ORIGINAL ARTICLE

Colorectal cancer screening in LHU4 Chiavarese, Italy: ethical, methodological and outcome evaluations at the end of the first round

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Key words

Colorectal cancer • Screening • Prevention

Summary

Introduction. *The screening programmes are very challenging from the ethical perspective, and their impact in terms of morbidity and mortality make secondary colorectal cancer prevention a valuable public health intervention.*
Methods. *The target population people aged 50-69 years receive an invitation card with a test-tube for the fecal occult blood test (FOBT) and an immunochemical test is used for fecal occult blood. Subjects positive to FOBT are invited to perform a gastroenterologic examination and a full colonoscopy.*
Results. *In the firt round of screening, 100% of the target population has been invited with an adhesion rate of 41.3%. A total of 1,739 FOBT-positive subjects have been invited to the second level of the screening. 1,429 of them have performed the gastroenterologic examination (83.9%). To date 956 full colonoscopies have been completed and the rate of subjects affected by carcinoma, malignant polyp and advanced adenoma has been equal to 23.5%.*
Discussion. *Thanks to the reminders already sent, an increasing compliance has been registered with an increased rate of subjects with a low schooling that have performed a FOBT test. With the aim to optimize all the operative aspects of the screening programme it is already ongoing a set of meetings between health workers of Local Health Unit 4 and General Practioners.*

Introduction

The integrated chronic disease prevention approach ideally implies three levels of intervention: primary, secondary and tertiary prevention. The first two levels have the highest relevance as they have an impact on healthy people or on the pre-clinical stages of the disease, reducing morbidity and premature mortality.
Primary prevention represents the gold standard, acting on healthy subjects and tackling the major risk factors; however, it has some critical issues as it implies the necessity to raise awareness for healthy life-styles as well as to promote the control of major behavioural risk factors [1].
For some chronic diseases, the long pre-clinical course, the impact in terms of morbidity and mortality, the availability of effective, safe and at low cost diagnostic procedures make secondary prevention a valuable public health intervention. Evidence suggests the effectiveness of screening, even if not always the population is aware for chronic noncommunicable diseases and their prevention.
As well-designed and well-managed cancer control programmes lower cancer incidence, screening for colorectal, breast and cervical cancers have been adopted in many countries. For these reasons, in Italy colorectal screening, as well as breast and cervical cancer screening, has been included in the Essential Levels of Health Care (LEA), which are the interventions and services that should be provided by the National Health Service to all Italian citizens [2-8].
The screening programmes are very challenging from the ethical perspective, as accessibility, equity, good quality, effectiveness and compliance should be warranted. People adherence to screening programmes is voluntary and should be mostly implemented among disadvantaged communities, which are the most difficult to reach by preventive interventions.
The evaluation of the burden of colorectal cancer in a geographical area, in terms of morbidity, hospitalizations and mortality, is crucial. All stakeholders should be involved in the analysis of scientific literature as well as of economic affordability of the screening programme; disequalities should be avoided as much as possible.

LHU4 Chiavarese: background

In Local Health Unit 4 (LHU4) Chiavarese, mortality rates, defined as years of life lost (YLL), identify colorectal cancer as the second (following lung cancer) and third (following breast and lung cancer) leading cause of death in men and in women, respectively [9] (Tab. I).
In our LHU the organisational framework of the screening has been defined on the basis of the already available data on both the state of health of the residing population

Tab. I. Years of life lost (YLL) due to cancer, years 1992-2006.

	1992-1996	1997-2001	2002-2006
Female			
Breast cancer	819	680	567
Lung cancer	325	385	442
Colorectal cancer	368	406	367
Male			
Lung cancer	1,365	1,235	1,018
Colorectal cancer	431	369	452

and its lifestyle factors that may contribute to increased or decreased risk of colorectal cancer [1].

As a matter of fact, LHU4 Chiavarese is involved in the surveillance system called PASSI (Health Improvements in Italy, a Monthly Health Interview Survey in adults aged between 18-69 years); this surveillance system evaluates both behaviours and lifestyles that may impact on the health of the population (diet, tobacco use, physical activity, etc.) and preventive interventions implemented by Regions and LHUs.

In LHU4 Chiavarese, the residing population as a whole comprises 148,000 subjects (Fig. 1).

