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ANALYSIS OF THE FRAMEWORK OF HEALTH AND SAFETY OF ACTIVE WORKERS IN BRAZILIAN MINING ACTIVITY

ANÁLISE DO CENÁRIO DE SAÚDE E SEGURANÇA DOS TRABALHADORES ATUANTES NA ATIVIDADE DE MINERAÇÃO BRASILEIRA

ANÁLISIS DEL ESCENARIO DE SEGURIDAD Y SALUD DE LOS TRABAJADORES ACTIVOS EN LA ACTIVIDAD MINERA BRASILEÑA

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ABSTRACT

Objective: to analyze the health and safety scenario of workers who work in the mining activity in Brazil and the role of nurse in this sector. **Method**: It is a theoretical study, based on readings and interpretations of articles, dissertations, theses and official websites, in Portuguese and English, available on the internet. **Results and Discussion**: A predominantly small-scale sector, in rural areas that are difficult to access, with informal, intense and extremely dangerous work, without control or supervision, with underreporting of what happens during the work process. Between 2010 and 2013, the typical number of accidents represented about 86.8% of the total number of accidents with Communication of Accidents at Work; Road accidents 10.2%; And the number of occupational diseases increased by 82.5%. **Conclusion**: The nurse plays a fundamental role in the continuing education of workers, acting in the prevention and reduction of risks caused by the environment and work process in mining.

Keywords: Mining. Work accidents. Worker's health. Legislation.

RESUMO

Objetivo: analisar o cenário de saúde e segurança dos trabalhadores que atuam na atividade de mineração no Brasil e a atuação do enfermeiro nesse setor. **Método**: trata-se de um estudo teórico, baseado em leituras e interpretações de artigos, dissertações, teses e sites oficiais, em português e inglês, disponibilizados na internet. **Resultados e Discussões**: Setor predominantemente artesanal e de pequena escala, em áreas rurais de difícil acesso, com trabalho informal, intenso e extremamente perigoso, sem controle ou fiscalização, havendo subnotificação do que acontece durante o processo de trabalho. Entre 2010 e 2013, o número de acidentes típico representou cerca de 86,8% do total de acidentes com Comunicação de Acidentes de Trabalho; acidentes de trajeto 10,2%; e o número de doenças de trabalho aumentou em 82,5%. **Conclusão**: O enfermeiro tem papel fundamental na educação continuada dos trabalhadores, atuando na prevenção e redução dos riscos causados pelo ambiente e processo de trabalho na mineração.

Palavras-chave: Mineração. Acidentes de Trabalho. Saúde do Trabalhador. Legislação.

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RESUMEN

Objetivo: analizar la situación de la salud y seguridad de los trabajadores que trabajan en la actividad minera en el Brasil y las acciones de enfermería en este sector. **Método**: Se trata de un estudio, basado en lecturas e interpretaciones de los artículos, disertaciones, tesis y sitios web oficiales, en portugués y en Inglés, disponibles en internet. **Resultados y Discusión**: Sector predominantemente artesanal y de pequeña escala, en las zonas rurales de difícil acceso, con el trabajo informal, intenso y extremadamente peligroso sin control ni supervisión, existe un subregistro de lo que sucede durante el proceso de trabajo. Entre 2010 y 2013, el número de accidentes típicos representó alrededor del 86,8% de todos los accidentes de trabajo informe de accidente; los accidentes de trayecto 10,2%; y el número de enfermedades de trabajo se incrementó en 82,5%. **Conclusión**: La enfermera tiene un papel fundamental en la formación continua de los trabajadores, que trabajan en la prevención y reducción de los riesgos causados por el medio ambiente y el proceso de trabajo en la minería.
Palabras claves: Minería. Accidentes de Trabajo. Salud del Tabajador. Legislación.

