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Prevention and screening of diabetes through a workplace campaign: an experience in advanced tertiary sector

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Summary

Introduction: *Worldwide, diabetes and its complications are a health priority. In Italy, its social global impact on private life and occupation relationships is not always considered. In adults the physiopathology is not completely understood yet, but it surely involves many relevant risk factors. Corporate social responsibility actions can play a significant role in life style through information and education, but the level of uncertainty about the screening cost-effectiveness ratio is high.* **Objectives:** *To evaluate a diabetes screening and educational program, in the workplace.* **Results:** *An information campaign about diabetes was addressed to 4,232 office workers. In this group, 425 volunteers without a prior diagnosis of diabetes (average age of 44 years, average Body Mass Index 24.4 kg/m^2) participated in individual moments with the company physicians (assisted calculation of "Diabetes risk score", screening by fasting blood glucose, and specific counseling). The prevalence of elevated capillary blood glucose was 16% (n = 68) and new diagnosis of diabetes was made in 1.6% of workers participating in the screening (n = 6).* **Discussion:** *A diabetes prevention campaign was carried out on Italian office workers in order to develop targeted preventive strategies. The campaign was aimed at primary and secondary prevention.* **Conclusions:** *The collaboration of the "company system" provided useful and effective support for a successful implementation of preventive diabetes campaign. The company's occupational physician's involvement was strategic.*

Riassunto

«Campagna di prevenzione e screening del diabete in ambito aziendale: una esperienza nel settore terziario avanzato». **Introduzione:** *Il diabete e le sue complicanze costituiscono una priorità sanitaria. In Italia non è sempre considerato l'impatto sociale che può avere (privato e lavorativo). Si ignorano i dettagli fisiopatologici ma molti fattori di rischio sono chiari. Interventi sullo stile di vita sono sicuramente utili, mentre permane un alto grado d'incertezza sull'effettivo vantaggio costi-benefici dello screening. Azioni di responsabilità sociale delle imprese possono svolgere un ruolo rilevante.* **Obiettivi:** *Sperimentare e valutare un programma di screening e formazione sul diabete sul luogo di lavoro.* **Risultati:** *Un gruppo di 4.232 impiegati d'ufficio ha partecipato a una campagna d'informazione sul diabete. Di questi, 425 volontari senza una precedente diagnosi di diabete (età media 44 anni, BMI medio 24,4 kg/m^2) hanno partecipato al momento individuale con il medico aziendale (calcolo assistito del "punteggio di rischio di diabete", screening mediante glicemia capillare a digiuno e consulenza mirata). Nel 16% dei partecipanti allo screening (n = 68) si è riscontrata iperglicemia e nell'1,6% (n = 6) è stata in seguito posta una nuova diagnosi di diabete.*

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Discussione: *Su un campione d'impiegati è stata impostata e condotta una possibile campagna di prevenzione del diabete, al fine di sviluppare strategie preventive mirate in ambito lavorativo in Italia. La campagna condotta era mirata alla prevenzione primaria e secondaria.* **Conclusioni:** *Una collaborazione costruttiva del "sistema aziendale" consente di fornire un supporto utile ed efficace a una corretta attuazione di una campagna preventiva sul diabete sul luogo di lavoro. Il coinvolgimento del medico del lavoro dell'azienda è strategico.*

Introduction

Diabetes is a global health emergency. Recent large-scale epidemiological studies showed that over the past 30 years diabetic cases in the adult population have increased, reaching 347 million cases worldwide, and also cases of prediabetes were growing fast (10). The disease is very heterogeneous, clinically complex with the involvement of target organs complications (i.e. heart, eyes, blood vessels, nerves, kidneys). Type 1 diabetes usually develops in children or young adults until 30 years of age. Risk factors research is still ongoing and primary prevention can't be performed. People who have prediabetes (called impaired glucose tolerance or impaired fasting glucose) do not properly process sugar (i.e., glucose). Sugar levels will be higher than normal, but not high enough to be classified as diabetes. Without a change of diet and more physical activity, about half of the people with prediabetes will develop diabetes type 2. Diabetes type 2 has traditionally been seen as a disease that occurs slowly over time and could be managed rather than cured. The exact reasons why this disease develops are still unknown, but many relevant risk factors have been identified. Today, diabetes really is a highly preventable condition. There is no widespread perception of what diabetes is and what social impact it may have on a population. In Italy, the total direct and indirect costs of diabetes for the National Health Service is estimated at up to 30 billion Euros per year. Many patients with diabetes and many non-specialist doctors underestimate the disease and so prevention strategies are not more implemented (6). Diabetes is often first diagnosed in people who show clear signs and symptoms of complications even before reporting those specific to the disease itself.