The population is distributed in 30 municipalities, merged in three health districts (District 14: West Tigullio, District 15: Chiavarese, District 16: East Tigullio).

In the period 2007-2008, the 17.7% (CI 12.6-23.1) of the interviewed subject belonging to the age class 50-69 years reported to have performed a test for the early detection of colorectal cancer accordingly to guidelines [10]. Interpretation of these data is essential to the planning, implementation and evaluation of cancer screening policies in LHU 4 Chiavarese and may rapresent a basis value for following evaluation of impact after the introduction of the screening programme [11].

In detail, a fecal occult blood test (FOBT) every two years and a colonoscopy within the past five years have been performed in 8.4% and 9.3% of interviewed subjects, respectively.

The end of the first round of the colorectal screening (started in 2009) allows an evaluation of the organizational and operative issues afforded in LHU4 Chiavarese.

Materials and methods

Organized colorectal cancer screening programme in LHU4 Chiavarese has been planned evaluating both international guidelines [12-18] and the available economic resources, and taking into account pros and cons as well.

The targets of the cancer screening programme are the following:

- early detection of invasive cancer;
- therapeutic removal of adenomatous polyps, thus blocking the natural progression of the disease in cancer;
- decrease of morbidity and mortality related to colorectal cancer in the cohort of subjects invited to adhere to the programme (estimated decrease of 8.5 deaths/10,000 within 10 years, if 2/3 of invited subjects do at least one test).

A relevant point was the identification of the target population, its numerosity and stratification by gender; the compliance to opportunistic screening, when a organized programme was not existing, was studied as well [19].

Fig. 1. LHU4 Chiavarese: residing population stratified by age class, 2006 (source: www.demoistat.it).

age class	male	female
>90 yrs	606	1841
85 - 89 yrs	1065	2358
80 - 84 yrs	2394	4158
75 - 79 yrs	3526	5094
70 - 74 yrs	4313	5397
65 - 69 yrs	4765	5632
60 - 64 yrs	4473	4917
55 -59 yrs	4982	5213
50 - 54 yrs	4833	4927
45 - 49 yrs	5103	5206
40 - 44 yrs	5880	5823
35 - 39 yrs	5651	5561
30 - 34 yrs	4850	4803
25 - 29 yrs	3571	3421
20 - 24 yrs	2919	2899
15 - 19 yrs	2848	2765
10 - 14 yrs	2886	2642
5 - 9 yrs	2740	2631
0 - 4 yrs	2627	2490

