

Management of an Integrated Care Pathways (ICPs): an Italian Study

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Abstract

Background: The World Health Organization defines chronic disease as long duration and generally slow progression disease, with a continuous treatment over decades. The management of such diseases is complex, as the aim of treatment is not cure, but maintenance of a good quality of life and prevention of possible complications. Cardiovascular diseases are the leading cause of death worldwide (18 million deaths per year) and hypertension remains the largest preventable cause of cardiovascular disease globally. In Italy, the prevalence of hypertension was of 31.1%. The goal of antihypertensive therapy should be to reduce blood pressure back to physiological levels or to a range of values identified as targets. The National Chronicity Plan identifies an Integrated Care Pathways (ICPs) for several acute or chronic conditions, at different stages of disease and care levels, in order to optimize the healthcare processes.

The aim of the present work was to perform a cost-utility analysis of management models of Hypertension ICPs to assist frail patients with hypertension following the National Health Service (NHS) guidelines in order to reduce morbidity and mortality rates. In addition, the paper emphasizes the importance of e-Health technologies for the implementation of chronic care management models based on the Chronic Care Model (CCM).

Materials and Methods: The management of the health needs of frail patients in a Healthcare Local Authority finds an effective tool in the Chronic Care Model, involving the analysis of the epidemiological context. Hypertension Integrated Care Pathways (ICPs) includes a series of first-level laboratory and instrumental tests necessary at the beginning of the intake, for accurate pathology assessment, and annually for adequate surveillance of the hypertensive patient. For the cost-utility analysis were investigated the flows of pharmaceutical expenditure for cardiovascular drugs and the measurement of the outcomes of the patients assisted by the Hypertension ICPs.

Results: The average cost of a patient included in the ICPs for hypertension is 1636.21 euros/year, reduced to 1345 euros/year using telemedicine follow-up. The data collected by Rome Healthcare Local Authority on 2143 enrolled patients allow us to measure both the effectiveness of prevention and the monitoring of adherence to therapy and thus the

maintenance of hematochemical and instrumental tests in a range of compensation such that it is possible to impact on the outcomes, resulting in the 21% reduction in the expected mortality and the 45 % reduction in avoidable mortality due to cerebrovascular accidents, with related impact on potential disability. It was also estimated that patients included in ICPs and followed by telemedicine compared to outpatient care, obtained a 25% reduction in morbidity, with greater adherence to therapy and better empowerment results. The patients enrolled in the ICPs who accessed the Emergency Department (ED) or hospitalization presented adherence to therapy in 85% of cases and a change in lifestyle habits in 68%, compared to the population not enrolled in the ICPs, which presented a 56% adherence to therapy and a change in lifestyle habits of 38%.

Conclusions: The performed data analysis allows to standardize an average cost and to evaluate the impact of primary and secondary prevention on the costs of hospitalizations associated with a lack of effective treatment management, and e-Health tools lead to a positive impact on adherence to therapy.

Background

The World Health Organization (WHO) defines chronic disease as "any disease of long duration and generally slow progression" that therefore requires "continuous treatment over a period of time from years to decades" (1).

The WHO characterizes chronic diseases as a set of heterogeneous pathological conditions with multifactorial etiology, linked to complex risk factors resulting from the interplay of genetic, environmental and socio-economic determinants, and influencing access to care.

The management of such diseases is complex, as the aim of treatment is not to cure, but to maintain a good quality of life and prevent the occurrence of complications.

In fact, chronic diseases are characterized by a long pathogenetic latency, gradual onset, long duration, slow progression, leading towards progressive aggravation and requiring a continuous and sustained treatment.

Cardiovascular diseases are the leading cause of death worldwide with about 18 million deaths per year, accounting for about 30 percent of the total (2); among these, hypertension remains the largest preventable cause of cardiovascular disease globally (3).

In Italy, in 2019, the prevalence of hypertension was of 31.1%, the prevalence of ischemic heart disease and ischemic stroke were respectively of 4.4% and 4.8%, while for diabetes and COPD a prevalence of 5.6% was registered (4).

In this scenario of chronicization of pathology among the population, the Italian Ministry of Health issued on 15th September 2016, the National Plan of Chronicity with the aim of "harmonizing on a national level the activities in the field of chronicity [...] which, in accordance with the availability of financial, human and structural resources, identifies a common strategic design intended to promote interventions based on an holistic approach, centered on the individual and oriented on a better organization of services and a full empowerment of all actors of care."

The National Chronicity Plan identifies, accordingly with the categories of risk and level of care complexity of individuals, personalized care pathways and related examinations, in consideration of the management of costs for tailored primary and secondary prevention interventions. These clinical pathways - Integrated Care Pathways (ICPs) - for several acute

or chronic conditions, at different stages of disease and care levels (local, hospital and ICPs) are intended to optimize the healthcare processes, representing a precious tool for structuring an effective integration between different professionals and facilities (1).

In addition, the paper emphasizes the importance of digital health (eHealth) technologies for the implementation of chronic care management models based on the Chronic Care Model (CCM).

The aim of the present work was to perform a cost-utility analysis of management models of diagnostic therapeutic care pathways to assist frail patients with hypertension following the National Health Service (NHS) guidelines in order to reduce morbidity and mortality rates.

