Work-Related Cancer Surveillance in the State of Minas Gerais: Implementation Strategies (2019-2023)

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Vigilância do Câncer Relacionado ao Trabalho no Estado de Minas Gerais: Estratégias de Implantação (2019-2023)

Vigilancia del Cáncer de Origen Laboral en el Estado de Minas Gerais: Estrategias de Implementación (2019-2023)

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ABSTRACT

Introduction: In Minas Gerais, work-related cancers (WRC) are underreported in the Notifiable Diseases Information System (SINAN), mainly due to the lack of implementation of Work-Related Cancer Surveillance (WRCS). **Objective:** To describe the strategies used by the Minas Gerais Health Department (SES/MG) to implement WRCS in the state, focusing on epidemiological surveillance**. Method:** An experience report was used to describe the WRCS implementation process that took place between 2019 and 2023 through professional experiences, analysis of meeting minutes and data from SINAN, the Hospital-Based Cancer Registry (HBCR) and the Mortality Information System (SIM), in the case of mesothelioma. The number of WRC cases notified at SINAN before (2008-2018) and after (2019-2023) the implementation of the WRCS were compared. **Results:** The implementation of the WRCS followed nine stages: training on cancer and work; partnership with the Cancer Surveillance Coordination of the SES/MG; definition of the cancers-targeted actions; screening of priority cases; preparation of forms; articulation with high-complexity services; screening of cancers at the HBCR and SIM (mesothelioma); epidemiological investigation; issue of a report; and monthly monitoring of notifications. There was an increase in WRC notifications at SINAN, from 73 cases in 2008-2018 to 1,148 cases in 2019-2023. **Conclusion:** Through the strategies implemented, routine WRCS actions were initiated at Occupational Health Surveillance (OHS) services. In addition, with qualified and routine notification at SINAN, it will be possible to better characterize the epidemiological scenario of WRC in Minas Gerais.

Key words: Neoplasms/epidemiology; Occupational Health; Occupational Exposure.

RESUMO

Introdução: Em Minas Gerais, os cânceres relacionados ao trabalho (CRT) são subnotificados no Sistema de Informação de Agravos de Notificação (Sinan) em razão principalmente da não execução da Vigilância do Câncer Relacionado ao Trabalho (VCRT). **Objetivo:** Descrever as estratégias da Secretaria de Saúde de Minas Gerais (SES/MG) para implantar a VCRT no Estado, tendo como enfoque a vigilância epidemiológica. **Método:** Utilizou-se o relato de experiência para descrever o processo de implantação da VCRT ocorrido no período de 2019 a 2023 por meio das vivências profissionais, análise de atas de reuniões e de dados no Sinan, Registro Hospitalar de Câncer (RHC) e do Sistema de Informação sobre Mortalidade (SIM), no caso do mesotelioma. Foram comparados o número de casos de CRT notificados no Sinan antes (2008-2018) e depois (2019-2023) da implantação da VCRT. **Resultados:** A implantação da VCRT seguiu nove etapas: capacitação sobre câncer e trabalho; parceria com a Coordenação de Vigilância do Câncer da SES/MG; definição dos cânceres-alvo das ações; rastreamento dos casos prioritários; elaboração de formulários; articulação com serviços de alta complexidade; rastreamento dos cânceres no RHC e SIM (mesotelioma); investigação epidemiológica; emissão de parecer; e monitoramento mensal das notificações. Observou-se um aumento das notificações de CRT no Sinan de 73 casos de 2008-2018 para 1.148 casos de 2019-2023. **Conclusão:** Por meio das estratégias implantadas, foram instituídas rotinas das ações de VCRT nos serviços de Vigilância em Saúde do Trabalhador (Visat). Além disso, com a notificação qualificada e rotineira no Sinan será possível melhor caracterizar o cenário epidemiológico de CRT em MG.

Palavras-chave: Neoplasias/epidemiologia; Saúde Ocupacional; Exposição ocupacional.

RESUMEN

Introducción: En Minas Gerais, existe un subregistro de los cánceres relacionados con el trabajo (CRT) en el Sistema de Información de Enfermedades de Declaración Obligatoria (Sinan), principalmente debido a la falta de ejecución de la Vigilancia del Cáncer Relacionado con el Trabajo (VCRT). **Objetivo**: Describir las estrategias utilizadas por la Secretaría de Salud de Minas Gerais (SES/MG) para implementar la VCRT en el Estado, centrándose en la vigilancia epidemiológica. **Método:** Se utilizó un informe de experiencia para describir el proceso de implementación de la VCRT que tuvo lugar entre 2019 y 2023 a través de experiencias profesionales, análisis de actas de reuniones y datos del Sinan, del Registro Hospitalario de Cáncer (RHC) y del Sistema de Información de Mortalidad (SIM), en el caso del mesotelioma. Se comparó el número de casos de TRC notificados en el Sinan antes (2008-2018) y después (2019-2023) de la implantación de la VCRT. **Resultados**: La implantación de la VCRT siguió nueve etapas: formación sobre cáncer y trabajo; asociación con la Coordinación de Vigilancia del Cáncer de la SES/MG; definición de los cánceres objeto de actuación; cribado de casos prioritarios; elaboración de formularios; enlace con servicios de alta complejidad; selección de cánceres en el RHC y SIM (mesotelioma); investigación epidemiológica; emisión de dictamen; y seguimiento mensual de las notificaciones. Se observó un incremento en las notificaciones de CRT en el Sinan, pasando de 73 casos en el periodo 2008-2018 a 1148 casos en el periodo 2019-2023. **Conclusión**: A través de las estrategias implementadas, se instituyeron acciones rutinarias de VCRT en los servicios de Vigilancia de la Salud del Trabajador (Visat). Además, con la notificación calificada y rutinaria en el Sinan, será posible caracterizar mejor el escenario epidemiológico de CRT en MG.

