

Original papers

Is there a benefit in the follow-up of medical emergencies in the occupational medicine on-site office?

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Abstract

Background: Medical emergencies (ME) occur frequently in the Occupational Medicine (OM) office and sometimes require immediate treatment, disrupting the flow of current activities. The objective of this prospective observational study is to document the evolution of patients previously presented with ME, the factors that influence it, the impact of initial major ME and recurrent ones, towards optimizing individualized medical management.

Materials and methods: Subjects presented between January and June 2023 with ME in the on-site office of a pharmaceutical company, 137 patients, were followed up for 1 year, resulting 2 groups(G): those who returned with ME(G1 – 53 patients, 38.7%) and G2 – the rest of the patients, who did not return (84 employees, 61.3%). ME that required ambulance/treatment (etiological/symptomatic) were noted, along with the disease categories corresponding to the reason for presentation, work ability, professional exposures, vital status.

Results: During the follow-up period of the 137 included subjects (mean age 41 years, female predominance-66.4%), 53 (38.7%) returned to the office, a mean of 1.8 returns/patient. In G1, digestive, cardiovascular, respiratory, infectious and psychological MEs were frequent. The majority received symptomatic treatment(67%), and 20%-etiological. Current work ability is influenced by the history of conditional work ability ($p=0.049$, $RR=2.1$) and initial major ME ($p=0.04$, $RR=1.8$). Initial major UMs were associated with both the need for intervention upon return ($p=0.041$), and the number of interventions required ($p \approx 0.0003$).

Conclusions: Employees with ME frequently return to the OM office (approximately 40%). Most ME require medical intervention, significantly influencing the occurrence of subsequent ME and work ability. Most recurrent MEs were digestive and cardiovascular in nature, without highlighting a causal relationship with OE. A percentage of 37.7% of patients returned with the same category of conditions, which suggests that monitoring the evolution could contribute to the identification of undiagnosed or insufficiently controlled diseases.

Keywords: *occupational medicine, medical emergency, on-site office*

Introduction

Employees frequently seek care for medical emergencies (MEs) at occupational medicine (OM) offices [1, 2]. Active follow-up of such cases may entail additional costs; however, potential benefits for employee health, and productivity may counterbalance these costs. OM consultations are defined by governmental regulations - HG 355/2007, amended by HG 1169/2011, as preventive medical evaluations performed at hiring, adaptation, periodically, upon return to work, special surveillance, and health promotion at the workplace [3,4], while presentations for acute MEs fall outside these administrative purposes. On-site medical offices, authorized inside the company, often represent the first point of medical contact within the enterprise; patients with prior MEs may subsequently return either for the same complaint or for unrelated conditions. Monitoring these individuals may reveal previously undiagnosed pathology, and inform work fitness decisions, rendering systematic analysis of ME characteristics in OM settings imperative.

This problem is very actual, as data on MEs in OM remain scarce. A recent Polish study highlighted overburdening of emergency medical services by workplace-related events [5]. The role of emergency physicians with additional OM competencies has been acknowledged since 1986 by the American College of Emergency Physicians, as ME had become an increasingly common challenge, but OM physicians and personnel had to be instructed in handling ME [4]. Recent research focuses on occupational cardiology, including jobs with a high risk of developing cardiovascular diseases with potentially serious consequences. Although specific scores have been submitted for OM, data remains insufficient for proper risk stratification [6,7]. Another very recent review focuses on ME linked to workplace risks, to better the response and outcome of such events [8].

The present investigation extends a prior cross-sectional analysis of MEs in the same on-site office, which studied differences between major and minor MEs, and factors prolonging consultation duration for emergencies [2].