Materials and Methods

The management of the health needs of frail patients in a Healthcare Local Authority finds an effective tool in the Chronic Care Model that allows:

- Patient empowerment, intended as the ability to "cope" with the new dimension imposed by chronicity and the development of the ability to self-manage (self-care);
- Multidimensional and team approach, as an alternative to the previous univocal "doctor-patient" relationship;
- Shared development of integrated, personalized and dynamic pathways and overcoming assistance based on occasional and fragmented provision of services;
- proactive and empathic intake and not just a caring response to the onset of health needs.

The implementation of the Chronic Care Model involves the analysis of the epidemiological context that identifies chronic non-communicable diseases as accounting for approximately 90 percent of deaths in the WHO European Region (5).

The Integrated Care Pathways (ICPs) for arterial hypertension implemented in the Lazio region pursues the aim of reducing morbidity and mortality linked to hypertension, through pressure control in the least invasive way possible. The goal of antihypertensive therapy should be to reduce blood pressure back to physiological levels or to a range of values identified as targets. The assessment of the achievement of therapeutic goals should be performed by the Primary Care Physician, who evaluates whether the pressure targets have been achieved within 3 months since the beginning of therapy, after 3 months, whether side effects have occurred, and whether the hypertension is difficult to treat or is resistant (3 drugs or more).

The Integrated Care Pathways (ICPSs) intake includes a series of first-level laboratory and instrumental tests to be carried out both at the beginning of the intake, for accurate pathology assessment, and annually for adequate surveillance of the hypertensive patient.

In particular, these examinations include: fasting blood glucose, LDL, HDL and total cholesterol, triglycerides, potassium, sodium, uricemia, blood creatinine, creatinine clearance, CBC, urinalysis, electrocardiogram, fundus oculi examination. According to cardiovascular risk and personal medical history (presence/absence of comorbidities),

instrumental examinations are also planned: echocardiography, echocardiography-Doppler of neck vessels, quantitative proteinuria, ankle-arm pressure index.

For the cost-utility analysis, the flows of pharmaceutical expenditure for cardiovascular drugs and the measurement of the outcomes of the patients assisted by the ICPs were taken into account and compared with the entire assisted population with hypertension.

Were measured moreover number of admissions to the ED, the number of complications, number of hospitalization of the ICPs patients compared with the remaining population.

Results

The annual cost of diagnostic and instrumental examinations for each patient enrolled in Lazio, and thus also in Rome Healthcare Local Authority, is about 136.21 euros, while the cost of cardiovascular drugs in Italy was about 3,318 million euros, which is 14.1 percent of total public budget with a total per capita charge for these drugs of 56.0 euros (4). Costs for specialist care and Primary Care Physicians have been estimate around 300 euros/year per individual patient. Therefore, the average cost of a patient included in the ICPs for hypertension is 1636.21 euros/year, which have been reduce to 1345 euros/year when telemedicine follow-up is used.

The data collected by Rome Healthcare Local Authority on 2143 enrolled patients allow us to measure both the effectiveness of prevention and the monitoring of adherence to therapy and thus the maintenance of hematochemical and instrumental tests in a range of compensation such that it is possible to impact on the outcomes.

The analysis has shown in the 21 percent reduction in the expected mortality of the hypertension patient population and the 45 percent reduction in avoidable mortality due to cerebrovascular accidents, with related impact on potential disability.

In terms of risk reduction, we also noted the following results in primary and secondary prevention:

Intervention	Primary prevention Risk Reduction	Secondary prevention Relative Risk (IC 95%)
Physical activity greater than 8000 steps per day		0.78 (0.73-0.85)
Reduction of body weight at a BMI 18.5 between 24.9	45%	
Abolition of smoking	50% (after a year)	
Correction of hyperlipidemia (statin treatment)	20-30%	0.81 (0.75-0.87)
Correction of arterial hypertension	38%	0.72 (0.61-0.85)

It was also estimated that patients in charge of the ICPs and followed by telemedicine compared to outpatient care, obtained a further 25% reduction in morbidity, recording greater adherence to therapy with better empowerment results.

The patients enrolled in the ICPs who accessed the Emergency Department (ED) or hospitalization presented adherence to therapy in 85% of cases and a change in lifestyle habits in 68%,.

The population affected by arterial hypertension and admitted to hospitalization but not enrolled in the ICPs, presented a 56% adherence to therapy and a complete change in lifestyle habits of 38%.

Discussion

The data analysis was carried out on patients affected only by arterial hypertension, even if complicated, and 38% of the population enrolled had at least one other chronic pathology (diabetes) and 17% also had COPD.

However, the cost calculations were performed only on the consumption of drugs and services for arterial hypertension, while the utility analysis measured the impact on lifestyle habits (nutrition, smoking, sedentary lifestyle, alcohol) and on access to the emergency room, hospital and to general practitioner.

What has been measured allows to state that it is possible to estimate the cost for the expense of an effective taking care of a patient with hypertension and that the systematic monitoring of hematochemical and instrumental parameters saves on hospital expenditure, with a potential amount of 28.7 percent of hospitalizations in medicine ward for hypertension-related complications, taking into account an average stay of 16.5 days at a cost of 709.72 euros per day and a reduction in ICU admissions of 39.6 percent at a cost of 1680.59 euros per day for an average stay of 11.7 days.

Conclusions

The management of the health needs of a chronic patient leads to a consistent impact on quality of life, morbidity and mortality variables.

The performed data analysis allows to standardize an average cost but also to evaluate the impact of primary and secondary prevention on the costs of hospitalizations associated with a lack of effective treatment management.

E-health tools have a positive impact on adherence to therapy, which is one of the main components of the lack of effectiveness of the proposed treatment.

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