Original papers

Occupational medicine in Sibiu: the switch from historical diseases to the current and emergent ones

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Abstract

This study aimed to provide a brief historical overview of occupational medicine in Sibiu County combined with epidemiological evidence and trends in occupational diseases useful to design an agenda for future research and development of other components. Methods: to depict a model of circumstances, correlations, and trends, we applied to the local employee population a semi-structured narrative review method combined with the analysis of occupational diseases. The search strategy relied on literature and document review to create a timeline. We used a statistic chart histogram to highlight the most significant factors. Results: since 1950, concerning the industrial profile and the significant health effects on workers, we identified six stages of developing an occupational health network. The coverage was both for medical and hazard surveillance through a centralized system in the communist regime and recovery in the unique Sanatorium for occupational diseases established in the area. Occupational medicine private health services and the Faculty of Medicine from Sibiu appeared in the 1990s. Sibiu's occupational disease model was a particular one in the 20th century, given the burden of lead poisoning from local industries. Infectious diseases in medical staff related to sporadic epidemics and the ongoing COVID-19 pandemic as an emergent professional risk pose new current challenges for occupational medicine. Conclusion: unique challenges increase the need for occupational epidemiologic research and the need for advances in other components of occupational health, but lessons from the past and traditional methods are well documented and still valuable.

Keywords: *occupational medicine, timeline, occupational disease, development*

Introduction

Occupational health and safety (OHS) are inseparable into the second industrial revolution relevant to the present time, but from a historical perspective, it was the safety that ranked the first place. Thus we could consider finger and wrist guards worn by Bronze Age archers as some early form of personal protective equipment, while probably the earliest occupational physicians were those that treated gladiators in Ancient Rome [1]. Over time, the relationship

between workplace hazards and occupational medicine developed at the crossroad of the social capital of work, economy, urbanization, lifestyles, institutional development (public health authorities, labour inspection and environmental protection agencies), chronicles, and scientific evidence.

Profound health prejudice towards the human workforce was shown throughout human civilization's history, for example, manual work done by slaves [2]. During the first industrial revolution, child labor was a common feature of life, while many work

categories suffered exposure to incredibly dangerous work situations, often resulting in injuries. As a consequence of the revelations of the abuse of children in textile mills, the Parliament of the United Kingdom, introduced in 1802, the first Act intended to protect the welfare of people at work [3]. The early 20th century highlighted the occupational health concern, and disciplines like industrial hygiene and occupational diseases were recognized. In the United States, Alice Hamilton was the first physician to devote herself to research in industrial medicine and occupational diseases [4], while at the same time in Europe the first clinic of occupational diseases was established in Milan – Italy based on the initiative of Luigi Devoto [5]. Essential government agencies and professional associations appeared in 1906, namely the International Commission on Occupational Health (ICOH), and in 1919 the International Labour Organization (ILO), respectively, both still active nowadays.

The historical experience of society shows us that health models originated in the guilds and religious institutions with charitable activities during the Middle Ages. These models changed substantially in the late 19th century when Chancellor Bismarck instituted the first modern health system by providing free healthcare for workers in the German industry [6].

The Romanian public health system started functioning officially in 1874 when the first modern healthcare law came into effect. According to this Act, "the primary obligation of a sub-county physician was to perform two general inspections of his area of responsibility per month and check on the physical health of the villagers" [7]. In the early 20th century, the hygienist and politician Gheorghe Banu was the first who wrote about measures of rational work organization and hygiene at work [8].

Under concrete historical conditions of social and economic development, demography is the science that provides data on population mortality and morbidity, life expectancy, urbanization indices, employment, commercial sectors, education level. These statistical data substantiate the development of health policies at the national level, including workplace health promotion and occupational health surveillance.

Through using a multidisciplinary approach of contributions from preventive medicine, epidemiology, psychology, engineering, and other disciplines, we could not imagine a more positive future for occupational healthcare. For example, occupational stress is the inevitable element of the

work environment we are facing now, which is not toxic but may become a chronic issue [9]. Therefore, one of the current interests is to provide a satisfactory work environment at an organizational level, if organizations possess a healthy culture and a positive attitude towards employee work [10].