Materials and Methods

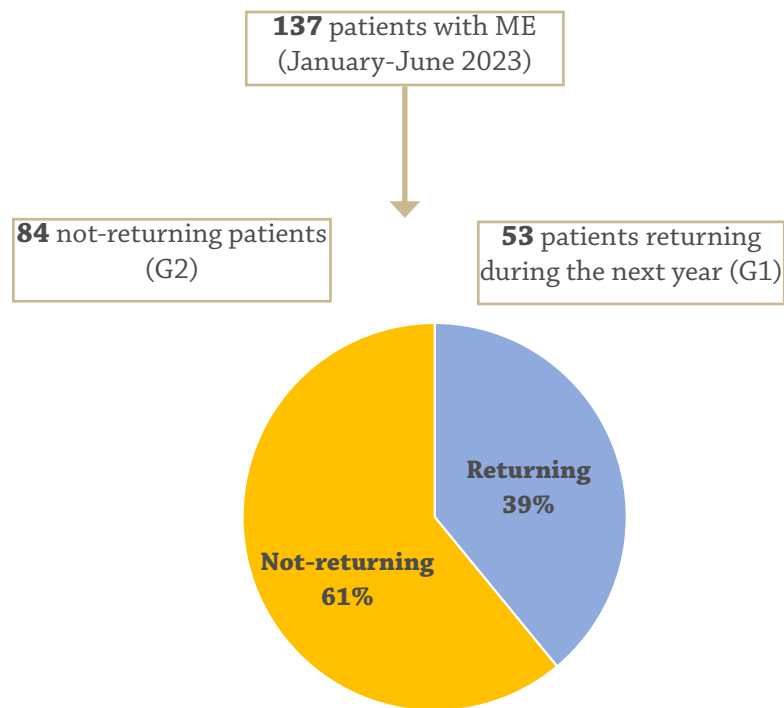
Employees and on-site contractors presenting with MEs at the pharmaceutical company's OM office between January and June 2023, 137 subjects, were prospectively followed for one year (01 July 2023 – 30 June 2024), resulting into two groups: G1 – recurrence

of ME (N=53; 38.7%) and G2 – no recurrence (N=84; 61.3%), shown in Figure 1. MEs were defined as acute presentations unrelated to scheduled preventive or administrative OM examinations. Interventions comprised: 112 emergency service requests, etiological or symptomatic pharmacological treatment, specialist outpatient referral, or excused for the rest of the shift. Major MEs were those requiring at least one intervention.

The MEs in the initial study generated 173 office presentations over a 6-month period and required multiple interventions. A prospective observational study with a 1-year follow-up period was designed with the primary objective of analyzing the evolution of patients who had previously presented with MEs. Secondary objectives were: noting the MEs that intervened in the dynamics and the disease categories involved, factors influencing the evolution, the impact of major MEs at previous presentations on subsequent events, how work ability is influenced, to optimize individualized patient management.

Study variables included: demographic data, reason for presentation for recurrent ME - diagnosis by ICD-10 categories, need for ambulance with/without transport to hospital, resolution of the case by symptomatic/etiological treatment in the office, if the patient was excused for the rest of the shift (with written communication of the medical decision to the direct manager), refusal to comply with medical recommendations, work ability before and after the follow-up period, professional exposures, mortality from any cause (by accessing the National Health Insurance House platform, <http://siui.casan.ro:82/Asigurati/>) [9]. The diagnostic categories used were the chapters from the international classification of diseases ICD-10: Chapter I, Certain infectious and parasitic diseases, Chapter IX, Diseases of the circulatory system, Chapter VI, Diseases of the nervous system, Chapter XI, Diseases of the digestive system, Chapter XIII, Diseases of the osteo-articular system and connective tissue, Chapter XIX, Injuries, poisonings, traumas and other consequences of external causes, Chapter X, Diseases of the respiratory system, Chapter XII, Diseases of the skin and subcutaneous tissue, Chapter XIV, Diseases of the genitourinary system, Chapter V, Mental and behavioral disorders [10].

Inclusion criteria were: employees or contractors who presented with ME in the initial study (6 months: January-June 2023) at the on-site office on weekdays during the official schedule (08:00 – 16:00), age >18 years. The exclusion criterion consisted of the refusal of patients to participate in the research.

Figure 1. General study population and study groups

Legend: ME=medical emergency, G=group.

Statistical analysis used Microsoft Excel version 2013 and Epi Info version 7.2.2.2. Numerical variables were expressed as mean and median, and qualitative variables were presented as absolute value and percentage. Comparison was performed by ANOVA for quantitative variables with normal distribution and non-parametric tests for quantitative variables and Chi-square and Fisher Exact test for qualitative variables, statistical significance being accepted for p value < 0.05 . Access to the database stored on the healthcare provider's computers was secured with a

password, and all ethical requirements were met, in accordance with the Declaration of Helsinki.

