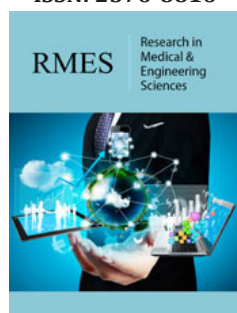


eMass: A Smart Digital Tool For Efficient Management And Medical Assessment of The New Recruits In Greek Armed Forces

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Introduction

In Greece, all men between the age of 18 and 45 with Greek citizenship are obliged to serve mandatory military service. The reserved training divisions are performed four to six times every year and the average number of recruits at each of them is around 400 to 1,000 [1]. For each recruit a physical / clinical overall examination is performed, involving various medical specialties. Currently, this procedure takes place in the absence of any kind of digital tool. Hence, this shortage results in disrupting the efficient human resources, assets and time management.

eMass overall concept

The eMass project aims at creating a platform that will facilitate the military recruitment process and, more specifically, the medical examination procedure. The platform will integrate a recruits' Electronic Health Record (EHR) which will be utilized to extract significant health indicators, which constitute a valuable key factor for actions towards recruits' health prevention [2]. In fact, for each recruit an EHR will be created by the staff of the classification unit, where his demographics along with his personal and family medical history will be stored. Additionally, a pre-screening test, through portable telemedicine equipment collecting ECG, blood pressure and oximetry signals, will be performed. The data will be automatically stored in the recruit's EHR and will be deployed in assessing the individual's cardiovascular risk function through dedicated digital tools and algorithms. The eMass digital health platform, with all the stored data, will be available to health scientists of local and central military medical units, for further evaluation and processing, giving them access to recruits' EHRs and advanced health data processing solutions.

eMass Information flow description

The information flow in the context of the eMass platform is summarized in Figure 1. This figure describes the following steps of each recruit's medical examination during his military recruitment process.

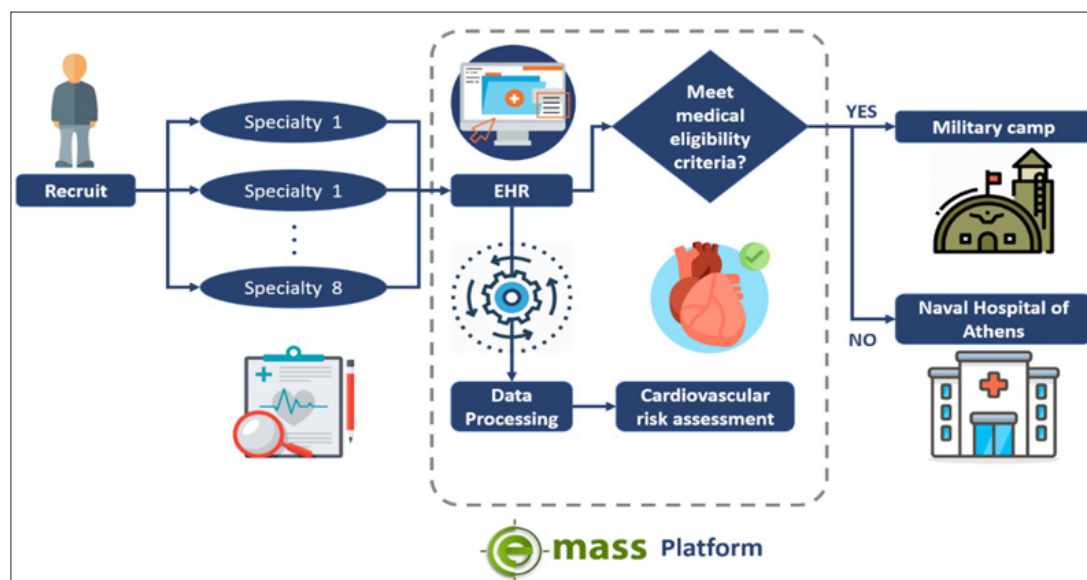


Figure 1: The information flow in the context of eMass platform.

A. Every prospective army recruit goes to a military entrance processing station.

B. The staff search his record with the conscription or social security number. Once the recruit has been identified, his basic data will be displayed (i.e., Name, Surname, Father's and Mother's name, conscription, and social security number).

C. The recruit's status is changed to "PRESENTED".

D. A QR code is printed for the recruit. The recruit is then forwarded to a specially designed area where the medical staff is located, which is staffed with a doctors' team from eight medical specialties (radiology, microbiology, pathology, cardiology, otorhinolaryngology, ophthalmology, surgery – orthopedics, and neurology – psychiatric). Each recruit passes through each medical specialty's workplace, where the code given to him at the entrance station will be scanned and the data entry will be accomplished.

The pathologists and cardiologists will have the system of portable telemedicine equipment, which will be connected with the laptop that will be used to record the medical data of the conscript in their EHR and by extension in the platform of e-Mass. The data recorded by the medical staff are stored on the main server of eMass. The team of each medical specialty is responsible for choosing if everything is normal. In the incident of a disease diagnosis, the appropriate finding is selected from a list of ICD-10 disease codes. Then, depending on the findings of each medical specialty, a decision is made as to whether the new conscript will receive a capacity crisis and join the ranking center to the military camp or whether he should receive a medical referral to the Naval Hospital of Athens (NHA) for further examinations.

An innovative feature of the project is that a possible cardiovascular medical incident will be clinically evaluated both by locally based medical staff and automatically through computational

means, utilizing machine learning algorithms (e.g., classification, clustering, market basket analysis by using association rules and forecasting procedures) incorporated into eMass medical incidents management unit. If a critical incident arises, and needs special care, specialized clinicians at the NHA will be thoroughly informed and they will provide their advice accordingly. The summary report exporting from the recruit's visit to the medical staff is recorded in the recruit's EHR.

eMass benefits

The major benefits deriving from the development and implementation of the eMass platform are summarized consequently:

- Supervision of overall health status and medical history of each recruit, contributing to timely and accurate diagnosis of underlying pathologies.
- Medical findings and diagnostic reports will be directly available to doctors.
- More productive management of medical exam scheduling (e.g., in cases of referral to the NHA), as the procedures will be automated, recorded and will follow a predetermined flow, without deviations [3].
- More efficient management and interpretation of medical data, avoiding repetition of unnecessary physical / medical examinations and, therefore, avoiding entailing errors [4].
- Reduction of bureaucratic procedures and simplification of work processes (through e.g., scheduling, access to PACS-RIS and EHR, creation reporting, etc.).
- Reduction of time and operational costs through utilization of ICT services (e.g., reduction of physical / clinical / imaging

examinations for each recruit throughout the whole military recruitment process).

- G. Facilitate and systematize the process of collection and recording of medical data [2].
- H. Development and utilization of a recruiter's Electronic Health Record. (i) The introduction and employment of automated machine-learning based cardiovascular risk assessment tool. This information is recorded in the individual's EHR and supports medical staff in making decisions [5].

In overall, the Greek Ministry of Defense will be able to upgrade its recruitment facilities and procedures. The medical examination process will be supported at every stage by the developed EHR, thus helping administrators to guarantee an efficient way to assess and protect the health of new members of the Greek Army. The work performed in this project provides basis for future research in several areas.

Acknowledgement

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