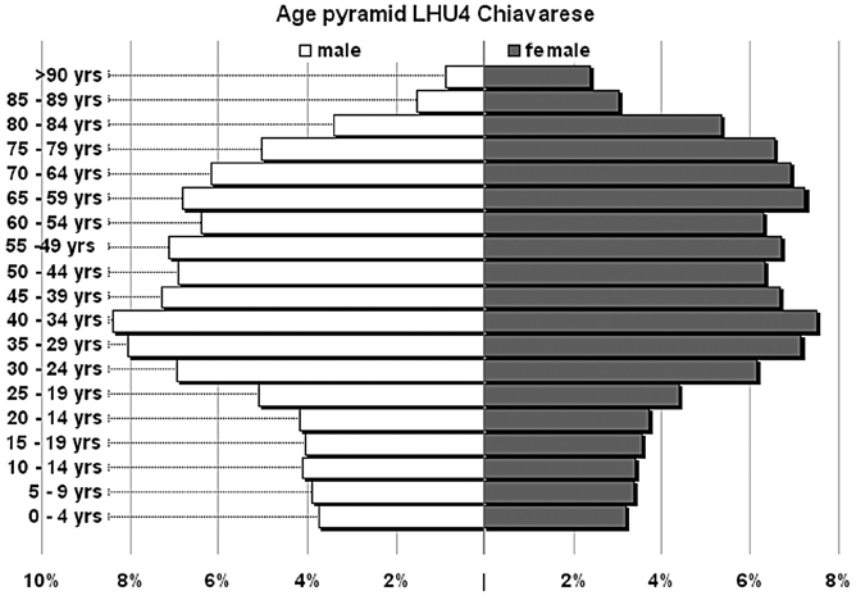
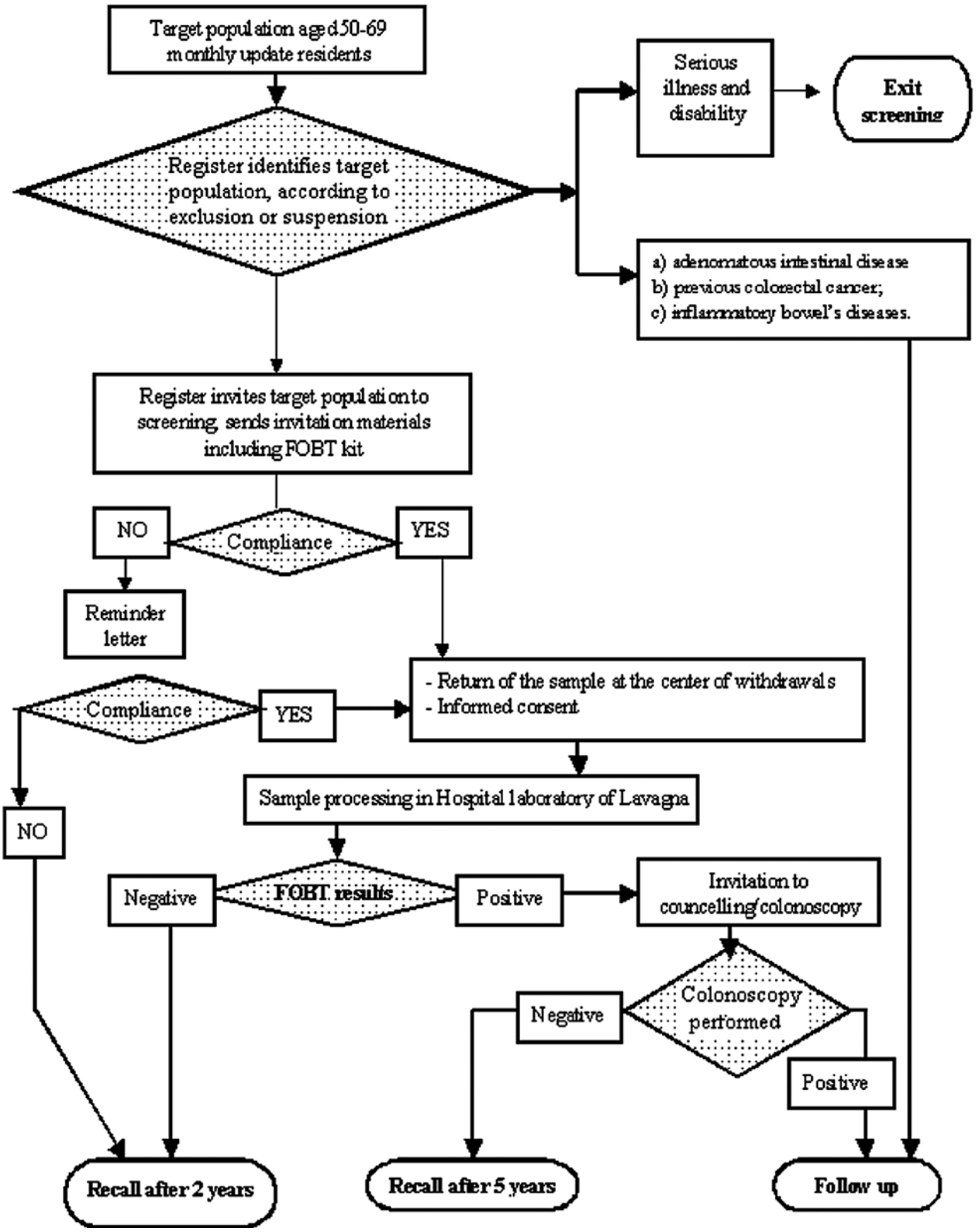


Fig. 2. Operative algorithm of the cancer screening programme.



Taking into account the experiences already gained in other regions [20], it has been possible to evaluate the volume of activities and to estimate the burden of work needed during the implementation of the programme.

Besides, it was decided to adopt the management information system already in use in our LHU for the breast cancer screening (Dedalus Spa, Software for Healthcare).

