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MANAGING BIOLOGICAL RISKS TO CONTROL LABORATORY ACQUIRED INFECTIONS (LAIs)

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Introduction

Despite their undeniable value and significance, laboratories can pose biological risks for the workers and the environment, if containment measures and protocols are not followed and enforced properly. The above risks, are due to the uncertainty of any infectious biological agents in the diagnostic samples. Although many of these agents are found in nature and they are harmless for humans, some may cause diseases and laboratory acquired infections (LAIs).

LAIs are a concerning aspect of scientific research and laboratory work and the potential consequences can range from mild illness to severe, life-threatening conditions, depending on the infectious agent involved and the level of exposure. Some common routes of transmission include inhalation, accidental needle sticks, splashes, or direct contact with contaminated surfaces. To mitigate the risk of LAIs, laboratories must adhere to a combination of engineering and administrative controls, good microbiological practices, appropriate personal protective equipment (PPE), and personnel training.

Aim

The aim of the present study was by combining laboratory workers' perception and experts' evaluation, to review the biological risks in biomedical laboratories of public hospitals in Athens, Greece. It was also to evaluate how they are managing the biological materials, the level of safety awareness and training of the personnel, and to propose mitigation measures according to the existing risks, based on the local legislation and the international Biosafety guidelines.

Materials and Methods

The study was designed as a cross-sectional study with a detailed health and safety (H&S) questionnaire focused on biosafety and biorisk management, and a checklist to obtain the relevant information from these laboratories. A total of 36 biosafety level-2 biomedical laboratories in 20 public hospitals were assessed for their biosafety containment specifics and compliance with biosafety practices. Laboratory staff (medical laboratory doctors, medical laboratory technologists, laboratory assistants, biologists and biochemists, n = 415) completed the questionnaire. An expert biosafety officer observed and filled in a checklist in each biomedical laboratory (n=36) of the 20 hospitals.

Results

The results showed, that a significant percentage of laboratories lacked proper management of the biological agents and biological materials in general, thus: restricted access, controlled and independent ventilation, use of Biological Safety Cabinets (BSCs), biorisk management system, risk assessments, biosafety manuals, Standard Operating Procedures (SOPs), assigned biosafety officers, occupational medical doctor, emergencies plan, accidents reporting, and biosafety training programs.

Conclusion

There are marked deficiencies in containment and administrative controls, as well as in the implementation of the Greek and EU biosafety legislation, increasing the possibility of LAIs. This emphasizes the urgency of addressing critical gaps in biosafety and in emergency preparedness in Greek biomedical laboratories. Comprehensive biosafety mitigation measures, including a Biorisk Management System, risk assessments, SOPs, assignment of Biosafety Officers, staff trainings and emergency response plans should be developed, applied and enforced, in compliance with the local and European legislation and guidelines.

This study also showed that the combination of staff perception and experts' evaluation in the risk evaluation process increases the efficiency of risk management in the laboratory environment and the enforcement of relevant legislation. Therefore, these factors should be taken into account in future studies aimed at increasing the participation of hospital workers.

Using the results of this review, actions can be formulated to enhance the safety of these facilities and the Biosafety culture for the laboratory professionals, in order the laboratory professionals, the patients, the community and the environment could be better protected from possible harmful biological samples and agents, and LAIs.

Keywords: Biosafety, Biorisk Management, Biosafety legislation, LAIs