative is to prevent emergency situations that would require hospital admission to intensive or emergency hospital units.

To this end, two local hospitals and the local Health Unit of the region developed a telecare service which focuses on patients, their families and caregivers. It enables the monitoring

of patients' health and risk status at home. These data are evaluated in accordance with a predefined health risk protocol established by the pulmonologists and an emergency admission risk evaluation procedure that is followed by all the local actors involved in the care process.

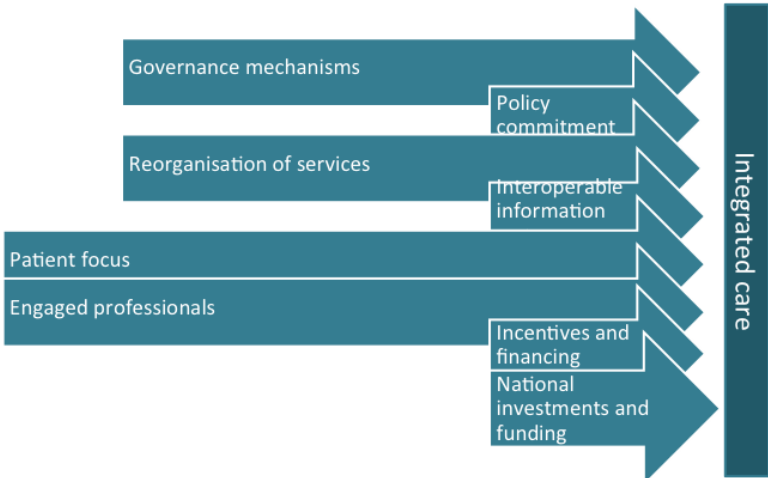
The pulmonologists at the 2 local hospitals act as gateways to the ARIA services. Specific inclusion criteria related to the patients' and their relatives' motivation and willingness to cooperate drive the selection process.

The ARIA initiative would have a significant impact on the local health system and on the whole regional health system if it were implemented more widely. Impact measures have shown its benefits in an integrated care context. Among these is a significant reduction in the cost of service provision to individual patients. It can therefore be assumed that substantial savings for the regional health expenditure could be achieved, especially for a large number of highly-fragile patients who receive home care. However, these savings are only hypothetical for the moment, unless structural changes within the traditional health care system are implemented. In order to exploit the full potential of the ARIA initiative, the following barriers have to be tackled:

- Lack of engagement of stakeholders in the implementation process, in terms of a shared vision and ownership of the service delivery process.
- Difficulties with respect to recruitment and training of professionals and non-professionals caregivers.
- Lack of incentives schemes that take into account the additional responsibilities of the actors.
- Integration between health and social care, currently limited to vertical integration of primary and secondary care and for a small number of patients.
- High investment cost of the service.

These barriers have been partly addressed by the facilitators displayed in the following figure.

**Figure 5 ARIA Integrated care facilitators**



The two main facilitators are patient focus and engagement of health care professionals. Patient engagement, together with the engagement of family members and caregivers is

the main driver to implementing the care process effectively. In fact, only daily monitoring and constant assessment of the symptoms by the patients themselves, family members or carers can guarantee the early detection of the need for emergency hospital admission on a cost-effective basis. However, these services could not have been developed without the strong commitment of the pulmonologists and GPs who are voluntarily involved in the initiative.

Another main driver is the governance mechanism which steers the ARIA initiative and consists of the two local hospitals together with the Local Health Unit. The re-organisation of the service, including the definition of a risk alert procedure personalised for each patient on the basis of the severity of their disease, and the definition of a recovery procedure contributed to the importance of this facilitator.

Currently, none of the other key facilitators appears to be relevant in the ARIA case. However, the service is still on limited trial and other facilitators could prove important in the event of wider uptake. Policy commitment, incentives and financing would then be crucial. Lastly, interoperability issues do not appear to be of importance at the moment. However, in a wider take up scenario, the integration of patient data gathered at home and the data from the hospital information system should be considered, as well as the automatic registration of updates to the patient risk profile in the patient's health record managed by the GP. All these types of data integration should be supported by the regional health information system.

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