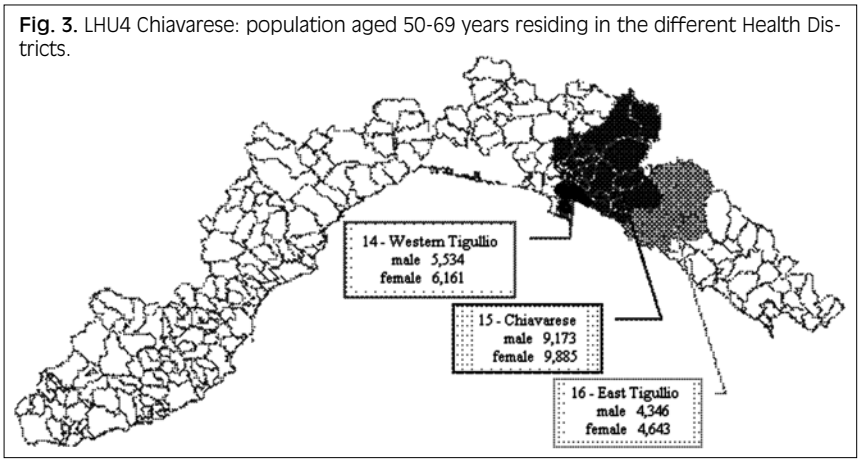


Fig. 3. LHU4 Chiavarese: population aged 50-69 years residing in the different Health Districts.

The evaluation of activities and performance is done using the indicators provided by the National Observatory on Screening [21] and by the Italian Group on Colorectal Screening (GISCoR). Besides, the data provided by the surveillance system PASSI allows to evaluate the impact of social issues on the programme and the results obtained in more disadvantaged (low qualification and low income) people.

In detail, the operative algorithm adopted by LHU4 Chiavarese and based on the recommendations provided by the Ministry of Health [11] is illustrated in Figure 2.

The programme involves the following operative units:

- Organizational secretary with administrative personnel (invitation of subjects, organization and collection of tests in the different health districts, forwarding of test negative outcome);
- Lab O.U. well-equipped for the FOBT;
- Endoscopy O.U. for the performance of colonoscopy in subjects with a positive FOBT;
- Pathological Anatomy O.U. well-equipped for a quick and adequate test of bioptic samples collected during II level colonoscopies;
- Informatic and Technology Department.

Accordingly to the operative protocol adopted, the target population includes females and males aged 50-69 years residing in the territory of the LHU4 Chiavarese (Fig. 3). Eligibility criteria, as well as exclusion and/or suspension criteria have been defined accordingly to National Guidelines (PNLG) [17].

The invitation card, signed by each General Practitioner (GP) and the MDs of the LHU4, is supplied with a test-tube for the FOBT; this latter should be given back to any centre of sampling of the Health Districts.

Assuming 20,000 subjects invited each year and a rate of adhesion equal to 30%, the annual workload for the Lab O.U. should be about 6,000 FOBT tests (30 samples per day).

Immunochemical test is used for fecal occult blood research for its accuracy and sensitivity for detecting significant neoplasia in an average-risk population [22].

Accordingly to the operative algorithm adopted, subjects positive to FOBT are invited to perform a gastroenterologic examination by recorded delivery; this latter is sent also to the GP, in order to have a brief anamnestic form and the counselling of the patient.

Taking into account the standard rate of positivity to the first call (7%), 10 colonoscopies should be planned each week.

During a preparatory phase a group of General Practitioners (GPs), taking into account exclusion/suspension criteria, pointed out their 50-69 year old patients. Subsequently, the screening programme has been progressively extended to all Health Districts of LHU4 Chiavarese.

Results

The first round of the colorectal screening started on January 19th, 2009.

In the period January 19th, 2009 – September 14th, 2011, 42,245 subjects residing in the Health Districts of LHU4 Chiavarese have been invited; this represents the 100% of the target population (subjects that were 68 and 69 year old in 2009 and that nowadays are 70 and 71 year old have been included).

The adhesion rate has been equal to 41.3% (17,441 subjects); the recalls are still ongoing (Tab. II).

A total of 1,739 FOBT-positive subjects has been invited to the second level of the screening. 1,429 of them have performed the gastroenterologic examination (83.9%), while 5.9% did not allow to adhere to the operative algorithm nor to perform colonoscopy (10.2% of subjects did not comply to the invitation).

To date 956 full colonoscopies have been completed, corresponding to a second level compliance of 67%; 250 case histories are still to be closed.

The final results of the II level of the screening show that 36.3% of colonoscopies have been negative for neoplas-

Tab. II. LHU4 Chiavarese: colorectal screening. First round results.