Results

Study population

The main characteristics of the general study population are detailed in Table 1. The 2 groups are homogeneous in terms of age, gender distribution, number of initial presentations with major ME, and work ability.

Table 1. The main characteristics of the general study population

Parameter	Total patients N=137	G1 (N=53)	G2 (N=84)	p-value
Age (years) (mean, (median))	41 (41)	40.7 (40.5)	41.5 (41)	0.71
Male sex (n, (%))	46 (33.6)	17 (32.1)	29 (34.5)	0.76
Initial intervention - major ME (n, (%))	72 (52.6)	27 (50.9)	45 (53.6)	0.71
Conditional fitness for work up to Jan 2023 (n, (%))	12 (8.8)	7 (13.2)	5 (6.0)	0.24
Conditional fitness for work after Jan 2023 (n, (%))	15 (10.9)	7 (13.2)	8 (9.5)	0.82

Legend: N = number; G = group; ME = medical emergency.

Results regarding G1 - the group of employees with emergency visits

On average, in G1 there were 1.8 visits/patient, with a minimum of one visit and a maximum of 8 visits to the office. 20 employees (37.7%) returned for the same category of illness as in the initial study (Table

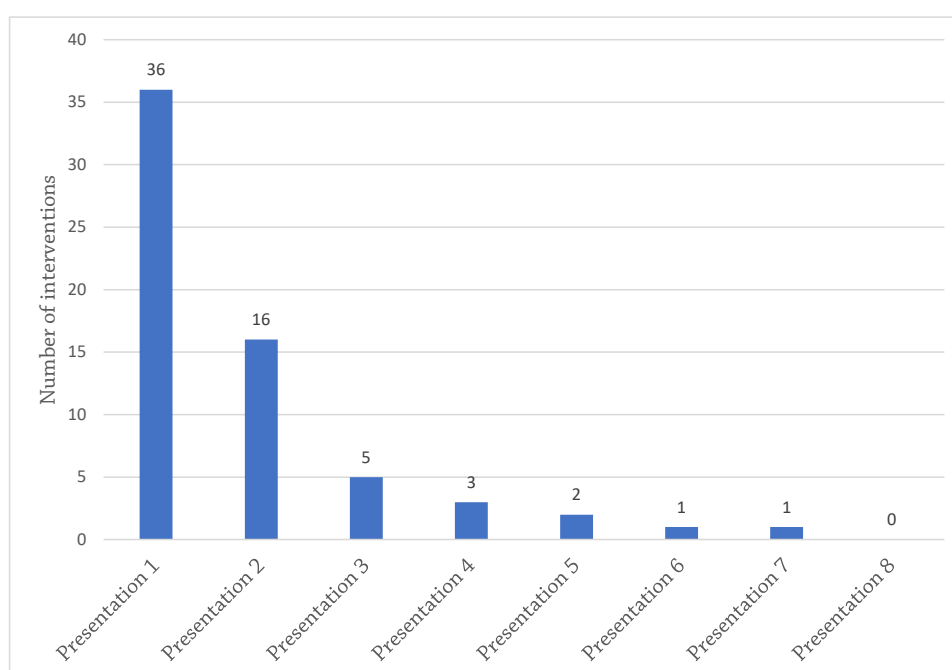
2, where G1=ME with immediate intervention, and G2=ME that did not require intervention). The graph in figure 2 illustrates the number of interventions according to the number of presentations of the subjects in G1.