Diabetes also has a relevant impact on the quality of life, private as well as working (e.g.: main cause of blindness in adulthood). For this reason, lifestyle preventive interventions are certainly useful (many risk factors are also common in the primary prevention of other important chronic diseases, such as cardiovascular ones). For these reasons an adequate specialized care and therapy that stop the evolution of the disease and its complications are also required and highly recommended (3).

However, there is a high degree of uncertainty about the actual cost-effectiveness advantage of secondary prevention interventions through screening, particularly if it is performed in the general population rather than in greater risk groups (11). Epidemiological studies are limited and the levels of evidence are based on the experts' opinion: "there are doubts about whether it should always be recommended, but it is believed that its execution should be carefully considered - level of recommendation B " (1).

General health balance and workplace screening are realistic opportunities contemplated by the European legislation for the protection of workers' health and safety. In Italy, occupational physicians operating within companies have a leading role in promoting and protecting health in the workplace and collaborate in the implementation and enhancement of voluntary "health promotion" programs, according to the principles of social responsibility (Legislative Decree 81/2008, article 25, c.1, let. a) within the frame of the International Code of Ethics for Occupational health professionals (by ICOH).

The advanced tertiary sector provides services with high innovative content directed to other organizations using the most recent technologies. Intellectual performance is made available as a "network" rather than a "structure"; human resources, with their professional and relational contribution, are considered a central value. The organizational setting leads workers to consolidate their confidence,

and decision-making autonomy is supported and delimited by reliable regulations. Workers have to feel themselves in a framework defined as "freelancers in a corral" (4). Alterations of personal health related to the expansion of the working space-time are counterbalanced by an increasing attention to wellness. In this perspective, corporate social responsibility actions play a significant role both in awareness-raising and prevention activities and management of physical, mental and social well-being of a worker affected by a chronic disease. This working context appears to be useful to support a prevention campaign on a chronic and complex pathology such as diabetes.

Methods

The preventive diabetes campaign was part of a health promotion program carried out between November 2013 and February 2014 and directed/targeted at a number of companies related to an Italian multinational information technology consulting group. Companies in Lombardy, Piedmont, Puglia, Lazio, Campania, and Veneto Regions were involved in the study.

Informed consent from workers included in the study was obtained before review of the medical records. During data collection and analysis, anonymity and privacy was respected.

All 4,232 employees involved (average age 45 years, range 24-55; females 33%; average Body Mass Index 24.1 kg/m^2, range 18.2-32.3 kg/m^2; smokers 10%) can be classified as office workers with task of "Video Display Unit (VDU) operator" (health risks: VDU, organization and stress, use of company car).

During the periodical health check for renewing pass-issue, data on family history, personal physiologic (including lifestyle characteristics), pathological and occupational history, general clinical examination, musculoskeletal and visual symptoms and sign, anthropometric measurements (weight, height) were collected by trained health occupational physicians using standardized methods (i.e., same methods/equipment in all locations). Results of the complementary investigations such as clinical laboratory analysis (i.e. blood glucose, glycated hemoglobin, thyroid function, etc.) performed by specialists were also included.

An information campaign to increase awareness about diabetes was addressed to all workers, by sending an e-mail message, posting streamers or flyers in high traffic areas (i.e. break areas), and setting up a dedicated website where more informations were made available.

A total of 425 employees without a prior diagnosis of diabetes (mean age 44 years, range 25-55; females 32%; average Body Mass Index 24.4 kg/m^2, range 19.1-32.3 kg/m^2; smokers 11%), equal to 10% of all workers, spontaneously agreed to participate in a private examination with the company doctor. Assisted calculation of the probability of a non-diabetic person to develop Type 2 Diabetes in the following 10 years by means of "Diabetes risk score" (9), a extemporaneous screening by measuring of fasting blood glucose, and targeted counseling with possible referral to General Practitioner for further investigations have been carried out. Individuals screened positive for diabetes based on standard criteria for Fasting Plasma Glucose test (FPG): normal value up to 99 mg/dL (5.5 mmoles/L) was considered.