Gender	Male					Female					Total
Five-year age class	50-54	55-59	60-64	65-69	70-71	50-54	55-59	60-64	65-69	70-71	
First invitation	5,170	4,917	4,862	4,469	893	5,299	5,159	5,292	5,096	1,088	42,245
Compliants	1,801	1,855	2,109	1,873	342	2,251	2,209	2,478	2,120	403	17,441
% compliance	34.8%	37.7%	43.4%	41.9%	38.3%	42.5%	42.8%	46.8%	41.6%	37.0%	41.3%
% FOBT positive	7.8%	7.8%	11.4%	12.1%	12.8%	7.5%	4.8%	8.9%	10.8%	13.1%	9.1%

Tab. III. Colorectal screening: results of the II level tests at the end of the first round.

Histology	%	
Carcinoma	1.81	PPV 23.5
Advanced adenoma	19.74	
Malignant polyp	1.92	
Initial adenoma	23.48	
Non-adenomatous mucosa	1.28	
No alterations	28.39	
Non-neoplastic polyps	6.62	
Else	16.76	

Tab. IV. PASSI data: 2007-2008 period and 2009.

Early detection of colorectal neoplasia in accordance with the guidelines (50-69 years) LHU4 Chiavarese– PASSI 2007-2008 (n = 197) PASSI 2009 (n = 120)			
		Fecal occult blood*% (CI95%)	
Total	2007-2008	8.5	4.9-13.4
	2009	21.6	14.5-30.1
		Fecal occult blood °%	
		2007-2008	2009
Age class			
	50-59	8.8	13.1
	60-69	8.2	31
Gender			
	Male	6.4	24.6
	Female	10.5	18.6
Level of education			
	Low	6.7	21.2
	High	10.7	22.0
Economic difficulties			
	Lot/some	3.6	14.8
	None	7.1	27.8

* in the absence of signs or symptoms

tic lesions. The rate of subjects affected by carcinoma, malignant polyp and advanced adenoma has been equal to 23.5% (Tab. III).

The comparison between results provided by PASSI database involving 50-69 year old subjects for the years 2007-2008 and 2009 shows relevant and positive improvements. In the period 2007-2008, 8.5% of 50-69 year old subjects in the LHU4 reported to have done one test for the early detection of colorectal cancer, performing, accordingly to guidelines [11], one FOBT every two years. In 2009, the same datum has increased to 21.6%. Data provided for 2009 show that the rate of subjects performing a test for the early detection of colorectal cancer has increased in low schooling people. As demonstrated by other studies [23] having a low income or less education are critical factor in opportunistic screening. A critical issue still exists in economic disadvantaged subjects (Tab. IV).

In 2009, 31% of 60-69 year old interviewed subjects reported to have done a FOBT test. The same year, 80% of 60-69 year old subjects have been invited to adhere to the screening and the compliance has been equal to about 42%.

The indicators provided by GISCoR and calculated in 2010 show a 10% of positivity at the first level of screening in the invited cohort and an identification rate of cancer/advanced adenoma equal to 1.4‰ in the screened population (Tab. V).

Conclusions

The colorectal cancer screening started first in the Chiavarese Health District and then has been extended in other Health Districts of the LHU. The preliminary step, tested in cooperation with some GPs, has allowed to optimize the operative aspects of the programme. The adhesion rate equal to 42% has been 10% greater than estimated as well as the rate of positivity (10% vs 7% estimated). These results have involved both an increase of the resources fixed for the screening and a new organizational framework. As a matter of fact, in LHU4 Chi-

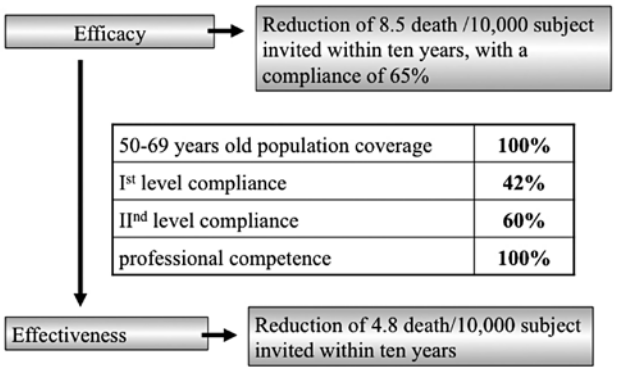
Tab. V. GISCoR indicators calculated in the LHU4 Chiavarese.

