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Preventive Medicine Center and Health Care for students of Medicine and Health Professions at the Sapienza University of Rome: a research protocol

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Abstract

This project aims to develop a Center of Preventive Medicine and Health Care for the students of Medicine and Health profession at Sapienza University of Rome. At the beginning of the university career students, both residents and nonresident s, have to face several difficulties such as: starting smoking or the increase in cigarette consumption ; the independent management of their own health (especially for non residents consequently to the distance of the family doctor) ; unhealthy diet; tuberculosis (TB) biological risk during their university training. These aspects , especially if present at the same time, act as a source stress and adversely affect the quality of life and the academic performance. Specific aims of the project will be: implementing an ambulatory of Preventive Medicine; implementing a virtual ambulatory of general medicine; creating a website on the problems mentioned above. Data collected will be computerized to keep an electronic health record (HER) and to use the information for the purposes of scientific research. The Centre will act in close relationship with the Central Administration, with the Headmasters of the Medical Faculties, and in close collaboration with the Center of Occupational Medicine of Sapienza University.

Keywords: *Preventive medicine; University students; Faculties of Medicine; primary care; smoking; vaccination; infectious diseases; healthy diet; alcohol consumption; physical activity*

Background

Sapienza University of Rome, is the largest university in Europe and welcomes students from all cities in Italy and beyond. In this project, our focus are the students of the Faculties of Medicine, considered to be those most exposed in their technical and practical activities in medicine to biological, chemical and physical risks. Many of these students are nonresident, come from other cities and moved to Rome to attend university. At beginning of their university career , these students have to face many difficulties, such as:

- university career can be stressful for many students that may start smoking or increase the average cigarette consumption;
- with the change of the city, students lost all contacts

with their Family doctor and often the access to Health Services is difficult so they have to manage Individually their own health;
- with the stop of the mandatory military service in Italy, at least for males, the opportunity to carry out health screening has failed;
- with the distance from their own home the diet change and often become unregulated and unhealthy. Students often eat away from home, quickly and overtime; this lead to diet problem, for example obesity or loss of weight or digestive problems;
- integration into a new city (students often come from cities smaller than Rome) often generate stress and disorientation.

All these aspects act together as a source of stress for students and have a negative impact on academic record, on social life and on the psychological aspects, or on anything concerning their quality of life. A recent survey has shown that only a few universities in Italy have service for the assistance of nonresident students, while in other universities, in case of need student can contact the Medical Guard or the Pharmacist, often with a substantial outlay. The prevalence of depression, anxiety and stress among university students around the world is increasing; this show the need for the adoption of primary and secondary prevention measures by establishing appropriate dedicated support services.

Furthermore, it is important to underline the alert in our country about the presence of TB and XDR-TB forms, (extensively drug - resistant TB). Despite the incidence of the disease is low in the general population, the epidemiological patterns are changing. The events in recent years in a Teaching Hospital in Rome have highlighted the need for guidelines aimed at reducing infection also in the healthcare workers. Therefore, special attention should be given to all those professionals exposed to greater TB biological risk : health workers and especially students of the medical faculty who attend their training in risk environments . To this Purpose University " Sapienza" since 2000 decided to address this emerging problem with the following measures:

a) the introduction in the announcement for the access at the Faculties of Medicine , since the Academic Year 2002-2003, of the obligation to practice the tuberculin test (Mantoux) alongside with documentation on the anti-hepatitis B vaccination (the students sent their documents by mail to the Center of Occupational Medicine [CMO] of the University) (1-2);
b) the planning in the year 2007 with the Chemical Laboratory for safety of the Sapienza University of Rome and the Lazio Region of the first virtual center of Italy finalized to the systematic archiving of the vaccination documentation, the exchange of information and training of worker professionally exposed to biological risks. These activities were also used for research purposes. Our teamwork was able to make research on the trends of positivity to the Mantoux test among the biomedical students, on the association between levels of antibodies against HBV and HBV vaccination, as well as a review of the activities on the prevention of TB and HBV in all the Italian Universities. However, a comprehensive approach, following is lacking. This research is intended to present the Health Promoting University Approach (3).

