

# **Home Telemonitoring of respiratory function in Cystic Fibrosis patients: economic evaluation and quality of life.**

S. Bella, F. Murgia and C. Cotognini

Cystic Fibrosis diagnosis and treatment Unit,

High specialization in continuity of care in  
chronic diseases

# Introduction

- In chronic lung disease, the continuous monitoring of clinical status, the detection and early treatment of respiratory complications are currently the main criteria guiding the treatment [1]. Early initiation of antibiotic therapy can prevent the development of serious complications perhaps using less invasive antibiotic therapy [2].
- In The Center for Cystic Fibrosis (CF) of Bambino Gesù Pediatric Hospital of Rome since 2001 the telehomecare (THC) has been activated in the follow-up of patients at home.

# Introduction

- In a previous study [3] we have investigated the possible role of THC in the follow-up of a group of patients with CF in detecting early stages of infectious pulmonary exacerbations. The study included 17 subjects (11 f, 6 m) with CF followed at home with THC in addition to conventional treatment, for a period of  $29.6 \text{ months} \pm 13.5$ . The age of entry in THC was  $15.74 \text{ years} \pm 5.8$ . As controls were enrolled 28 patients with CF (13 f, 15 m, age  $14.77 \pm 5.22$ ). The results indicate, in subjects with THC, a statistically significant reduction of hospital admissions and a tendency over time to the stability of lung function.

# Introduction

- In the present study we have attempted to quantify the real economic significance of using the monitoring of respiratory function on the scale of economic NHS, in order to find a balance between spending on health and health needs.

# Materials and Methods

- In our CF center, the activity of THC was initially performed using Oxitel equipment and since 2005 using Spirotel equipment supplied as “Home Vivitel Control Service” ([www.vivisol.it](http://www.vivisol.it)). Patients included in the program were followed and treated in the Day Hospital with the usual protocols of follow-up [4].

# Materials and Methods

- The calculation of the budget statement was made by examining the costs of medical equipment, medications used, the cost of housing, of a day hospital and of an outpatient visit. We considered as revenue the fees relating to admissions avoided through early detection of acute events and therefore to remaining free beds that the hospital could use for other patients

# Materials and Methods

- Simultaneously we administered to patients a questionnaire (sent via e-mail) with multiple answers, partly open, to confirm the level of satisfaction with this method and related matters. We used 3 categories of subjects, homogeneous for age and all chronic diseases: 1. CF patients who used the telemonitoring, 2. CF patients who did not use the remote home monitoring 3. 28 chronic non-CF patients who did not use the remote home monitoring. We tried to evaluate some parameters to which a market value does not match such as anxiety, pain, the expectation of well-being, using the method of individual "willingness to pay" (W.T.P.) [5].

# Results

- We recognized 136 pulmonary relapse episodes: 99 were treated at home by oral or i.v. antibiotic therapy (€ 379.833) and 37 by hospitalization (€ 150.405), with a total cost induced of € 530.238. Considering that, in absence of THC, all episodes would involve hospitalization, we compared the total cost of THC patients with the cost of 136 in-patients acutely hospitalized in the same period for chronic pathologies with similar DRG (€ 552.840).

# Results

- On the other hand, in THC treated patients, the 99 avoided hospitalizations needed the structure to perform as many admissions, with an income of € 422.916 that we considered a saving ( $€ 530.238 - € 422.916 = € 107.321,88$ ). The balance ( $€ 552.840 - € 107.321$ ) shows a total saving of € 445.519 (€ 89.103/year, € 5241/patient/year considering a 5 years period).