	2010	GISCoR standard
People invited (number)	17,367	-
Population invited (number of annual target population = 19.824) (%)	87.4	80
Compliant to the invitation (first call: excluded recall of inadequate) (number)	♂ 3,133 ♀ 3,797	-
Compliance (%)	♂ 38.8 ♀ 44.3	45
Positives (number)	701	-
Positives on the first level (%)	10	6
Adenocarcinoma/ malignant polyp (number)	10	-
Detection rate (‰)	1.4	2
Advanced adenoma (diameter > 10mm, villous or tubulo-villous component >20%, high risk dysplasia) (number)	38	-
Detection rate (‰)	5.5	7.5

Tab. VI. Table of indicators.

Indicator	Acceptable	Desirable
I. Structural, logistic and organisational, and functional indicators		
Subjects invited	> 80%	> 90%
II. Indicators of the clinical diagnostic process		
Positivity rate	First test: <6%	First test: <5%
	Subsequent tests: < 4.5%	subsequent tests: <3.5%
Participation to further assessment	> 85%	> 90%
Positive predictive first test: value (PPV) of FOBT at colonoscopy (for advanced adenoma or carcinoma)	> 25% first test: Subsequent tests: > 15%	> 30% 1 overall Subsequent tests: > 20%
III. Early indicators of impact		
Compliance	Crude compliance: > 45%	Crude compliance: > 65%
Detection rate	FOBT carcinoma First test: > 2.0‰ Subsequent tests: > 1.0‰ FOBT advanced adenoma First test: > 7.5‰ Subsequent tests: > 5.0‰	FOBT carcinoma First test: > 2.5‰ Subsequent tests: > 1.5‰ FOBT advanced adenoma First test: > 10.0‰ Subsequent tests: > 7.5‰

Fig. 4. LHU4 Chiavarese: screening performance in preventing colorectal mortality.



avarese the screening programme is exclusively state-funded and is related to a great effort of each Operative Unit. While the programme was in progress, an increasing working load, a greater organizational demand and a closer and more coordinated cooperation between different medical skills has been required.

Thanks to the reminders already sent, to the coooperation of GPs and to the between peer communication in subjects belonging to the part of population invited to adhere to the screening, an increasing compliance has been registered. The PASSI survey performed in 2009 in the 60-69 year old population showed an increased rate of subjects that have performed a FOBT test (raised from 8.2% to 31%), in particular in the part of population with a low schooling (FOBT 6.7% and 21.2% in 2007 and 2009, respectively).

The analysis of data related to the first round help to define future needs. The need and the opportunity for an improvement are well defined by some GISCoR indicators (Tab. VI) [21].

The compliance to the first round of the screening in the age class 50-69 years has not yet reached 45% as requested by GISCoR, and the rate of subjects that undergo colonoscopy should be improved (Fig. 4).

Taking into account all these points, it is extremely relevant the already ongoing set of meetings between health workers of LHU4 and GPs with the aim to optimize all the operative aspects of the screening programme [24].

During these meetings some possible interventions has been defined; any of these implies the effective involvement of GPs.

Taking into account the first level of the screening, two new centers for collecting samples in the hinterland has been foreseen as well as media involvement and a better communication strategy between GPs and their patients.

Taking into account the second level of the screening, a better pertinence of emergency colonoscopies to be done outside of screening should be guaranteed in order to avoid an overload of work of the Endoscopy Unit.

Besides, the habit to repeat FOBT after a positive result should be absolutely discouraged and the counselling should be standardized.

Subjects who need a follow-up colonoscopy are a critical issue; this latter should be handled by GPs with the aid of the health workers of LHU sending reminders to the patients.

In conclusion, on the basis of the experience gained in our LHU it is possible to state that an optimal intervention should be based both on scientific evidence and local experience. The implementation of a cancer screening programme, such as colorectal cancer screening, should imply planning, feasibility evaluation, pilot studies, scaling up from pilot studies to full-scale programme. All these phases should be evidence-based and the performance should be adequately evaluated.

At the end of the first round, it is possible to conclude that in LHU4 Chiavarese all the efforts done in the past few years have allowed to reach very satisfactory results, beyond the targets established beforehand.

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