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Potential users' preferences towards cardiac telemedicine: A discrete choice experiment investigation in Sardinia

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ABSTRACT

Background: Potential users' preferences for telemedicine services directed to cardio-vascular diseases are investigated applying a discrete choice experiment (DCE). Given the potential of telemedicine to minimize costs without reducing overall efficiency, assessing preferences for these types of services represents a priority for policy makers. This is especially true for those pathologies that absorb a relatively high quota of total health expenditure. The empirical setting is Sardinia (Italy) because of its insularity and the underdeveloped internal transport network. Telemedicine is likely to mitigate distance between healthcare providers and final users.

Methods: A survey conducted between February and May 2013 was administered to a selected Sardinian population older than 18 (potential users) through face-to-face interviews. A discrete choice experiment was implemented and four attributes (i.e. scanning mode, location, waiting list and cost) assess in what measure these influence potential users' utility by using a random parameter modelling with heterogeneity (RPH).

Results: The empirical findings, based on 2000 interviews, highlight that potential users are not very open to the application of telemedicine services in cardiology, mostly preferring the *intromoenia* (visit at the hospital) and private system. Besides, remarkable individual heterogeneity has been found.

Conclusions: Potential users see the implementation of new technologies in healthcare with a certain caution. However, the relatively higher preferences towards services provided at their own municipality suggests that there is ground to explore further the implementation of telemedicine services through the family doctor and local pharmacy.

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Introduction

In Italy, 10% of the total health expenditure is devoted to circulatory diseases and denotes the largest share for hospital stays and pharmaceuticals spending, even if the latter had seen a consistent reduction thanks to the introduction of the "generic market" [1,2]. Although several health indicators (e.g. life expectancy, obesity rates, doctors per capita [3]) and quality of care are still above OECD average, the country lags behind in terms of long term care and prevention given the high quota of the aging population. Although telemedicine may help in facilitating a real time connection

between the patient and health care services, an appropriate investigation on needs and preferences of potential users is required.

This paper explores potential users' preferences for telemedicine and their evaluation on public policy directed to enhance cardiologic services. These objectives are pursued by applying a discrete choice experiment (DCE) to explore potential users' willingness to accept new diagnostics for heart problems. The empirical setting is the region of Sardinia (Italy). The rising incidence of cardiovascular diseases – due to unhealthy habits, obesity and an increased life expectancy – together with public sector financing constraints and costs reduction make this analysis relevant from an economic and policy perspective. Sardinia represents an interesting case study because of its insularity and underdeveloped internal transport network. In such a geographical setting, telemedicine may represent a way to mitigate distance between healthcare providers and final users.

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From an empirical perspective, a preliminary random parameter with heterogeneity (RPH) will assess the impact of four attributes (i.e. scanning mode, location, waiting list and cost) and in what measure these influence potential users' utility. Besides, a cluster RPH will assess the robustness of the previous analysis and will explore the attributes that mostly affect individuals' utility within the clusters. These steps of the investigation will provide a more comprehensive picture on potential users' preferences.

Background

One of the key objectives of the telemedicine action plan for 2012–2020 was to exploit the full potential of Information and Communication Technology (ICT) in improving quality and modes of provision of healthcare. This aim has remained mostly unmet in many EU countries [2,4,5]. The use of ICT has been widely supported by European policy makers, since it responds to the need of promoting a vision of citizen-centered health delivery systems, by increasing participation of patients in health decisions and strengthening the linkage between healthcare deliveries and end users [6]. Furthermore, the benefits of telemedicine extend to an improved efficiency and quality of healthcare, thus becoming a priority in the EU policy maker's agenda. Practitioners support an extensive use of telemedicine (e.g. promoting cooperation, information sharing, decision support and flexibility) especially for those with chronic conditions, thus improving the quality of care [2,7].

In a geographical setting, where reduced mobility and access to healthcare providers – due to distance to major urban centers and the lack of, or costly transportation – represent a major barrier to healthcare, telemedicine may help to ease the remoteness constraints, reducing travel costs and disadvantages, such as mobility problems and the scarce availability of specialty healthcare providers [8–10]. Furthermore, telemedicine may represent a possible solution for an uneven distribution of healthcare specialists; this is particularly true in those sectors, such as cardiology, where an increased demand – due to the increased number of elderly people that has caused a higher incidence of chronic diseases – has not been offset with an adequate supply of healthcare specialists [11].