Our goal is to implement a project that could contribute to the health protection and quality of life of students of the Faculties of Medicine at Sapienza University.
In this way we want to facilitate their University training, considering that if students are more healthy today, they will be more confident and capable professionals.
Specific objectives are:

1. implementing an ambulatory of Preventive Medicine
2. implementing a virtual ambulatory of general medicine;
3. creating a website on the problems mentioned above.

Regarding the first objective, the project will create a structure that will have competence in terms of:

- infectious diseases and Vaccinations, in particular those of interest for the healthcare workers as pointed out by the Center for Disease Control and Prevention (hepatitis B, MMR, varicella, seasonal influenza, etc.) and control of infectious diseases (tuberculosis with Mantoux intradermal Control and/or BCG vaccination);
- eating habits (food frequency questionnaire);
- lifestyles (cigarette smoking , consumption of alcohol);
- physical activity (using the International Physical Activity Questionnaire);
- quality of life (using the SF-12 questionnaire).

In relation to these problem the Center will act both using epidmiological tools and labortatory ones, such as the determination of urinary cotinine levels, antibodies against the cited infectious diseases, and the presence of Methicillin Resistant *Staphilococcus aureus* (MRSA).
The Centre will use the students' record available from the CMO, both in print and in electronic form, and this is a solid base of information leaving for prevention and monitoring of TB and HBV.
For the second objective it will be created a virtual ambulatory of General Medicine, addressed particularly to nonresident students, with branch dedicated to psychological support. This ambulatory will be located in the University City (at the local Department of Public

Health and Infectious Diseases), where students will be visited by medical personnel and, if necessary , will be sent to specialist visit. In this way, the students will not need to return to their original residence and thus will not loose days of lesson and study.
Furthermore the third objective will consist in the creation of a website, one of the modes of communicate of young people. With the realization of a forum within the site, the students could share opinions and advice through a mediation by competent healthcare worker.

The forum would have the task of clarifying doubts, solve more simple problems and suggest and suggest the right process to be undertaken with regard to the most serious problems.

Methodology

The first approach with the students should always take place at the beginning of their university career.
The presentation of our project would take place in the classrooms.
It would expose a brief introduction of the project, its aims, and other practical information such as the place of the location, hours of activity and the web/phone contacts; moreover, it would provide to give a calendar of planned activities.
In addition to that, it would be shown the mode of the first meeting–visit in the ambulatory, for students who wish to use the service :

- the administration of IPAQ questionnaire to investigate Physical Activity levels (4);
- the SF12 Questionnaire Administration to investigate the dimensions of health-related quality of life (5);
- administration of a Food Frequency Questionnaire (24 hours recall or weekly Diary) to investigate the dietary habits;
- general medical medical examination, in which data will be collected (i.e. weight, height, BMI, blood pressure, short medical history);
- blood and urine samples for laboratory tests (antibodies against measles, mumps, rubella, varicella, pertussis; Methicillan Resistant *S. aureus*; urinary cotinine level, as a biological marker of the exposure to nicotine).

Data collected will be computerized, with the dual aim to preserve electronic medical record that can be consulted afterwards, both in order to use this information for the purposes of scientific research. Such data shall be processed in accordance with privacy legislation, Legislative Decree 06/20/2003 n ° 196.

The Preventive Medicine Center will be managed in collaboration with a family doctor with the certification of the training in General Medicine, which will be available after an agreement between the University and the Local Health Unit Roma 1.

This project is inspired by the Health Promoting University initiative, in which Institutions of higher education have long been concerned about promoting health among students. According to the Okanagan Charter published in 2015 (3), Health promoting universities and colleges enhance the success of the academic institutions; moreover it can contribute to create campus cultures of compassion, well-being, equity and social justice; improve the health of the people who live, learn, work, play and love at the University; and strengthen the ecological, social and economic sustainability of the academic communities and wider society. The settings-based approach to health promotion can potentially enhance the econtribution of universities to improving the health of populations and to adding value in the following ways: 1) by protecting the health and promoting the wellbeing of students, staff and the wider community through their policies and practices;
2) by increasingly relating health promotion to teaching and research; 3) by developing health promotion alliances and outreach into the community. On the basis of the Okanagan Charter, this project will be useful to promote research, innovation and evidence-informed action. Our goal is to ensure that research and innovation contribute evidence to guide the formulation of health enhancing policies and practices, thereby strengthening health and sustainability in the University communities and wider society. It is important that our actions will be based on evidence, and revised over time.
The activities will be carried out by 4 Units:

- Epidemiology Unit (responsible La Torre)
- Occupational Medicine Unit (responsible Sernia)
- Microbiology Unit (responsible De Giusti)
- Chemical Unit (responsible Tomassini).