Table 2. Main characteristics of the study population on inclusion [2]

Parameter	Total presentations (N=173)	G1 (N=95)	G2 (N=78)	p-value
Age (years)	40.8 (41)	41.4 (41)	40.1 (41)	0.45
Male sex (n, (%))	53 (30.6)	25 (26.3)	28 (35.9)	0.17
Number of disease categories involved	1 (1)	0.9 (1)	1 (1)	0.08
Morning presentations (n, (%))	141 (81.5)	67 (70.5)	74 (94.9)	0.0004
Consult duration (minutes)	16.2 (10)	21.1 (15)	10.4 (10)	0.0001
Symptoms starting while at work (n, (%))	160(92.4)	89 (93.7)	71 (91)	0.51
Blood pressure (mmHg)	132.5/81.1	134.1/ 72.3	127.1/68.1	0.35
Heart rate (/min)	84.3 (80)	86.5 (85)	76.7 (76)	0.06
Oxygen saturation (%)	97.5 (97)	97.6 (97)	97.4 (97)	0.45
Blood glucose (mg/dL)	108.5 (105)	109 (106)	102 (102)	0.7
Acute episode of previously known disease (n, (%))	19 (10.9)	14 (14.7)	5 (6.4)	0.08

Legend: N = number; G = group

Figure 2. Medical interventions according to the number of presentations at the on-site office



Overall, a total of 64 interventions were applied to patients in G1. There were no cases requiring ambulance/hospital transport. Figure 3 shows the types of medical interventions applied to patients who returned with major ME.

Initial MEs requiring intervention influence recurrent ME ($p=0.04$, $RR=3.1$). Disease category at relapse with UM: digestive disorders upon returning in the office are significantly associated with initial major

ME ($p=0.002$). The number of interventions required when returning with ME is associated with the initial intervention for ME (a mean of approximately 1.1 interventions in those without, 1.85 in those with initial intervention, $p=0.0002$), as in Figure 4.

The reasons for emergency presentation, according to ICD-10 disease categories, are graphically represented in Figure 5.

Figure 3. Types of medical interventions at the office

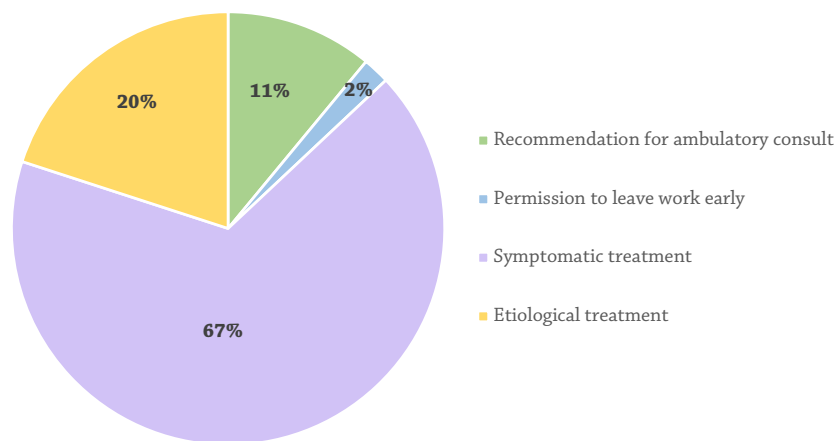


Figure 4. The number of interventions required for returns with ME is associated with the initial intervention for ME ($p=0.0002$).

