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Primary Health Care Information System for the Epidemiologic Study of Farmers

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Abstract

The agricultural work is associated with a series of adverse health effects. Health informatics could potentially contribute to the organization and development of the health data, therefore the need for an organized electronic file regarding farmers' health is crucial. The current project aims to develop an Information System which shall gather and store information not only about farmers' health, but also about the level of exposure to hazardous substances, the extend of use of Personal Protective Equipment (PPE) by farmers and the type of agricultural work. The above structure is expected to allow the use of the collected data in epidemiologic studies on farmers' health in order to associate exposure with the development of various diseases. A questionnaire was used as a methodological tool in order to set the appropriate fields that would finally be included to the Information System. The evaluation is being performed by assessing the effectiveness of the application as an epidemiologic tool as well as the various characteristics of the Information System itself.

Keywords:

agricultural workers, diseases, information systems, epidemiologic studies,
computerized medical records system

Introduction

Epidemiology of farmers' health

The agricultural work is associated with a series of adverse health effects, which are mainly caused by exposure to pesticides, allergenic agents, bad posture and weight lifting. According to the literature, the exposure to pesticides can cause several types of cancer, whereas allergenic inorganic and organic dusts are associated with the development of asthma, rhinitis and chronic bronchitis. As far as the ergonomic factors are concerned, inappropriate body posture, vibrations and heavy weight lifting may cause osteoarthritis and other musculoskeletal adverse effects. Accidents also consist an important hazard for the safety of farmers.

The use of Electronic Health Record in Primary Health Care

Most Primary Health Care Units in Greece do not use any kind of Electronic Health Record for the organization of the patient data at all. The health centers of the countryside routinely collect data into hand-written health records, but the data is not easily utilizable for the efficient surveillance of the patient health. In many countryside regions, the majority of people who visit the Primary Health Care facilities are occupied as farmers and stock breeders. Due to their occupation, they are are exposed to various hazardous agents, thus the need for an organized Patient Health Record is crucial. An effectively organized health record could be efficiently used for the improvement of the surveillance of farmers' health.

The use of an Electronic Health Record as a tool for epidemiological studies

A carefully designed Health Information System which includes various fields related with occupational health of farmers could be used as a tool for epidemiological studies. The use of information systems for this purpose is a practice that is being studied recently. The 2004 Utrecht study combined the traditional epidemiological studies with the strength of the Electronic Health Record that is being kept in Primary Health Care Facilities. Another study was carried out in 2004 by Majeed, which concludes that the data files stored in electronic form are potentially available for process and analysis. Manson et al. studied the applicability of data extraction from an Electronic Health Record and concluded that the collection of data is feasible.

The utilization of a reformed Information System for Primary Health Care Units to improve organization of health data of farmers is expected to assist Primary Health Care workers in their everyday practice. In addition, such a reformed Information System could be based not only on health data fields, but also on data of exposure to harmful factors, data regarding the extend of use of Personal Protective Equipment (PPE) and data on the type of production. Thus it can be used as a tool for the research of farmers' health and the fulfillment of epidemiological studies.

Materials and methods

The aim of the current project is to develop an Information System which can effectively be used in Primary Health Care facilities. The Information System shall be used as a tool for the surveillance and epidemiological study of farmers' health.

In order to build the fields of the Information System, a literature research was carried out regarding farmers' health, habits and factors related with the various hazardous exposures. Specifically, studies regarding farmers' health problems were studied and the results were summarized by type of risk and type of production. Also, literature research was carried out regarding the appropriate Personal Protective Equipment that should be used for each agricultural work.

Based on the above data, a questionnaire was built which was used as a tool to test the applicability and feasibility of the selected fields, before the actual development of the Information System. The questionnaire includes sections that resemble the actual structure of the Information System.

Once the specification and selection of the fields to be included in the Information System was completed, a careful design of the database schema was performed and the data fields were organized in normalized tables, connected with the appropriate relationships. The Information System is going to be installed in Primary Health Care Units and the extracted data shall be used by healthcare institutes and organizations for the surveillance of farmers' health as well as for the efficient utilization in epidemiological studies. The evaluation of the Information System is being performed in two levels.

The Questionnaire

After the completion of the literature research regarding farmers' health, habits and exposure factors, a questionnaire based on the results was created. The questionnaire is an important tool towards the development of the Information System, due to the fact that the fields selected are the ones that would be included in the e-health application.

The questionnaire has 4 sections. The first section includes questions about the demographic characteristics of farmers and their occupational history. The second section includes questions regarding the health record of farmers and their families. The third section refers to the type of production and the hours/days of work for each type of agricultural production type. Finally, the last section is about the exposure to hazardous substances, accidents related to the agricultural work, and questions about the use of various Personal Protective Equipment. The selected questions were based on a literature research aiming to recapitulate the main findings of studies on the appropriate PPE the farmers should use. The main sources of information are relevant organizations and Universities conducting research on farmers' health.

The Application

The Information System is being developed with Microsoft SQL Server 2005 in conjunction with Microsoft .net platform. The tables of the database include fields that were applied in the questionnaire. The application is being installed in Primary Health Care facilities and the data collected shall be used by any relative healthcare institute/ organization interested in conducting epidemiological research on farmers' health.

The Information System itself includes statistical calculations based on the data collected and further analysis can be performed once the extraction of the e-health record is done. The careful selection of the fields included in the information System and the way the data is being stored into the database, allows for easy extraction and direct use of the data in statistical packages such as SPSS.

Correlation of data

The data collected in the Electronic Health Record can be used in various correlation studies regarding farmers' health. The selection of the fields that were included in the Information System as well as the way the data is being stored makes it possible to directly extract data for statistical analysis and use it in order to carry out epidemiological studies.

Correlation of personal characteristics of farmers with the development of specific diseases, correlation of personal characteristics of farmers with the extend of use of Personal Protective Equipment, correlation of the level of use of PPE with the development of certain symptoms and diseases, correlation of type of production/hours-days of work per sector with the development of diseases/ symptoms and correlation of exposure to pesticides, noise from tractors and other hazards with the development of diseases/symptoms.

Evaluation

The evaluation of the Information System will be performed once the development of the application is complete. The evaluation is going to be carried out in two levels. The first level includes the evaluation of its use as an epidemiologic tool. A correlation study will be carried out on a well known health issue in order to assess the efficiency of the Information System as a tool for epidemiologic research. The second level of evaluation includes the assessment of the application in terms of content quality, usability, responsiveness and appearance.

Discussion

The use of the Electronic Health Record will contribute in the everyday work of healthcare professionals in terms of time, accuracy and operational costs. The use of the International Classification of Diseases (ICD) in all fields referring to diseases and symptoms will help towards the accuracy and fidelity of the health data. Every piece of health information will only be recorded once in the Electronic Health Record, without the existence of any kind of data redundancy. The Health Record of farmers is

expected to be easily distributed across granted interested parties. Finally, the backup system developed for the security needs of the Information system is expected to ascertain the security of the health data.