# Cost analysis

<u>services</u>	<u>n.</u>	<u>unit costs</u>	<u>€</u>
<u>home intravenous cycles n.</u>	<u>78</u>	<u>admission</u>	<u>4065</u>
<u>home oral cycles n.</u>	<u>21</u>	<u>D H</u>	<u>266</u>
<u>admissions</u>	<u>37</u>	<u>outpatient visit</u>	<u>16</u>
<u>Total critical events</u>	<u>136</u>	<u>home intravenous cycle</u>	<u>2027</u>
		<u>home oral cycle</u>	<u>283</u>
		<u>Vivitel monthly fee</u>	<u>210</u>

## **telemedicine +**

	<u>n</u>	<u>unit cost</u>	<u>total cost</u>
<u>admissions</u>	<u>37</u>	<u>4065</u>	<u>150405</u>
<u>intravenous cycles</u>	<u>78</u>	<u>2027</u>	<u>158106</u>
	<u>78</u>	<u>16</u>	<u>1248</u>
<u>oral cycles</u>	<u>21</u>	<u>283</u>	<u>5943</u>
	<u>21</u>	<u>16</u>	<u>336</u>
<u>fee 17 patients x 60 m</u>	<u>1020</u>	<u>210</u>	<u>214200</u>
<u>total costs</u>			<u>530238</u>

## **savings**

<u>revenue from use of beds</u>	<u>99</u>	<u>4065</u>	<u>402435</u>
<u>savings for travel expenses</u>	<u>99</u>	<u>59.1</u>	<u>5850</u>
<u>working days</u>	<u>99</u>	<u>147.78</u>	<u>14630</u>
<u>total savings</u>			<u>422916</u>

## **Actual cost (cost - saving)**

107321

## **telemedicine -**

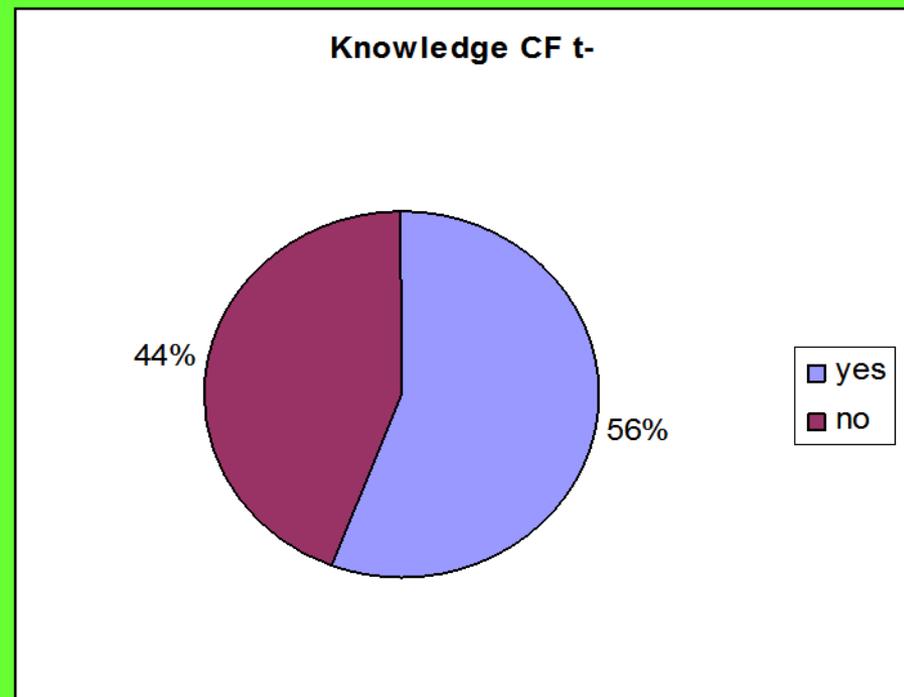
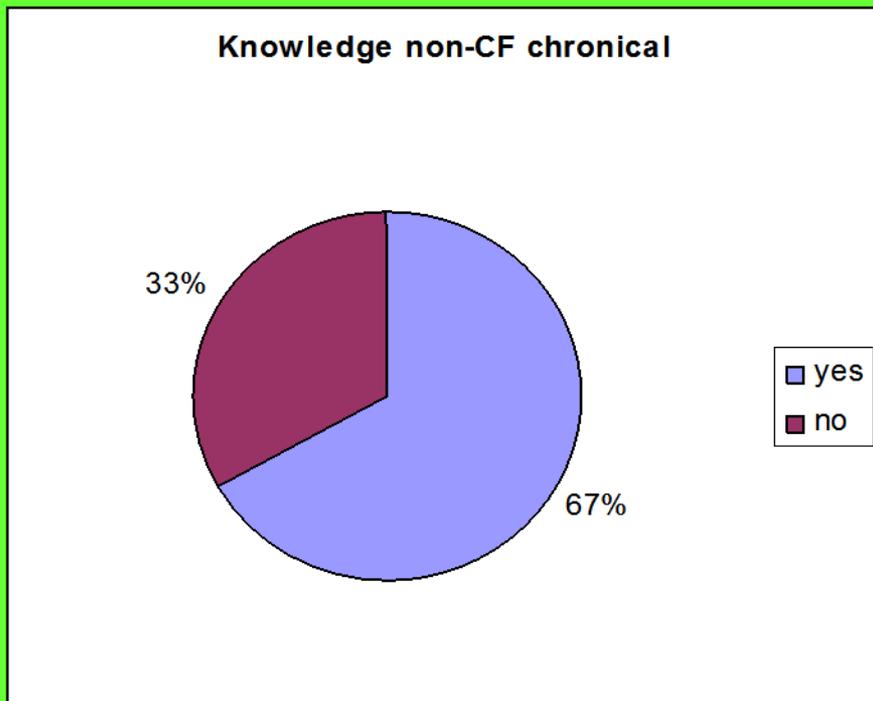
<u>admissions</u>	<u>136</u>	<u>4065</u>	<u>552840</u>
<u>total savings (admissions - actual cost)</u>			<u>445518</u>
<u>annual savings (total savings / 5)</u>			<u>89103</u>
<u>Annual Savings / patient</u>	<u>17</u>		<u>5241</u>