Epidemiology Unit will be involved in performing the following tasks: A) Coordination of the project; B) Administration of questionnaires; C) Data collection, input and analysis; D) creating a website of the Center. The task A will be assured by linking the activities with other partners for planning and organizing the Preventive Medicine Center; a strong relationship will be developed with Family doctors for assuring Primary Health care to nonresident students; the task B will be performed by trained researchers in administering questionnaires; the task C will be performed using SPSS, release 23.0. and the task D will be implemented and will cover all the areas of the project, giving information on the services available, the results of the project,.
Occupational Medicine Unit will be involved in performing three tasks: A) Blood sample collection B) Urine sample collection C) Nasal swab. Blood and urine samples and specimens collection will be performed by

healthcare personnel who gave completed training and demonstrated competency.

Microbiology Unit will be involved in performing two tasks: A) detection of antibodies against measles, mumps, rubella, varicella and pertussis; B) nasal swabs for the detection of *S. aureus* colonization. Blood samples from the study participants will be analyzed for levels of antibodies by enzyme-linked immunosorbent assay (ELISA) to determine the concentrations of immunoglobulin G against measles, mumps, rubella, varicella and pertussis.

The procedure will be calibrated to the World Health Organization (WHO) standard cutoff criteria. For measles, the second international WHO standard will be used. Diagnostic cutoffs for discriminating between susceptible and immune individuals are 0.2 IU/mL for measles, 45 IU/mL for mumps, 10 IU/mL for rubella, and 0.26 IU/mL for varicella. Antibody levels below the lower limits of quantification (LLOQ) will be assumed to be equivalent to half of the LLOQ (ie, 0.002 IU/ mL for measles, 0.2 IU/mL for mumps, 0.02 IU/mL for rubella, and 0.01 IU/mL for varicella). The nasal swabs will be inoculated directly on mannitol salt agar (Oxoid) for recovery of *S. aureus.* Biochemical identification and susceptibility to common antibiotics will be determined using Vitek®2 Compact (bioMérieux) in accordance with the manufacturer's instructions. Antibiotic susceptibility profile will be performed through following antibiotics: benzylpenicillin, erythromycin, clindamycin, gentamicin, tobramycin, mupirocin, tetracycline, fosfomycin, fusidic acid, levofloxacin, linezolid, moxifloxacin, nitrofurantoin, oxacillin, rifampicin, teicoplanin, trimethoprim/sulfamethoxazole and vancomycin.

Chemical Unit will be involved in performing the following task: A) determination of urinary cotinine using GC-NPD, HPLC; B) determination of urinary cotinine using HPTLC. The task A will be performed as follows: a 1.7-g amount of NaCl, 3 mL chloroform and 1 mL 5 M NaOH will be added to 5 mL of urine, stirred for 5 min and centrifuged at 3000 g for 10 min. Nitrogen will be used to purge the chloroform layer and 1 mL methanol will be added to dissolve the precipitate before measurement using GC-NPD (HP6890). A DB-WAX column (30 m×0.25 mm I.D.) will be used for the analyses and temperatures used started at 110°C for 2 min increasing by 20 °C/min to 150°C for 6 min then increasing by 30°C/min to 240°C for 1 min. The injection temperature will be 250°C, and NPD temperature will be 300°C. Moreover, concerning the HPLC analysys, HNO3 will be added to 2 mL of urine, heated at 60°C for 30 min and centrifuged at 3000 g for 5 min. A 1- mL volume of 100% methanol, 4 mL chloroform and 1 mL 5 M NaOH will be added to 1 mL of supernatant and centrifuged at 3000 g for 10 min.