INTRODUCTION

Mining has been present since the Brazilian colonial period, mainly in the exploration of gold mines, a time of important development for Brazil.[1] Today, it is essential for the country's economy, representing about 3% to 5% of the Gross Domestic Product (GDP), serving as a source of raw material for most other economic sectors.[2] In 2014, Brazil had a production of US $ 40 billion, of which 85% was in mineral exports, where only Iron was responsible for about 75%, with the states of Minas Gerais and Pará being the main sources, accounting for 51.6% and 32%, respectively.[1-2]

The Brazilian mining industry is mostly made up of micro and small enterprises, 2.9% of which are large-scale mining companies, 14.7% are medium-sized, 33.5% are small and 48.9% are micro-enterprises.[2]

It is the economic sector with greater job supply each year, representing a 22% increase in the number of formal workers, between the period from 2010 to 2014; and about 17% of the total number of jobs in all Brazilian economic sectors during the same period; with the states of Minas Gerais and Rio de Janeiro being the largest generators of jobs in Brazilian mining, accounting for around 24.6% and 19.6%, respectively.[3] The labor force is composed mostly of male workers, representing around 88.1% in 2014; and the predominant age group is between 18 and 39 years old, representing about 20.9%.[3]

In view of this, it is observed that mining is essential for the Brazilian economy. However, the workplace of this activity carries risks to the health and safety of workers. Although there are specific mining laws and regulations, the number of accidents and occupational diseases has increased. Little is known

about the subject, therefore, it is necessary to understand the main factors that impact on the health and safety of Brazilian mining workers, and the nurse's role in the attempt to prevent and minimize the risks to which miners are exposed in this sector.

METHOD

This is a theoretical exploratory study carried out between May 2014 and June 2015, with updates of the statistical data between February and April 2016, based on readings and interpretations of original articles, literature reviews, dissertations, theses and official websites, in Portuguese and English, available on the Internet. Consultation was made with Brazilian legislation on worker health available on the official website of the Ministry of Labor and Employment (MTE). Information and statistical data from the official websites of the MTE and the Brazilian Ministry of Social Security, the Brazilian Mining Institute (IBRAM), and Ministry of Health regulations were used. Regarding the role of nurses in worker health, information provided by the National Nursing Association of Brazil (ANENT) was used. The search was based on the descriptors: mining, work accidents, worker health, and legislation. Twenty references were used, published between 1999 and 2015.

RESULTS AND DISCUSSION

Scenario of the Brazilian mining industry

Large mining companies have highly mechanized work processes. However, artisanal and small-scale mining are still present in rural areas that are difficult to access, where work is informal, intense and extremely dangerous, without any control or inspection, with underreporting of everything that happens during the work process.[4-5]

In Brazil, there is no precise statistical data regarding the exact number of miners acting informally in artisanal and small scale mining; however, according to the literature, it is estimated that there are currently about 10,000 informal workers.[5] There is also no precise number of women working in these places, but they are presumed to account for about 10 to 30 percent of the workforce; being mainly involved in domestic service.[5]

Official statistics on ill-health, accidents and deaths in the Brazilian mining industry

The Brazilian Social Security considers as accidents with Communication of Work Accidents (CAT) registered the number of accidents, involving formal workers, whose CAT was registered in the INSS.[6]

Between the period from 2010 to

2013, the latest data available, 87.1% of the total work accidents in the Brazilian Extractive industry had CAT registered, and about 11% did not, and these are not linked to the INSS.[6-7] Unfortunately, workers working in artisanal and small-scale mining do not receive these benefits, due to the informality of work in these companies and the underreporting of accidents, as presented in the present study.

The number of typical accidents, those resulting from the characteristic of the professional activity performed, represented about 86.8% of the total number of accidents with CAT recorded in the same period of time; and an increase of about 18.3%.[6-7] Therefore, more formal workers are injured during the performance of their activities in Brazilian miners every year, which is worrying. We can highlight the following possibilities for this increase: the improvement in the processes of notifications and registries of CAT by the employers, or unfortunately there really was an increase in the number of accident victims in the work process in the Brazilian mining industry, which is alarming.

Road accidents, which occurred between the residence and the workplace, and vice versa, accounted for about 10.2% of the total number of work-related accidents with registered CAT during the same period, and an increase of about 28%, 8%.[6-7]

The number of occupational diseases with registered CAT increased by about 82.5% between 2010 and 2013.[6-7] This is a worrying fact, since it shows that workers are increasingly sick during their years of work in mining companies, which represents a very high growth in the number of diseases for a short time.