Systematic reviews have found consensus on the effectiveness of telemedicine devices in patients with chronic heart failure and coronary heart disease [12–16]. The benefits of telemedicine in cardiology include reduced mortality and number of hospital admissions, rationalized costs and improved practitioners' decision making [7].

The implementation of information technologies in healthcare has been explored from diverse perspectives that take into account users preferences in the case of adopting Electronic Health Record [17,18]. The economic literature provides a vast range of techniques to elicit consumer preferences. DCE applications are becoming popular in policy evaluation and many studies consider these tools as the most appropriate method in health services evaluation [19]. The elicited preferences techniques are generally applied to provide policy makers with useful directions in the decision process and for assessing the benefits provided by a specific healthcare scheme.

This methodology provides researchers the opportunity to collect comparable data, to understand individual trade-offs and identify benefits from services characteristics and at the same time provide a consumers' utility function [20,21]. Some studies adopt this method to study innovative health technologies and non-market goods [19,20] but also to elicit chronic pain patients' treatment preferences [22], hospital preferences and insured preferences for health system attributes [23]. By using a DCE, services and policies are described by their attributes. Respondents are

asked what they would prefer amongst a basket of goods/services [24]. Specifically, a DCE includes several scenarios (or alternatives), as combinations of a set of the selected attributes and associated levels, and respondents are asked to choose the most preferred options. The importance of each attribute can be estimated through models which handle observed and unobserved heterogeneity [25]. Moreover, DCE applications for policy analysis allows one to estimate how choice probabilities vary with changes in attributes or attribute levels.

The empirical investigation

The study context

The empirical application focuses on Sardinia (Italy), where the healthcare integrates the public National Healthcare Service (NHS) and private health services. Public healthcare is mainly supplied at the major urban centers (Cagliari and Sassari), with emergency and cardiologic rehabilitation units [26]. However, there is still a scarce availability of highly specialized cardiovascular healthcare and often users travel to the mainland for specific treatments. Hence, the Regional Plans of Prevention (PRP) 2010–2012 promote programs aimed at the prevention of cardiovascular diseases by raising awareness about risks related to incorrect lifestyle and involving medical and voluntary associations [27].

In Sardinia, healthcare expenditure is 9.8% of regional GDP. Healthcare expenditure in 2014 was equal to €3.23 billion (1,944 euro per capita), far above the national average and the similar Southern regions [28].

The island has one of the lowest inter-regional mobility index of 0.29, that is the ratio between the inflow and outflow rates, compared to an average of 0.43 in the south and 1.42 in the centre-north [29]. This index takes values larger than 1 when the Regional Healthcare System (RHS) is a net importer of patients from other RHS. The insularity condition represents an obstacle for patient mobility who has to rely on more expensive air and sea transport. Furthermore, an underdeveloped regional transport infrastructure limits public transport usage, preventing intra-regional mobility. In 2014, the percentage of people using public transport amounted to 15.3% [28].

The survey

The questionnaire contains three main sections: Section I, *The Health Expenditure* – within a 5-point Likert Scale from 1 = complete disagreement to 5 = complete agreement, respondents were asked to provide their view on several public policies aimed at reducing healthcare costs. Section II, *DCE (Analysis of Preferences on Cardiology telemedicine)*, contains 22 cards presented to the respondents to assess their preferences on Scenario B with respect to Scenario A (the status quo). This choice structure helped respondents to distinguish the most currently used health service, as a combination of the previous described levels, from the alternatives proposed under new policy scenarios that enhance telemedicine services. Section III, *interviewee's profile* – where socio-economic and demographic information such as gender, year of birth, employment status, marital status, income class, as well as whether they belong to the health sector were gathered.

The discrete choice experiment

In the DCE application, services are described by four attributes and four or five levels (Table 1) that help to understand potential users' preferences for telemedicine services. Hence, the set of attributes and levels were selected on the basis of the geographi-

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