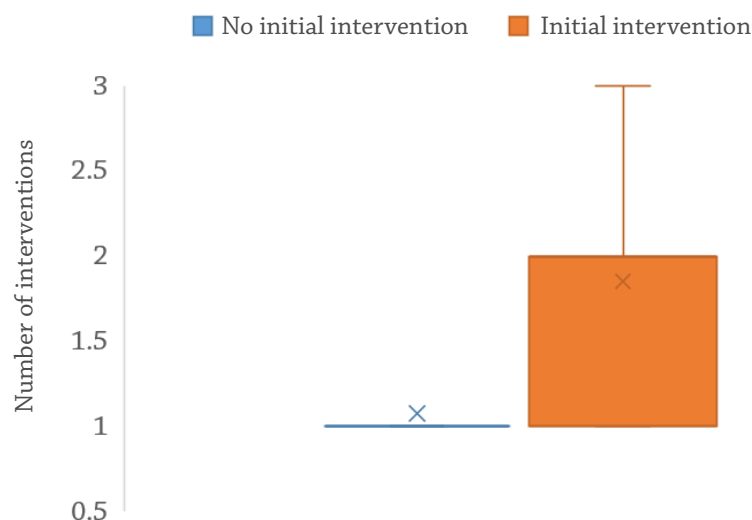
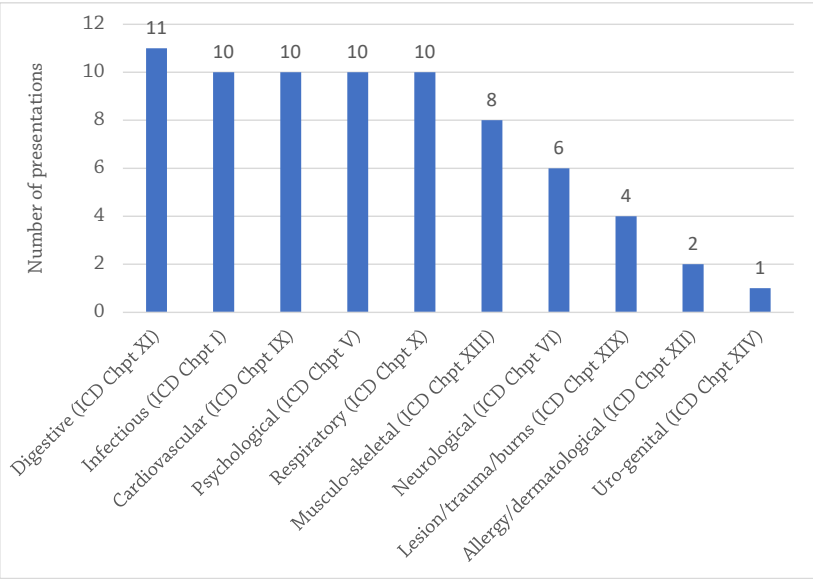


Figure 5. Distribution of cases by reason for presentation to the on-site occupational medicine office. ICD= International Classification of Diseases.

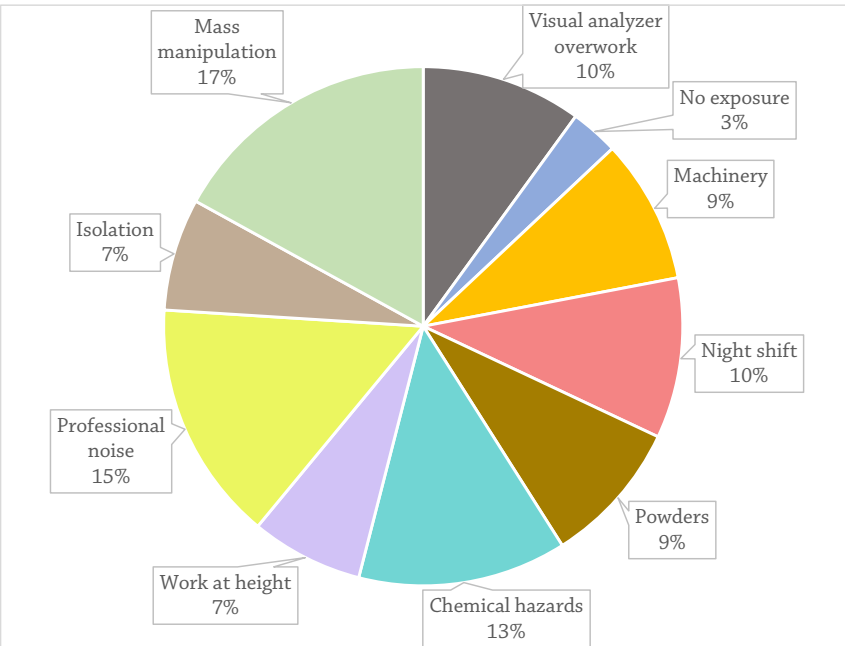


The analysis of the work ability of employees presenting with ME to the office and returning with ME revealed significant associations. Employees with a conditional work ability by June 2023 were 2 times more likely to be with a conditional work ability later ($p=0.049$, $RR=2.1$). Initial presentation with major ME (requiring intervention) influences subsequent work ability – conditional work ability ($p=0.04$, $RR=1.8$).

Occupational exposures

In the company studied, the presence of occupational exposures (OEs) did not influence the probability of returning with ME ($p=0.065$) in the population of 137 patients analyzed. The distribution of OEs in the subpopulation of 53 employees returning with ME is shown in Figure 6 (employees had multiple OEs - minimum 0, maximum 4).

