RESEARCH ARTICLE

Occupational exposure of healthcare workers to biological agents in a University Hospital of Northern Greece; A retrospective study

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ABSTRACT

Introduction: Healthcare workers who perform invasive procedures are at increased risk of contact with a patient's blood or other biological fluids. Exposure to blood and body fluids may occur through injuries caused by contact with sharp objects that can penetrate the skin, or through mucous membrane exposure. The risk associated with these accidents lies in the fact that workers are at risk of developing bloodborne infections, particularly hepatitis B and C viruses and human immunodeficiency virus (HIV).

Aim: The aim of this study is to record the frequency of exposure among staff working in a tertiary hospital to blood or other biological agents.

Methods: Data were collected from January 2018 to December 2021 for 365 exposures reported by healthcare workers at a University General Hospital in Northern Greece. The accidents were reported to infection control nurses. The statistical model used for data analysis was SPSS 25.

Results: The majority of accidents involved injury from a sharp object. Almost one tenth of the accidents involved employees with more than two exposures. Thirty percent of accidents occurred among employees with less than five years of work experience. The exposure frequency among employees was 20.92%. During the first pandemic years, occupational exposures decreased by almost 30%, as a result of the continuous vigilance of the infection control office, which provided daily updates on measures to prevent the then unknown coronavirus.

Conclusions: Occupational exposures are common in the hospital environment. The pandemic appears to have affected the frequency of accidents. The majority of employees complied with hygiene and safety rules. However, the number of accidents indicates that more intensive education is needed regarding bloodborne diseases, as well as measures for the prevention and management of occupational exposures.

Keywords: sharps injuries, healthcare workers, occupational exposure, bloodborne diseases, needle

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INTRODUCTION

Healthcare workers, particularly nurses (Vitello et al, 2024), who perform invasive procedures are at increased risk of contact with a patient's blood or body fluids (Elseviers et al, 2014; Alwabr, 2018). A sharps injury occurs when sharp instruments penetrate the skin tissue. If the sharp instrument is contaminated with blood and body fluids, there is a possibility of infection transmission. Exposure to blood or other biological fluids in healthcare settings is a common occurrence for healthcare workers in their daily practice (Perry, Parker and Jagger, 2003). However, the literature is replete with cases of non-reporting to the dedicated surveillance teams responsible for such exposure incidents (Doebbeling et al, 2003; Musa et al, 2014), even though such accidents constitute a small, but not insignificant, risk of exposure to potentially fatal bloodborne viruses (Almoliky et al, 2024).

Reports by the World Health Organization indicate that 1 in 10 healthcare workers worldwide sustains a needlestick injury every year (Prüss-Ustün, Rapiti and Hutin, 2005). In the United States, approximately 600,000-800,000 sharps injuries occur annually among medical personnel (Rapparini, 2006).

Exposure to blood and body fluids may occur through injuries following contact with sharp objects (needle, blade, scalpel, or other medical instruments that can penetrate the skin) or through mucous membrane exposure (such as the eye, mouth, or damaged skin tissue) (Fadil et al, 2021). According to a report by the Royal College of Nursing (2021), such exposures are highly hazardous because they can transmit almost any pathogen present in human blood, while reports have documented approximately 60 pathogens that may potentially be transmitted to healthcare providers.

As noted earlier, hospital workers are at risk of developing bloodborne infections, particularly hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) (Tarigan et al, 2015), which carry significant morbidity and mortality and account for the vast majority of occupational infections reported in hospital settings (Tarantola, Abiteboul and Rachline, 2006).

In addition, there is an economic burden borne by employers due to occupational exposure to infectious diseases transmitted through blood or other biological fluids, which includes costs for laboratory tests, treatments, and lost working hours (Lavoie, Verbeek and Pahwa, 2014). The World Health Organization (WHO) estimates that sharps exposure in the hospital setting is responsible for 2-3% of HIV infections and 40% of HBV and HCV infections among workers (WHO, 2002). The annual cost of occupational exposures is estimated to range from 6.1 million dollars in France to 118-591 million dollars in the USA (Saia et al, 2010).

After exposure to biological agents, reporting the accident is essential for treatment and prevention purposes. Healthcare workers' exposure to blood or other biological fluids threatens both their physical health and their psychological balance, while also alerting employers to the need to strengthen preventive programs that prevent such accidents (RCN, 2021). Especially for workers exposed to HIV, the psychological and emotional disturbance caused produces negative emotions (Almoliky et al, 2024), which may even lead them to resign (Elseviers et al, 2014).