This paper aimed to provide a brief review of institutional development and epidemiological evidence regarding occupational health in Sibiu County as useful lessons for meeting future challenges and enhance preparedness. In particular, we need to understand how individuals and communities responded to the extreme health risk posed by heavy metals in the most polluted town in Europe - Copsa-Mica, Sibiu County - the legacy of the socialist state.

Material and method

This study was designed and conducted using a semi-structured method of collecting literature combined with an epidemiological analysis approach [11]. We developed the search strategy using "occupational health, social medicine, history of health systems, occupational diseases, industrialization, the legislation" tag words in Romanian appropriate books, articles, reports, regulations, and archive documents. We searched resources using online databases and inventories from The National Archives of Romania, as well as the digital and traditional ASTRA library of Sibiu. Also, the academic search engine Google Scholar was helpful, especially for accessing international literature. The main selection criteria used were by year and type of publication. Qualitative historical analysis and evaluation of the development within occupational medicine in Romania and especially in Sibiu County, were combined with the statistical analysis of occupational diseases to provide evidence and to depict the specific model of associations and trends in Sibiu County during the last century. We obtained medical data from the local public health authority sources, namely from the Registry Book of Occupational Diseases active since 1968 [12]. To show the most significant factors in the data (relative portion, frequency distribution, skewness), we used a statistic chart histogram. The histogram chart created in Excel for Microsoft Office 2019 contains columns sorted in descending order and a line representing the cumulative total percentage.

We expected this method of narrative review combined with analysis and creative collection of data to provide a historical overview of the Romanian occupational healthcare system, to evaluate the present state of knowledge, to identify

actual knowledge gaps, and to discuss the particular matter of health damages in Sibiu County during the communist regime.

Results

Chronological organization of the narrative review results in several stages of development regarding the occupational health system in Sibiu, as follows:

I. Stage of industrial development.

In 1926, the company of metallurgical plants, Copsa-Mica - Cugir, appeared in economic reports as an essential producer of arms and munition [13]. Subsequently, in 1940, it was the only zinc producer in the country, extended with lead concentrate processing facilities in 1968 [14]. The second factory in Copsa-Mica was active between 1935-1993 and produced carbon black, the most visible pollutant in the area. As economic development progressed, concerns about occupational safety came into the first regulations for special working conditions – see Table 1.

II. Primary health care for workers and residents of Copsa-Mica.

Medical facilities were developed between 1950-1960 and consisted of one sanatorium treatment for lead poisoning, and one recovery center for the young staff of the two factories in Copsa-Mica. These medical and social activities lasted until 1960 and highlighted the century-old ingrained traditions of rest and good food [15]. In 1977 the metallurgical company's own medical office was equipped with an ambulance and became active 24 hours per day, giving an insight into the emergency medicine practice of occupational health at the time [16].

III. Establishment of public health structures - State Sanitary Inspection.

Initially established to prevent and control infectious diseases in the early 1950s, the State Sanitary Inspection has expanded between 1963-1965 with occupational hygiene structures, occupational physiology laboratory and industrial toxicology laboratory. Since 1968, the public health authority is active in each county - the administrative division of Romania [17]. After several names changes, it became the Public Health Directorate.

IV. Clinic department for occupational diseases within

the public hospital.

The Council of Ministers translated the recognition of occupational diseases into Decision in 1966, and the challenge of confronting occupational health was to develop a relationship with both clinical medicine and public health. Beginning in the 1970s, the general hospital of Sibiu did achieve a clinical department for providing diagnostic services, treatment, and prevention of occupational diseases. Serious problems exist today in the operation of this clinical department, particularly with the bureaucracy of the compensation system for chronic occupational diseases and work-related health problems.