There is insufficient statistical data available regarding the number of fatal accidents in the Brazilian mineral sector. The latest records are for the year 2013, where MTE reported 62 deaths.[8] However, according to the MTE, the Mortality Rate (per 100,000) workers is 24.38, and the Permanent Disability Rate (for 10,000) is 4.84; in the Brazilian Extractive Industry.[8]

Occupational risks in the Brazilian mining industry

The mining field is classified as risk grade 4, considered the highest by the MTE, being one of the most dangerous work processes.[1] One of the reasons are the risks that the work process alone entails for the safety and health of miners, and the high cost of implementing existing legislation on prevention measures, especially for small and medium-sized enterprises.[1]

Physical Hazards

Hearing impairment is related to exposure to a high noise level during mining activities, such as drilling and noise from machinery used.[9]

The operation of mobile equipment, such as trucks and excavators, exposes the worker's body to continuous vibrations, thus affecting the spine conditions of the same, and may cause spinal disorders such as cervicobrachial syndrome and shoulder injuries.[10-11]

Inadequate ventilation systems, large numbers of workers sharing the same space, humidity, and heat generated by used equipment in underground mines represent the main sources of heat release.[12-13] Exposure to sunlight and proximity to equipment at high temperatures is more related to work in open pit mines.[13] Male infertility and sunburn are examples of occupational diseases caused by exposure to these extreme temperatures.[11]

Radioactive radon and other mediators, especially used in underground mines, expose workers to ionizing radiation.[12] The practice of welding also compromises health due to exposure to non-ionizing radiation.[12] Malignant neoplasms of skin, leukemias, among other diseases , may occur due to exposure to radiation.[12]

Chemical hazards

The use of mercury in some processes of mineral extraction and the manufacture of paints is still present in Brazilian mining.[14] Hydrarirism is a classic example of a known disease that can be caused by exposure to this chemical element.[14]

The release of poisonous gases during the work process is also considered a problem.[13] Methane, for example, is extremely flammable and is responsible for most of the explosions occurring in coal mines.

The release of dust into the environment is also common in certain activities in mining, with silica present in the released powder being the main cause of respiratory diseases.[15] It is estimated that in Brazil the number of workers potentially exposed to silica to be greater than 6 million.[15]

Biological Hazards

The tropical climate increases the risk for tropical diseases, such as malaria.[10] In addition, poor hygiene in the workplace in mining increases exposure to these biological agents; thus increasing the incidence of Silicotuberculosis in workers.[12]

Ergonomic Risks

In recent years, many of the mining jobs have been mechanized; making the work process partially or totally limited to machines; therefore, requiring more time for their operation.**16** Because of this, fatigue, monotony, musculoskeletal

disorders, and back and neck pain may occur.[16]

Psychosocial Risks

Unfortunately, the occurrence of post-trauma mental problems due to the injuries and deaths that occur in mining can generate a profound impact on the health and morale of employees and managers; therefore, they carry the feeling of guilt, even if there is no negligence; as well as being heavily pressured to face government investigations and prosecutions.[10]

Performance of the federal labor inspection system in the Brazilian mineral extractive industry and legislation aimed at this sector

The Brazilian Federal Labor Inspection System (Sfit) determines the type of surveillance to be carried out in the labor process in the national territory.[3] With regard to the Brazilian Mining Industry, we present the latest official data on health and safety inspections in the sector, during the period from 2010 to 2015. These are related to tax actions (17,490); workers reached (2,322,760); notifications (31,034); notifications (23.224); and embargos / prohibitions (1,070).[3] It is important to note that the number of accidents whose causes have been analyzed have been maintained over time, remaining at a total of 639 between 2010 and 2015.[3]

Brazil has a large set of laws that address health and safety at work in general, as well as specific laws geared toward mining. Among them, it stands out the Norma Regulamentadora (RN) -22, a specific norm focused on Safety and Occupational Health in Mining, whether underground or open. The purpose of this standard is to present the duties to be observed in the organization of the environment and the work process in mining, thus making them favorable to the development of mining activities, always aiming at the health and safety of the worker.[17]