In hospital settings, occupational accidents due to exposure to blood or other biological fluids must always be recorded. Hospitals have surveillance systems for monitoring the rates of such accidents, as well as the possible risk factors associated with these injuries. Immediate reporting of blood exposure following injury from sharp objects, as well as exposure to other infectious agents, is necessary so that prophylactic treatment can be administered. Preventive strategies such as the education of hospital employees, increased use of universal precautions, and implementation of safety devices have been shown to significantly reduce such exposures (Prassana, Dick and Murphy, 2007).

As already mentioned, exposure to blood or other biological fluids in healthcare settings is a common occurrence for healthcare workers in their daily practice (Musa et al, 2014). McCormick and Maki (1981) were the first to recognize and describe occupational exposure among workers in healthcare settings, proposing a series of strategies for controlling and limiting these accidents. These strategies included a series of educational programs focused on the proper management of sharp objects, such as their correct disposal in sharps containers, as well as avoiding needle recapping. However, strategies mainly focus on frequent briefing of clinical departments by those responsible for monitoring occupational exposures, with emphasis on educating healthcare workers, increasing the use of universal precautions, and implementing safety devices, interventions that have been shown to significantly reduce such exposures (De Carli et al, 2022).

One of the most important problems faced by occupational exposure control services is underreporting (Doebbeling et al, 2003; Musa et al, 2014), since immediate reporting of blood exposure following injury from sharp objects, as well as exposure to other infectious agents, is necessary so that prophylactic treatment can be administered (Viode et al, 2012). The result of underreporting is failure to follow the scheduled post-accident testing instructions, lack of scheduled follow-up by an infectious disease specialist, and inadequate adherence to prophylactic treatment protocols (Pérez-Diaz et al, 2015). As also noted above,

workers' lack of knowledge, lack of time due to workload, and lack of risk awareness (Wang et al, 2003; Joukar et al, 2018; Li, He and Zhao, 2024) are factors associated with low compliance with occupational exposure management protocols.

Regarding immediate control measures after exposure to blood and other biological fluids, the protocol of the National Public Health Organization (EODY, 2019) is followed. After care of the injured area, the incident should be reported to the supervisor and to the hospital infections office. If the exposure involves a suspected HIV case, information on antiretroviral treatment should be provided by infectious disease specialists. Moreover, the literature shows that adherence to antiretroviral treatment is associated with reduced viral load and delayed onset of HIV (Abadie et al, 2024). Scheduled testing for a healthcare worker exposed to HIV is performed at 6 weeks, 3 months, and 6 months after exposure, while follow-up by an infectious disease specialist is recommended. Testing of the healthcare worker must always be performed for HIV, HBV, and HCV in all accidents.

Regarding the management of hepatitis B prophylaxis, the decisions to be made depend on the number of antibodies (Anti-HBs), the presence of HBsAg, and the vaccination coverage of the worker. For prophylaxis against hepatitis C virus, there is no recommendation for immunoglobulin administration, while the healthcare worker should be placed on a periodic testing protocol (repeat Anti-HCV and ALT testing at 4-6 months after exposure and HCV-RNA testing at 4-6 weeks).

The aim of our study is to investigate the frequency of sharps injuries and to identify the risk factors for these injuries among healthcare workers in a General Hospital in Northern Greece during the period 2018-2021.

MATERIALS AND METHODS

The quantitative study analyzed data from a 4-year period (from January 2018 to December 2021) for 365 exposures to blood and other biological fluids reported by 315 healthcare workers (HCWs) at a University General Hospital in Northern Greece. The accidents were reported to the hospital infection surveillance team. This hospital is one of the largest in Northern Greece, with almost 700 beds. In all accident cases, an epidemiological form concerning details of the exposure was completed. Specifically, the demographic data of the exposed healthcare worker and the exposure source (patient), data concerning the circumstances of exposure, the injury site, the cause of the accident, and the immediate measures taken after the accident were recorded. Personnel were classified according to professional status as physicians, nurses, building support staff, allied health personnel, nursing students, and medical students.