V. Occupational disease sanatorium at Avrighi.

In addition to hospitalization, from 1975 to 2006 this Sanatorium was a unique source of health care for promoting the return to work for sick workers from across the country. According to the written press (Curentul, July 12, 2001) "proof that the Romanian Ministry of Health bought the Brukenthal Palace in Avrighi may be the fact that, even before the First World War, there was a military hospital, then a tuberculosis preventorium and, until 2005, the Sanatorium of occupational diseases, [...], recognized for the famous park that is said to be the only one in the country providing negative ions". Medical services provided for occupational diseases are covered by the public insurance system in force in this field since 2002. During the communist regime, Act no. 21/1967 was the most important regulation concerning social insurance for workplace injuries.

The specialized terminology used in the twentieth century was different, depending on the existing organizational structures, respectively: industrial medicine – in the company-based and owned model; occupational hygiene – in the Sanitary-Antiepidemic Centers, based on the evaluation and measurement of risk factors; occupational medicine – in outpatient clinics, based mainly on functional explorations; and occupational diseases – in public hospitals.

VI. Current public, private and academic institutions of occupational medicine.

In the 1990s, the newly implemented democratic and free-market measures allowed the development of private health care services and introduced new institutes for higher education (i.e., the Faculty of Medicine from the "Lucian Blaga" University of Sibiu). Currently, medical centers (60%), individual

medical offices (25%), and public institutions (15%) provide occupational health services in Sibiu County. Public institutions include specialized outpatient clinics affiliated to public hospitals, clinic department within the Emergency County Clinical Hospital, and the Public Health Directorate of Sibiu. The last two institutions have been affiliated with the university since 1993 and serve as training sites for occupational physicians within the four-year residency program. Epidemiologic surveillance of occupational diseases relied on the number of reported cases, diagnostic,

and period. The graphical display of results is shown in figures 1 - 3. Lead poisoning accounted for a significant proportion of the local burden of occupational illness, the last case registered in 2014 – see figure 1. Infectious diseases in healthcare workers became substantial with the ongoing COVID-19 pandemic (Figure 3). According to the Public Health Directorate of Sibiu, on July 14, 2020, the case-based surveillance data shows a total of 114 reported cases in medical staff for recording and notification as new occupational diseases.

Table 1. Official regulation and compensation for harmful working conditions on industrial platform at Copșa-Mică during the communist regime

Legislation	Special working conditions	Workplace	Factory	Working time / day (hours)
Council of Ministers: Decision no. 907 / 1956*	hard, harmful	Electrolysis, Horeschoff roasting furnaces for lead concentrates, zinc-metallurgists, crane handlers and cleaners from Agglomeration	Chemical-metallurgical plant (previous named "21 DECEMBER" plant)	6
Ministry of Labour: Order no. 59 / 1969**	very harmful, very hard, very dangerous	Agglomeration and melting of lead and zinc concentrates; Thermal refining of lead	Chemical-metallurgical plant	6
	Harmful, hard, dangerous	Manufacture of carbon black	CARBOSIN plant	8

*on reducing working time

** on early retirement

Figure 1. Distribution of lead poisonings (1968-2014)

Figure 2. Occupational diseases in carbon black factory (1970-1981)

20th CENTURY

- 1926: Metallurgical plants Copșa Mică - Cugir
- 1935: Carbon black plant Copșa-Mică
- 1946: Regional General Sanitary Inspectorate - Sibiu
- 1950: State Sanitary Inspection;
- Company-based medical office
- 1951: SANEPID authority
- 1953: Copșa-Mică sanatorium
- 1960: Outpatient Clinic of Sibiu
- 1970: Clinic department for occupational diseases
- 1973: Sanitary-Antiepidemic Centre
- 1975: Occupational Disease Sanatorium Avrig
- 1990: Faculty of Medicine
- 1993: Didactic discipline of occupational medicine
- 1996: Company-owned medical services
- 1999: Public Health Directorate

21st CENTURY

- 2002: Public and private OH offices;
- Postgraduate professional training courses
- 2004: Private toxicology laboratories
- 2005: Partnerships for workplace health promotion
- 2007: activities in national programs

Figure 3. Distribution of infectious diseases in medical staff

Discussion

In eastern European countries, the workers' protection care system, historically, was administered by several regional bodies through centrally planned and managed networks of sanitary-epidemiological (SanEpid) facilities [18]. Following the political transition in the 1990s, Romania has adopted the public health system and strategies in OHS. In this respect, the Public Health Directorate coordinates and implements at the local level the medical activities included in the national health programs for the protection of health and prevention of illness associated with risk factors related to the work environment.