# Discussion

- The annual savings achieved through home telemedicine in the management of patients with CF is not very relevant, especially in view of the national average expenditure per patient. It should however be noted that these savings are obtained in front of improved levels of care and satisfaction levels of the subjects.

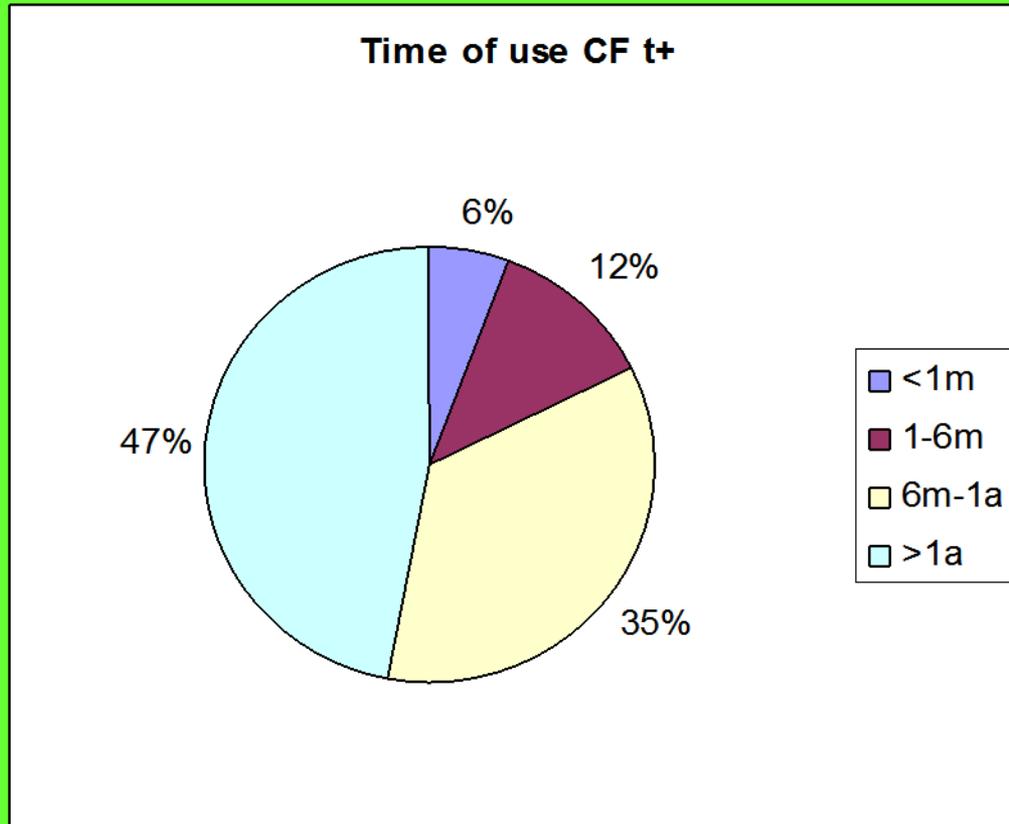
# Results

## Knowledge of the methodology by patients



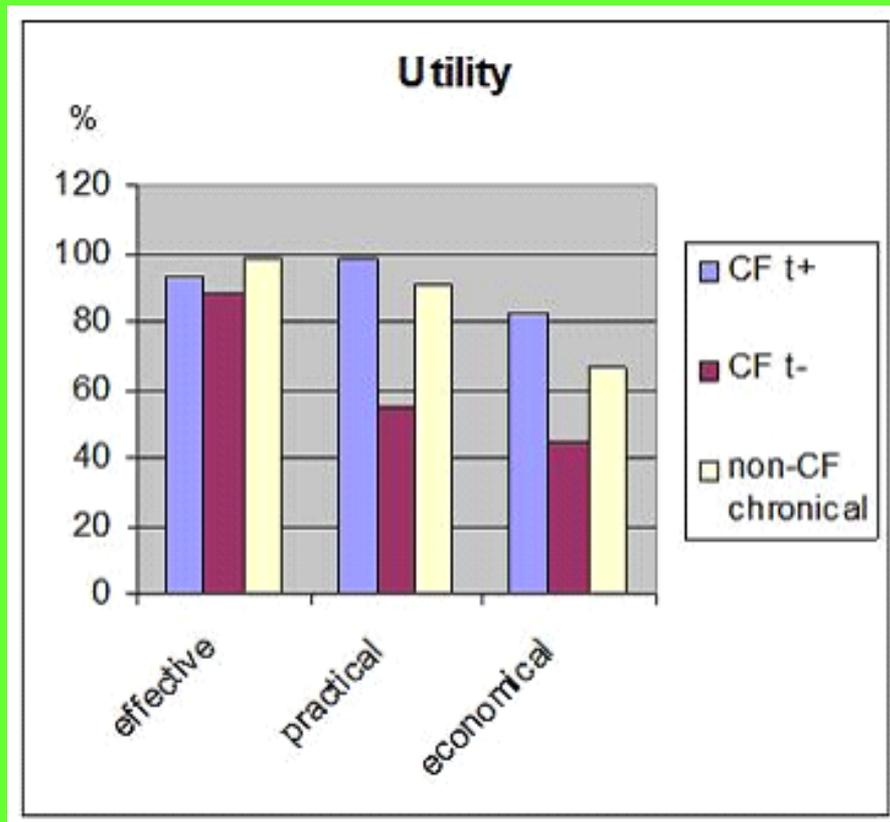
# Results

% distribution of CF patients based on time of use of THC