HCWs who came into contact with HBsAg-positive patients and who either had not been immunized or had been immunized but did not have an adequate number of Anti-HBs (<10 mIU/mL) received HBV immunoglobulin and, at the same time, began a complete immunization schedule (three-dose vaccination) or received a booster dose of vaccine (10 mIU/mL < Anti-HBs < 100 mIU/mL). In the case of an unknown source, HCWs were given antiretroviral treatment, followed a periodic testing schedule, and were monitored by the special infections department. When HCWs were exposed to an HCV-positive patient, they underwent initial serological testing and retesting with anti-HCV at 4 and 6 months, and HCV-RNA testing at 6 weeks. Finally, all HCWs who came into contact with HIV patients were referred to the special infections office for further instructions from infectious disease specialists, while antiretroviral treatment was administered after written consent. These HCWs underwent serological testing for anti-HIV at 6 weeks, 12 weeks, and 6 months.

Data related to age, gender, work experience, professional status, department of origin, mechanism of injury, causes of injury, measures taken after the accident, the shift during which the accident occurred, accidents involving bloodborne diseases, and antibody levels (Anti-HBs) were analyzed. The statistical model used for data analysis was SPSS 25.

The study protocol was submitted to the Bioethics and Ethics Committee of the University General Hospital in Northern Greece where the study was conducted. The basic principles governing the research are confidentiality and anonymity. The name or any other personal identifier of the participants is not recorded anywhere.

RESULTS

During the study, out of a total of 1,744 hospital employees, 315 workers reported one or more exposures to blood or other biological fluids, recording a total of 365 accidents. Specifically, one worker was exposed 6 times, 7 workers 3 times, and 42 professionals were exposed twice, while two of these had 3 exposures within a 6-month period. The exposure frequency among workers who had direct or indirect contact with patients was 20.92%. Regarding the professional status of those exposed, 48.2% (176 accidents) involved nurses, 31% (113/365 accidents) physicians, 4.1% (15/365 accidents) cleaning staff, 3% (11/365 accidents) medical students, while 6.8% (25/365 accidents) were nursing students. The data are presented in Table 1.

Table 1. Number of exposures by professional category

Professional category	Number of exposures	Exposure percentage
Nurses	176	48.2%
Physicians	113	31%
Cleaning staff	15	4.1%
Allied health personnel	25	6.8%
Medical students	11	3%
Nursing students	25	6.8%
Total	365	100%

Of the total 365 accidents, 260 involved female workers and 105 involved male workers. There was no association between sex and exposure in any professional category of workers, except one. In this specific category of workers, namely nurses, women presented higher injury rates than men, as shown in Table 2. Of the 176 accidents that occurred among nurses, 26 involved men and 150 involved women, while the distinction of these accidents by department, sex, and professional status revealed that the medical sector had only 10 injuries among male nurses out of 95 total exposures, the surgical sector had only 1 injury among a male nurse out of 12 total injuries, the operating theatre department had 7 exposures among male nurses out of 30 total injuries, and the Emergency Department (ED) had 2 exposures among male nurses out of 17 total injuries. In this specific categorization of accidents by sex, department, and professional status, no significant deviation was demonstrated among physicians, except for the surgical clinics, where 34% (8/23 exposures) involved female physicians and 66% (15/23 exposures) involved male physicians.

Table 2. Nurses' exposure according to sex and department

Nurses by department	Male injuries	Female injuries
Medical clinics	10	85
Surgical clinics	1	11
Operating theatres	7	23
ED	2	15
ICU	3	8
Allied health	3	8
Total	26	150

The association between age category and accidents revealed that the highest percentage of accidents was observed in the category of workers aged >50 years, with 105 accidents (28.8%), while in the other categories the percentages were relatively similar: 21.6% in the 20-30 years category, 25.5% in the 31-40 years category, and 24.1% in the 41-50 years category. Interesting results were revealed when this category (age group and accidents) was associated with professional status (Table 3).

Table 3. Accidents by professional category and age

Age (years)	Nurses	Phys.	Nursing students	Cleaning staff	Allied health	Medical students
20-30	14	36	12	1	5	11
31-40	39	40	8	2	4	0
41-50	52	21	4	4	7	0
>50	71	16	1	8	9	0

Specifically, nurses showed a higher tendency for exposure to blood and other biological fluids in older age categories. A progressively greater increase was observed as the age category increased. More specifically, of the 176 accidents that occurred among nurses, 7.9% belonged to the 20-30 years category, 22% to the 31-40 category, 29% to the 41-50 category, and 40% to the final category of >50 years.