In addition to the NR-22, there is the Mining Regulatory Norm of the National Department of Mineral Production (NRM-22 / DNPM), of Ordinance No. 12, dated January 22, 2002.[1]

It is also important to highlight the NR-06, which addresses the importance of the use of Personal Protective Equipment (PPE) by workers to protect their safety and health from susceptible risks during the work process.[17] The use of PPE is essential for head protection; eyes and face; hearing protection; breath protection; body protection; upper limb protection; and for fall protection.[17]

Importance of nurses' performance in worker health

The work nurse has a wide and important role in the health of the worker, playing a fundamental role in the search for causes of absenteeism, occupational diseases and traumatic injuries; collection and updating of statistical data; to investigate the possible relationships between the activities developed by the workers and the diseases and fatalities that occurred; promote the preservation of the physical and mental integrity of the worker; provision of first aid; assistential and managerial activities in the nursing sector; provide PPE and training necessary to use them; besides the supervision of the nursing team.[18]

Therefore, the constant updating of the Nurses is fundamental so that they are able to promote continuous education for the workers; and work together with other company health professionals to prevent and reduce the risks caused by the work environment, analyze possible occupational diseases that may occur, and treat existing diseases.[19]

In order to establish a technical link between the disease and the activity, whether current or past, the health professional must understand that the worker is the key agent for the correct diagnosis and therapy, and this must be included in the care plan.[20] In this regard, the use of an adequate instrument in the search for identification and control of risk factors in the workplace and working conditions becomes fundamental. The use of occupational anamnesis by nurses and other health professionals is crucial in this regard, because even if the worker does not present clinical manifestations apparent at the moment, knowledge of his / her occupational history allows health professionals to identify if the worker will need health monitoring during work.[20]

Occupational anamnesis includes current medical history and research on several important issues such as: personal and family history, occupational history, habits and lifestyle, physical examination, and complementary research; therefore, an important tool to be used by nurses and other health professionals.[20] However, in the academic life of nursing professionals and other areas, little or no attention is given to this instrument.[20] Therefore, professionals graduate with a lack of knowledge about health, safety, and disease related to the work process.[20]

CONCLUSIONS

Mining activities are classified as risk grade 4, that is, they are activities considered dangerous by Brazilian legislation, being common in remote rural areas, with surveillance processes affected. The theoretical study presented shows government investment and social participation in the construction of legal

apparatus and surveillance strategies in favor of safety and health, in mineral extraction processes. However, due to the country's territorial extension, the surveillance, supervision and health care of these workers still require investments, a fact explained by the significant number of occupational accidents and diseases still present in this field of activity.

We must also consider the possibility that, with the advances that have occurred in the last decades, the notification of cases has been increased, which could allow an increase in registered numbers. It is also important to emphasize the important participation of nurses in the collection of statistical data and maintenance of updated records. At present, with the existing norms in Brazil, for this branch of activity, there is enough apparatus to control the risks to the health and safety of these workers.

The nurse, as an educator, plays an extremely important role in the ongoing and permanent education of both miners and the health team, being of the utmost importance for workers' awareness and adhesion to the correct use and handling of PPE for occupational risk prevention which are exposed in the mining work environment. It is important to emphasize the fundamental role of institutions that train health professionals in the use of these professionals to act in the promotion of health and prevention of diseases determined by the work process they perform. It is also worth mentioning the responsibility of health surveillance services in the active search and early detection of cases, as well as notification and records, also trying to minimize the exploitation of children in this branch of activity. Investments in the supervision of workplaces by the competent bodies, using parameters from the current legislation, may reduce the health risks of these workers when determining mine operating conditions.

The study presented important limitations regarding the difficulty of access to updated statistical data regarding the number of fatal accidents in the Brazilian mineral sector; and the exact number of miners, women and children acting informally in the sector, due to lack of control or supervision by the responsible agencies, with underreporting of occurrences during the work process.

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