Figure 6. Occupational exposures in the group of employees returning with medical emergencies (G1).



Discussion

Standard equipment in the office includes the necessary equipment for OM consults: electrocardiograph, audiometer, spirometer, glucometer, blood pressure monitor, height meter, scale, emergency kit according to current regulations, semi-automatic defibrillator, and symptomatic medication. Most patients with ME received symptomatic treatment. A meta-analysis related to ME services in the UK highlighted the need to supplement the small number of specialist doctors with other resources, including office nurses, the use of computerized expert assessment systems (e.g., spirometry for asthmatic patients), followed by an online consultation or by telephone interview, precisely because most ME are not life-threatening [11]. The equipment of the on-site medical office could be optimized to allow a higher proportion of etiological treatments, in parallel with any specific courses followed by assisting health personnel. Psychiatric reasons for presentation were as common as cardiovascular and respiratory ones. They mainly consisted of panic attacks, anxiety, suggesting possible overwork, burn-out.

The female predominance of the studied population is closely related to the personnel structure of the company, where 62.2% of women are employed.

The pathology with which recurrent ME employees presented is varied, patients being probably having multiple diagnoses in Romania. Patients tend to go directly to hospitals for medical care, bypassing primary health care, as demonstrated by a European report on health in our country [12]. However, 37.7% of the subjects returned with the same disease, suggesting possible chronic diseases that were not diagnosed until then or not sufficiently controlled therapeutically, emphasizing the usefulness of following these patients and referring them to a specialist.

Work ability is an essential parameter for both the employee and the employer. Conditioned ability was maintained in subsequent assessments, probably in the context of chronic conditions, being also associated with major ME in the initial study. An initial major ME significantly influences the clinical evolution, with subjects subsequently presenting with multiple and complex medical emergencies. This result, although anticipated, emphasizes the need for continuous monitoring of these cases. The number of interventions required for returning MEs is strongly associated with the initial intervention for ME ($p=0.0002$), explainable by the fact that

patients with major ME also relapse with major ME, probably in the context of underlying diseases. Some returns are related to reassessment and monitoring under treatment, therefore employees with more than 2 recurrent presentations are fewer, with fewer interventions.

Although recent studies focus on occupational risks that can generate ME, the present study documents the massive proportion of ME caused by internal diseases (digestive, cardiovascular, infectious, respiratory, etc.), injuries and burns coming only in 8th place in the top of presenting pathologies in the studied population [8]. OE in the analyzed company, although multiple and complex, with risk potential, did not have a statistically documentable impact on recurrent ME. This aspect may be related to health policies in Romania, where the medical system and access to investigations and treatments are still suboptimal [12].

Limitations

The research targeted a single company, in the pharmaceutical field, with specific OE. Information on lifestyle, comorbidities or chronic treatments was not included as it would have been only declarative information. The lack of a centralized medical system at national level (such as a unified medical file), which would allow the tracking of hospitalizations, consultations in other units, sick leave, etc. limited the possibility of collecting these data. A prospective multicenter study, on a larger cohort, would provide a more complex perspective on the evolution, possibly correlated with workplace exposures in several companies from various fields, with outpatient medication, history of illness, recurrent hospitalizations, possibly with a focus on certain pathologies that imply a higher risk, such as cardiovascular diseases, etc. Stratifying cardiovascular risk within this future research could significantly help in the tracking of patients at risk, still undiagnosed, with the optimization of response times to the ME and rapid access to individualized treatment.

Conclusions

Patients with ME at the workplace frequently return to the OM office within one year (approximately 40%, 2 visits/year). Most ME require an intervention from the OM physician, significantly influencing workability, and ulterior MEs. Recurrent events predominantly involve gastrointestinal, cardiovascular, infectious,

respiratory, and psychiatric pathology and are not demonstrably driven by OE in this cohort. The conditions are diverse but 37.7% of subjects come back with the same pathology, therefore systematic follow-

up of ME patients evolution in OM settings appears clinically beneficial, facilitating early detection of still undiagnosed or therapeutically uncontrolled chronic conditions.

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