The analytical system used for the determination of fasting glucose with glucometer was Bayer's CONTOUR XT (Biosensor: Glucose Dehydrogenase converts Glucose from sample into Gluconolactone, Enzyme: Flavin Adenine Dinucleotide) conforming to ISO 15197: 2013 and more stringent quality parameters tested by Scandinavian evaluation of laboratory equipment for primary health care. Diabetes diagnosis was confirmed by a second level specialist center. Each participant received a report both hand-written and by e-mail containing all the suggestions of preventive improvement required (weight check-up, diet control and physical exercise).

Individual follow-up was performed during each mandatory clinical examination (periodic health surveillance).

Results

All workers were involved in the awareness-raising information phase regarding diabetes. Out of 4,232 participants, those already known to have diabetes were 67 (1.6%).

The slogan chosen for the campaign, "Play in advance with diabetes", led to immediate emotional

involvement as it recalls the rapid action of soccer players. The campaign was launched in concomitance with World Diabetes Day, reinforcing the link with a large-scale issue. The explicit invitation and the information provided helped reduce one's risk factors (extra weight, inactivity, high blood pressure, irregular sleep), and adopt a healthier lifestyle (eating a healthy low-fat and low-sugar diet, high-fiber foods and lots of fresh fruit and vegetables, keeping weight under control, and staying physically active). In-depth information was made available in simplified language, regarding each of the main clinical situations (gestational diabetes, prediabetes, type 1 diabetes, and type 2 diabetes), and attention was paid also to the unchangeable risk factors (age, family history).

During the voluntary screening (425 employees), the prevalence of elevated capillary blood glucose was 16% (n = 68), 18% and 14% in men and women respectively. After a 1-year follow-up a new diagnosis of diabetes was made in 1.6% of workers participating in the screening (n = 6).

Discussion

The present report shows a possible integrated strategy of diabetes prevention campaign, in a sample of Italian office employees. To our knowledge this is the first study carried out to investigate a diabetes preventive campaign including screening of elevated capillary blood glucose among not preselected individuals to develop targeted preventive strategies in Italian workplaces.

Preliminary results agreed with those of studies conducted in France where the prevalence of elevated capillary blood glucose was 20% (vs. 16%) (5). According with previous studies men generally tend to have higher levels of blood glucose compared with women (7) and type 2 diabetes is more prevalent in men (11). In our experience, diagnosis of diabetes was made in 1.6% of participants vs. 4% of a recent screening study conducted in the USA (2). Different results could probably be explained by the lower BMI values found in the workers we studied. The lower finding of diabetics compared to a screening study conducted in Canada (8) could be related to failure to pre-select the subjects at greater risk (1.6% vs. 8%).

The consistency of the new diagnoses of diabetes could hardly justify a screening investigation on a not pre-selected high risk population. In the workplace, the possibility that this diagnosis involves a colleague acts as a powerful message to stimulate a radical change in the own and family members lifestyle.

The campaign conducted was not only aimed at secondary prevention but settled with a vision of medium-long term primary prevention targets. The implementation of illness prevention (lower onset of the disease) in the working context appears to be an excellent opportunity to educate consciences and behaviors. Wellness intervention programs with workers health and wellness strategy may also lead to greater uptake by employees. The follow-up study will make it possible to have clearer understanding of the impact of our campaign on the working population.

The involvement of companies of the advanced tertiary sector played a role in defining and managing the prevention campaign combined with screening. In particular, a strong social support received from work organization and colleagues have certainly helped to maximize efficiency of the campaign.

The workplace environmental experience, based on a "moderate" open space (i.e.: without cubicles, with large aggregation areas, etc.), also facilitated the realization and contributed to the positive impacts.

In conclusion, the preliminary results of our experience demonstrated that a workers' prevention diabetes campaign can be implemented successfully. A collaboration of the "company system" is helpful to provide support to increase awareness of diabetes with positive implications on physical, mental and social well-being. The involvement of the company occupational physician not only provided a practical, accurate and reliable operator in carrying out the screening, but also allowed effective actions useful to therapy compliance and lifestyle improvement. Coordination between general practitioner and the specialist seemed to be necessary.

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