Similar trends to those observed among nurses were also identified in two other categories of workers. Increased accident rates in the two older age categories (41-50 and >50 years) were observed both among cleaning staff and among allied health professionals. Specifically, among cleaning staff, almost 80% (12/15) of accidents occurred in individuals over 41 years of age, while among allied health workers the corresponding percentage was 64% (16/25). For physicians, medical students, and nursing students, the exposure frequency was higher at younger ages (in the 20-30 and 31-40 years categories), with percentages of 67%, 100%, and 80%, respectively.

Most accidents occurred during the morning shift (07:00 am-15:00 pm), specifically 244 exposures (66.8%). The shift with the next highest exposure frequency was the afternoon shift (15:00 pm-23:00 pm), during which 98 accidents occurred (26.8%), while the fewest occurred during the night shift (23:00 pm-07:00 am) (6.3%). The results revealed that no differentiation was observed for any professional category.

Regarding the reasons for occupational exposure, carelessness, at a rate of 64.1%, is a very important factor, with haste being the second most important cause of exposure at 17.3%. Negligence and the presence of an agitated patient were reported at lower rates, 6.8% and 11.8%, respectively. A noteworthy finding concerns the actions followed by healthcare workers, as 39/176 nurses used bleach to care for their exposure site. The use of bleach instead of proper management with washing with water or use of antiseptics was also observed among physicians (14/113), cleaning staff (3/15), allied health personnel (8/25), medical students (2/11), and nursing students (4/25).

The association between accidents and the clinical area in which they occurred revealed that by far the highest number of accidents occurred in the medical sector, at a rate of 46.6% (170/365 exposures). The operating theatre area, with a large difference from the medical sector, followed with 54 accidents (almost 14.8%), while 46 (12.6%), 42 (11.5%), and 39 (10.7%) accidents were recorded in the surgical sector, central laboratories, and ED, respectively. Finally, the ICU was the department with the lowest percentage of worker injuries, with 14 accidents and a rate of 3.8%.

A total of 76.2% of injuries (278/365) involved injury from sharp objects (needle, venous catheter), while the next most frequent injury involved mucous membrane exposure, at a rate of 14.5% (53/365). The remaining percentage (almost 6%) involved skin injury following trauma from other sharp materials (scalpels), while a small category of 3.3% concerned other failures in daily practice. The ways in which healthcare workers were exposed involved a series of different practices. The majority of accidents (80/365) involved invasive surgical procedures, at a rate of 21.9%, while blood sampling, peripheral vascular catheterization, needle recapping, incorrect disposal of sharps in special containers, and blood glucose testing accounted for 18.9%, 17.8%, 14.2%, 9.3%, and 7.4%, respectively. Finally, 2.5% (9 workers) were punctured by needles left in linen or in waste bags.

Eighty-five of the 365 accidents occurred from patients who had a known bloodborne disease (HIV, HCV, HBV). Of the 365 accidents, 27 were from an unknown source. Among these patients, 20 were HIV-positive, 35 were HCV-positive, and 30 were HBV-positive. Among patients with HIV, 4 also had HCV, while 3 patients with HCV also had HBV. One patient had all three diseases. Forty-seven (47) workers received antiretroviral treatment, of whom 27 had exposure from an unknown source and 20 had exposure from seropositive patients. In none of these 47 cases was seroconversion detected among healthcare workers. Regarding injuries involving seropositive patients, 6/20 injuries involved needlestick injury, 2/20 exposures involved skin injury due to abrasion, while half of the exposures (10/20) involved mucous membrane exposure, mainly of the eyes. From an unknown source, 20 of the 27 accidents involved puncture by a sharp object, 4 involved mucous membrane exposure, and 2 involved skin injury. Of the 30 accidents involving HBsAg(+), 26 were punctures with a sharp object. Most accidents involving bloodborne diseases occurred among staff in medical clinics (41%), with the operating theatre being the second most frequent clinical area for such accidents at 17.6%, while surgical clinics and the ED accounted for 11.7% and 10.5%, respectively. No association was found between exposure to a known bloodborne infectious source and age status. Of the 365 accidents, in 317 (86.8%) healthcare workers had an adequate number of antibodies, while immune insufficiency was observed in 48 (13.2%).