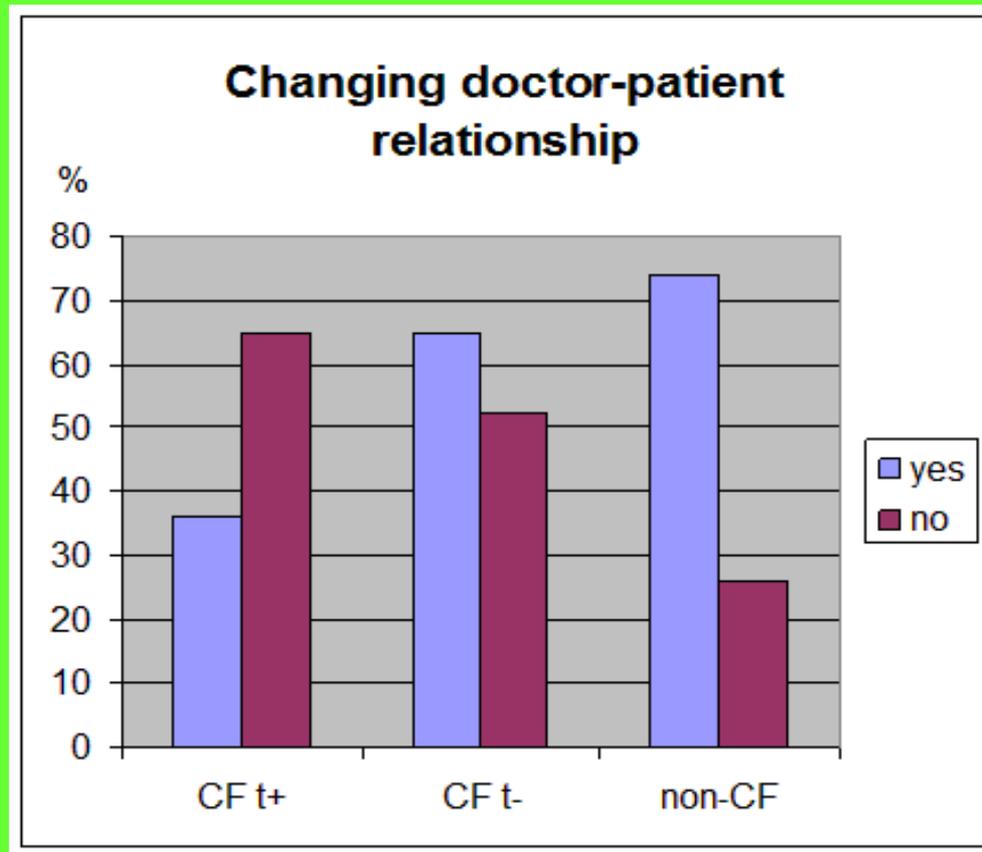
# Results

Opinion of patients on the utility of THC:  
percentage of positive responses



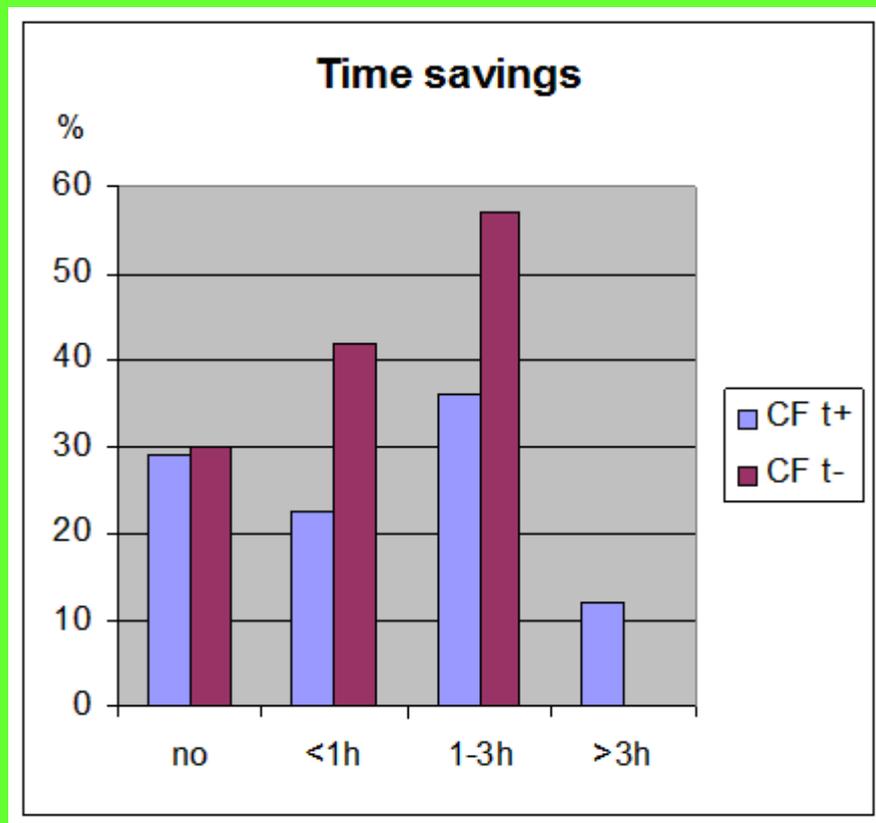
# Results

Opinion on the change of doctor-patient relationship: percentage of positive responses