Epidemiologic surveillance shows a highly adversarial system in the past, given the primacy of economic considerations over medical evidence - the case of reported occupational lead poisonings and human rights - the case of environmental pollution. After the fall of the communist regime, Copsa-Mica city has drawn international media attention as a danger shielded from foreign eyes (The New York Times, March 5, 1990), and later as the most polluted town in Europe (BBC News, January 17, 2007). As far as we know, there was only one published paper in 1971 on the damages to the flora of industrial area of Copsa-Mica due to sulfuric acid [19], respectively only one unpublished study conducted in the 1980s by the National Institute of Public Health Bucharest on population living in Copsa-Mica. Developmental problems in children were of particular interest. Therefore, lead poisoning can be considered both occupational and environmental disease in this model. The full therapeutic scheme comprised of hospitalization – sanatorium recovery – sick leave was the best option [20].

In the defined employee population of Sibiu County, epidemiologic surveillance provides both the data and an operational framework through ongoing systematic analysis and interpretation of the distribution and trends of occupational illness, switching subjects from poisoning to infectious disease in the 21st century, especially in medical staff during an epidemic of chickenpox, measles, and COVID-19 which has already made its mark on research. Tuberculosis and acute viral hepatitis were also recorded as occupational infectious disease. According to the European Centre for Disease Prevention and Control, on May 8, 2020, the overall percentage of healthcare workers among total COVID-19 cases was 23.2%, with a country median

of 13.8% (available at <https://www.ecdc.europa.eu/en/covid-19/latest-evidence/epidemiology>). At the same time, Romania reported an overall percentage of 14.6% of confirmed positive cases within the medical staff (available at <https://www.cnsrbt.ro/index.php/analiza-cazuri-confirmate-covid19/1721-raport-saptamanal-episaptamana18/file>), while Sibiu county reported 16.9% COVID-19 cases with known healthcare worker status, most of them amongst nurses. The control of occupational infectious diseases is, therefore, likely to become important for the OHS in the future.

The establishment of the Faculty of Medicine at Sibiu has steadily increased the implementation of OHS's standards both in research and in training programs. The case of Copsa-Mica became known and documented in terms of traditional exposure and health effects. Recent application of the foresight methodology to OHS enables potential risks to be determined in advance, aiming to identify today's research and innovation priorities.

Conclusions

The maturity of the OHS field in Sibiu county was shaped after the political transition in the 1990s, moving away from the former centrally-managed system and gaining more practicing specialists. Six stages of institutional development were identified since 1950, from worksite-based medical surveillance and recovery settings to occupational hazard surveillance and clinical facilities within the public hospital and the Sanatorium – provide a unique organizational source of expertise and recovery to complete the picture of nature and extent of occupational illnesses at the time. Hence, complementary advances in other components of occupational medicine are also needed, i.e., sentinel providers for new work-related disorders, since the most hazardous industries have disappeared.

Epidemiological assessment of the dimensions of occupational disease in Sibiu's geographic area is essential about other public health problems and shows the dominance of lead poisonings between 1981 and 2000. Given the actual knowledge gaps before the 1990s, we assume both the occupational and environmental causality of lead poisoning in Copsa-Mica city. The 21st century has shifted the recognition of occupational hazards from industry to environments such as hospitals, and this fact correlates with sporadic epidemics and the ongoing COVID-19 pandemic. The COVID-19 continually increases the

burden of infectious disease in healthcare workers as it constitutes an occupational disease for these professional categories. In this respect, efforts should be made worldwide to recognize, report, and notify this new occupational disease, and the OHS services should face the change, use all available data, and create appropriate surveillance programs together with other parts of the health care system.

Providing a historical overview and exploring the collective evidence could be a potential contribution to create an agenda for further research.

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