DISCUSSION

Occupational exposures are a common phenomenon in the hospital environment, since almost half of healthcare workers will experience an accident during their career (Bairami et al, 2024). However, they are not irreversible, as organized prevention strategies have shown signs of improvement (Prassana, Dick and Murphy, 2007).

In our study, the overwhelming majority of accidents

involved injury from a sharp object, following the findings of many research studies (Rapparini, 2006; White, 2007; Cho et al, 2013). In addition, a notable finding is that almost 13% of accidents occurred among workers who reported more than 2 exposures during the four-year study period. This finding does not agree with other studies in which re-exposure rates were many times higher than in our research (Martins et al, 2012).

In our study, a higher exposure rate was reported among women than among men, at almost 70%, with our data agreeing with other studies (Gheshlagh et al, 2018). An association between sex and exposure existed in only one specific category, namely the nursing profession. Almost 6 out of 7 nurses who were exposed were women, while among physicians the ratio of exposed men and women was similar. The difference in the distribution of accidents by sex, especially in the nursing profession, may be due to the fact that this professional category has traditionally been associated with the female sex (Meadus and Twomey, 2011), whereas this assumption does not apply in the medical profession (Levinson and Lurie, 2004). Our findings contrast with those of other studies reporting a higher frequency of injuries among male nurses than among female nurses (Saadeh et al, 2020).

Regarding the association between sex and clinical area, a difference was identified only in the medical sector, since male nurses clearly had fewer accidents than their female colleagues, while there was no significant difference in the remaining clinical areas. This may also be explained by the fact that medical departments had more frequent and demanding contact with patients, while also bearing the burden of nursing care for Covid-19 patients. In the medical profession, only in surgical clinics was a higher proportion of accidents observed among surgeons due to the many invasive procedures (Viode et al, 2012), while the fact that male surgeons had more accidents than female surgeons may be explained by the fact that the surgical profession is traditionally associated with the male sex (Hirayama and Fernando, 2018).

According to the international literature, nurses are the professional category with the highest frequency of exposure to blood and other biological fluids (Elseviers et al, 2014; Vitello et al, 2024). Our study reached the same conclusions, as almost 1 in 2 exposed workers belonged to the nursing profession. The fact that nurses are traditionally the professionals who spend the most time caring for patients (Vitello et al, 2024), and that they constitute the largest professional group in the hospital environment, may be possible reasons for these findings. Of course, there are also studies that record contrary results, reporting that physicians are the professional category most prone to injuries from sharp objects (Wicker et al, 2008).

Non-compliance with recommended infection control precautions was the main factor contributing to injuries during the study. In most cases involving placement of peripheral venous lines or the blood glucose testing procedure, workers reported that they did not have sharps disposal containers available nearby during their invasive practice, while when they did have them, the containers had exceeded the safe fill limit. These findings agree with the results of other studies emphasizing that such superficial injuries can be prevented through compliance with recommended protocols (Rice et al, 2015).

Studies report that the SARS-CoV-2 pandemic resulted in a reduction in the frequency of exposure to blood and other biological fluids, mainly following injuries from sharp objects (Diktas et al, 2021). The arrival of SARS-CoV-2, as well as the unknown consequences it caused for the health of those who became ill, sounded the alarm for infection surveillance teams, which considered that hygiene and safety programs for healthcare personnel might deteriorate due to the COVID-19 pandemic. In our study, during the period of the first and second pandemic waves (that is, throughout the year 2020), the number of accidents decreased by almost 30%, a finding that disagrees with the results of other studies that did not observe changes in the incidence of accidents (Diktas et al, 2021). This decline in accidents in our study may also be due to the vigilance of the hospital infection surveillance office, which informed clinical departments daily about the correct use of PPE and the prevention of transmission of the novel coronavirus. This may also have led to the creation of a trend toward greater compliance, making healthcare workers more careful. Therefore, compliance due to fear of exposure to the then unknown virus led to a reduction in accidents during the pandemic period. However, some studies suggested that the pandemic led to an increase in exposure to blood and other biological fluids because workers were unprepared to deal with such demanding care (Stojic, Grabovac and Lucijanic, 2022), while the extensive use of PPE often constituted an obstacle to the quality and safe care of Covid-19 patients, making this practice dangerous for healthcare workers themselves (Galanis et al, 2021).