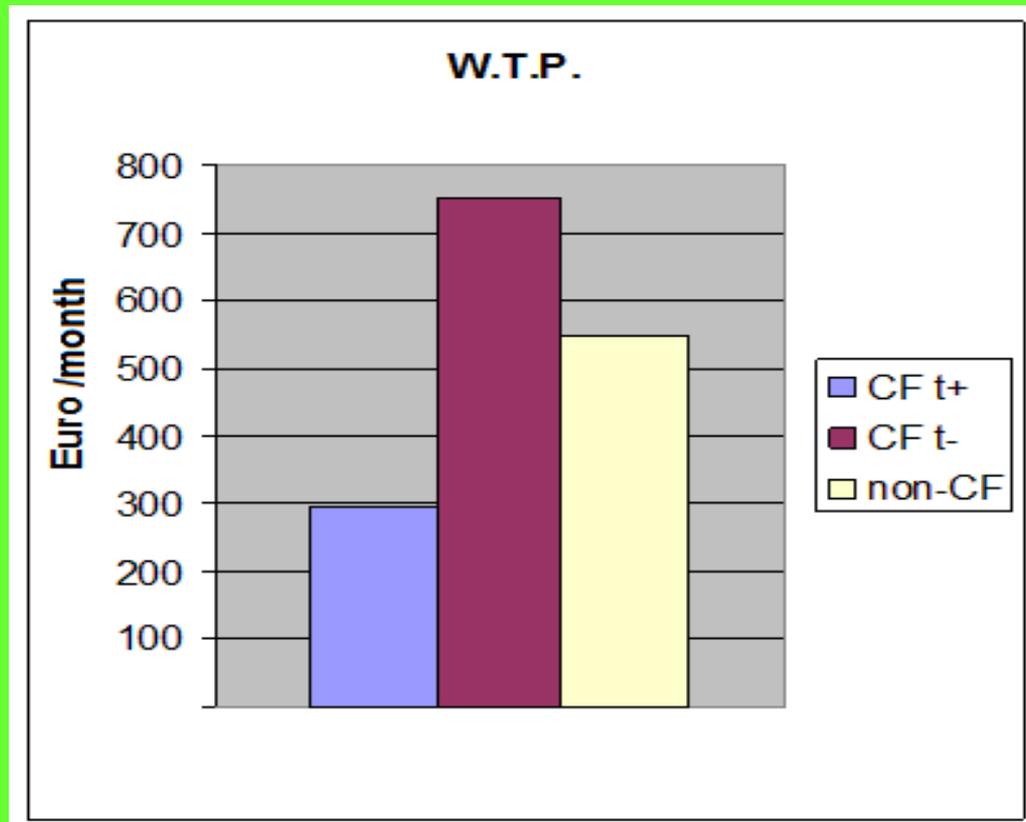
# Results

Opinion of patients on the time savings from the use of THC: percentage of positive responses.



# Results

Patients' willingness to pay (WTP) for a home telemedicine service, expressed in €/month



# Conclusions

- The use of telemedicine highlights several advantages that will surely become even more evident when its use will spread more. Being able to monitor patients at home is certainly a turning point for the "quality of life" of people with chronic conditions that, with the progress of medical knowledge, will in time more and more numerous.

# Conclusions

- The reduction in hospital accesses is a goal of considerable magnitude in the long-term management of chronic diseases. Telemonitoring in the follow-up provides a further guarantee of better survey on exacerbations often cause of the gradual decay of the general conditions.

# Conclusions

- From the economic point of view, we pass through a historical phase in which health is increasingly considered a right for all. In front of increasingly limited economic resources, it still shows a steady increase in health expenditure, which is now a substantial part of the National Gross Domestic Product. At this economic stage, telemedicine can be a rare source of savings. The hope is that new studies confirm our initial data to begin with conviction the phase of the development of telemedicine in Health.

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# Thank you