Nitrogen will be used to purge the chloroform layer and 0.5 mL methanol will be added to dissolve the precipitate before measurement using HPLC. The column used will be a TSK-gel ODS-80 (150 mm×4.6 mm I.D.). Flow-rate will be 0.6 mL /min and the UV detector will be set at 254 nm. The mobile phase will be water-methanol buffer-acetate-acetronitrile-acetic acid (50:27:20:2:1, v/v). The pH of mobile phase will be adjusted to 4.28 using diethylamine. The duration of each analysis will be 30 min.

For task B standard solution of cotinine will be prepared by dissolving 10 mg in 10 mL of 0.012 M HCl, and the internal standard solution by dissolving 400 mL of anhydrous 1-methyl-2-pyrrolidinone (1-Me-Pyr) in 4 mL of 1% (*v:v*) methanolic solution of HCl and rinsing up to volume of 10 mL with 0.2 M HCl. The solid-phase extraction procedure (SPE) will be performed as follows: 100 µl of 1-Me-Pyr internal standard solution will be added to 5 mL of each urine sample, then 1 mL of 2 M NaOH will be added to each tube followed by vortex-mixing for 1 min at 50 r.p.m. In preliminary step SPE columns (Thermo Scientific SolEx C18, 6 mL with 0.5) will be placed in a Thermo Scientific 16-port Glass Block Vacuum Manifold system and pre-conditioned by washing them with 6 ml aliquots of methanol and deionized water. After that, the urine samples, with the internal standard, will be aspired on the top of SPE column. In sample application step the samples will be enabled to flow freely for 5 min through the packing bed of SPE columns and then a vacuum 3 mmHg will be applied until all the volume flows, discarding these fractions. In the washing step of SPE the columns will be eluted with 1 mL of deionized water for 2 min applying vacuum 3 mmHg. Then, vacuum will be turned off and the columns air dryied for 10 min. Finally, in selective elution step of SPE, the columns will be eluted with two successive 0.5 mL aliquots of methanol for 2 min using vacuum 2 mmHg. To these collected eluates, containing urinary cotinine, 100 µL of 10% methanolic solution of *p*-toluenesulfonic acid will be added. From this final SPE extracts, 1 µL will be taken to spot on the sample application position of HPTLC plate.

To perform the HPTLC analysis a CAMAG HPTLC system (Muttenz, Switzerland), controlled by the 'WinCATS' 1.4.4 Planar Chromatography Manager (CAMAG) software, will be used. The HPTLC plates (silica gel 60 RP-18 HPTLC glass-backed plates 20 cm × 10 cm, 2 µm in thickness - Merck, Germany) will be preliminarly washed with methanol and dried for 15 min at 120°C. The samples will be applied as bands of 7 mm in length, at a constant application rate of 150 nL/s, keeping the distance between adjacent bands as 9.4 mm.

Chromatography will be performed in an Automated Developing Chamber ADC2 up to a migration distance

of 70 mm (from the lower plate edge) using a mixture of methanol and ultrapure water 80:20 (v/v) as mobile phase, drying the plate for 3 min at 120°C on a TLC Plate Heater III. After development, the chromatograms will be scanned by a TLC Scanner 3 (deuterium and tungsten lamps, slit dimension, 6.00 × 0.45 mm; scanning speed, 100 mm/s).

The UV and Vis spectra will be recorded at 220 and 260 nm, and the evaluation will be carried out based on peak areas. Post-chromatographic derivatization will be performed by a solution containing 0.4 g of 2,2'-dihydroxyindan-1,3-dione, 1 g of cadmium acetate monohydrate dissolved in 4 mL of glacial acetic acid and filled up to 200 mL with methanol using a TLC Immersion Device (CAMAG) with an immersion speed of 3.5 cm/s and an immersion time of 1 s and heated on a TLC plate heater for 2 min at 120 °C.

After derivatization, the plates will be detected by a TLC Visualizer under UV light (254 nm and 366 nm) and white light. The identification will be made by comparison with selected standards (Rf values, colors, UV spectra). Repeatability will be determined by running a minimum of three independent analyses.

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