Our study showed an almost balanced association between accidents and age, since the category >50 years had a slightly higher frequency of exposure (almost 28%). Other studies emphasize that age is an important factor that acts synergistically in the observation of increased incidents of exposure to biological agents, especially at ages <25 years (Smith et al, 2006). Similar conclusions regarding the association between young age and the occurrence of accidents are also emphasized in the Royal College of Nursing report (RCN, 2021), although the researchers are cautious because of the special circumstances created by the pandemic. However, other studies had findings similar

to ours and reported no significant association between age and the frequency of occupational accidents in hospital settings (Fredrich, Nsubuga and Jaakkola, 2005). A particular finding in our study concerned the association between age and professional category, where a high incidence of accidents was observed among nurses over 50 years of age compared with other age groups, while high exposure rates were also observed for cleaning staff and allied health professionals in the same age category. For medical and nursing students, the frequency of injuries was evident and is explained by their limited work experience (Ehsani et al, 2012).

In addition, work experience was also implicated in our study, since 30% of accidents occurred among workers with less than 5 years of service. These findings agree with other studies showing that more experienced workers had lower injury rates (Zhuo et al, 2018; Bazie, 2020). This may be because more experienced healthcare professionals have more complete and advanced skills in handling sharp objects and may therefore present a lower risk of sharps injury. However, we should not forget the phenomenon of bullying of new employees by older ones, within which a greater workload is transferred to younger workers, directly affecting their daily practice (Yıldırım, 2009). Due to excessive workload and time pressure, younger workers cannot complete their duties on time, often resulting in negative treatment by their superiors and making them vulnerable to occupational exposures.

Our study showed that carelessness due to haste was the most important factor in occupational exposure among healthcare workers, with our findings agreeing with other research studies (Siddique et al, 2008; Zafar et al, 2008). Fatigue resulting from the pressure to complete more tasks within a defined period is the likely explanation for this association between haste and exposure frequency (Bazie, 2020).

Our findings regarding the actions followed after exposure for care of the injury site were also noteworthy, as 1 in 5 nurses used bleach instead of washing with soap and water. The fact that the majority of these nurses who used bleach were over 50 years old may indicate difficulty in assimilating and adopting the educational programs that clearly describe the correct management of the wound area. In general, studies show that nurses do not have a satisfactory level of knowledge regarding exposure to biological agents (Garus-Pakowska and Górajski, 2019).

Finally, seroconversion rates among workers exposed to blood or other biological fluids in our study were zero, supporting the view of other researchers who emphasized that rates were very low, such as 0.1% for HCV (Egro et al, 2017). In addition, the immunization rate of exposed workers was very high. The incidence of injuries from a known source with HIV was lower than for HBV and HCV, as in other studies (Agustian et al, 2019). According to studies, although the frequency of infection by bloodborne diseases increases when the patient has co-infection (Sulkowski, Ray and Thomas, 2002), no seroconversion was observed from patients with simultaneous HIV and HCV, HIV and HBV infection, or all three diseases, findings that agree with previous studies (Yazdanpanah et al, 2005).

CONCLUSIONS

Handling sharp objects constitutes a significant risk for healthcare workers. Therefore, those responsible for healthcare units should develop strategies to improve the working conditions of healthcare professionals. The cornerstone of the multifaceted strategies for accident prevention will be the education and information of healthcare professionals. Training and education of healthcare workers for the prevention of sharps injuries and exposure to other biological fluids is part of their professional identity. Given the existence of legislative requirements to protect workers' health and safety, the literature has shown that investigating the outcomes of education reduced the anxiety and insecurity of healthcare workers regarding the prevention of occupational exposures (Moayed et al, 2015). Education will therefore strengthen healthcare professionals' ability to assess dangerous situations and manage medical equipment safely. After all, in a society of progress and well-being, the safety of the working environment is one of its defining characteristics for smooth functioning.

Author contributions

Lambros Tabakas analyzed the data and contributed to the interpretation of the results, the writing of the manuscript, and the collection of the literature. Ioannis Istikoglou, Eirini Georgopoulou, Konstantinia Bampi, and Evangelia Pontika participated in the design of the study as well as in data collection. Parthenopi Pantelidou evaluated the final manuscript. All authors approved submission of the final manuscript.

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