Palabras clave: Neoplasias/epidemiología; Salud Ocupacional; Exposición Ocupacional.

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INTRODUCTION

Work-related cancers (WRC) within the National Health System (SUS) are listed as a group of diseases whose cause is the exposure to factors, agents and hazardous situations found in working processes and environments even after exposure ends[1]. The classification considers the latency period of tumors, that can be longer for some individuals when disease develops even after a long time of exposure[2].

Biological, physical and chemical agents are more frequently associated with WRC[2], further to exposure circumstances as night work shift and breast cancer[3].

The literature identifies occupational exposure cancer types, standing out mesothelioma, lung, bladder, breast, non-melanoma skin cancer, sinonasal, kidney, liver, nasopharynx, stomach, larynx, ovary, colon and rectum, brain and central nervous system, biliary ducts, thyroid, salivary gland, bones, esophageal, lymphomas and leukemias (acute non-lymphocytic and acute myeloid)[2,4].

Notification of WRC in the Notifiable Diseases Information System (SINAN) is mandatory since 2004 through a proprietary investigation and notification file[5]. In 2009, only 30 cases of WRC were notified in SINAN[6]. In this same year, social security granted 113,801 sick-benefits, of which 751 (0.66%) were work-related[7]. The number of cases notified at SINAN is far from the reality, revealing a scenario of cancer sub-notification in the whole country.

Sub-notification at SINAN is related to diagnosis and identification of the cases and other causes, complexities of the diseases or harms, routines and protocols, human resources technical skills, professionals who do not value the notification, poor awareness of epidemiological surveillance, among others[8].

In addition, poor knowledge of occupational hazards and time since exposure and appearance of the disease (for certain neoplasms) of WRC, make the identification of the causes difficult and potentialize the sub-notification at SINAN[9].

In view of this scenario, the coordination of the worker's health of the Health Secretary of the State of Minas Gerais (CSAT-SES/MG) determined the implementation of Work-Related Cancer Surveillance (WRCS) whose main goal is the epidemiologic surveillance of priority neoplasms for timely and adequate identification, investigation and register of WRC cases at SINAN.

WRCS consists in a set of actions to identify, analyze and intervene in situations where workers are or may be exposed to risk-related carcinogenic factors and/or agents. This type of neoplasm is potentially preventable since the control of carcinogenic exposures is ensured by surveillance and intervention in working environments[4].

Given its complexity, WRCS requires the structuring of a network where timely capture of cases depends on articulation within and out of SUS, involving middle and high complexity, associated entities, assistance services and university. Most of the health services do not routinely perform surveillance and filing at information systems[10].

The main goal of this article is to describe the steps of the strategies of implementation of WRCS in the state of Minas Gerais.

METHOD

Description of the implementation of WRCS within SES/MG focused to epidemiologic surveillance from 2019 to 2023. The present study is a spin-off of the Master dissertation titled "*Implementation process of work-related cancer surveillance in Minas Gerais and its impact on mesothelioma notifications in the notifiable diseases information system*" of the Post-Graduation Program of Health Management Services of the Nurse School of the Federal University of Minas Gerais.

The description was based on professional practice along the whole process of the implementation and analysis of the notes of meeting and survey of the data of the information systems (SINAN), Hospital-based Cancer Registry (HBCR)[11] and Mortality Information System (SIM)[12].

The geographical area of interest included 853 municipalities of Minas Gerais and their respective services of Occupational Health Surveillance (OHS). For better understanding, the administrative organization of SES/MG and the state's OHS is described briefly.

SES/MG is divided in 28 health regional units (URS), being 20 health regional superintendencies (SRS) and eight regional management (GRS), whose task is to manage health policies and actions within their scope[13].

OHS in Minas Gerais consists in CSAT-SES/MG (technical coordination and support for actions in the state), state and municipal technical references of worker health (RT-ST) (one for each URS and one for each municipality) and state, regional (18) and municipal (one in Belo Horizonte, the state capital) worker health reference centers (CEREST).

Additionally, the implementation of actions of WRCS in the state considered the pillars of worker health epidemiologic surveillance[4] prioritizing the surveillance of the cases diagnosed, as shown in Figure 1.

The organization and structure of WRCS in Minas Gerais was developed in nine steps: education and training about cancer and work; creation of partnership with Cancer Surveillance Coordination (CVC) of SES; definition of the cancer-targets; tracking of priority cases; supporting materials; articulation with high complexity services; tracking of cancer

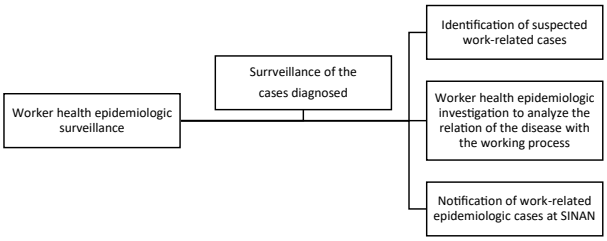

Figure 1. Flowchart of the steps of the structure of the worker health epidemiologic surveillance

cases in information systems; epidemiologic investigation of tracked cases; month report and monitoring of the quality of information of the cases notified (Figure 2).

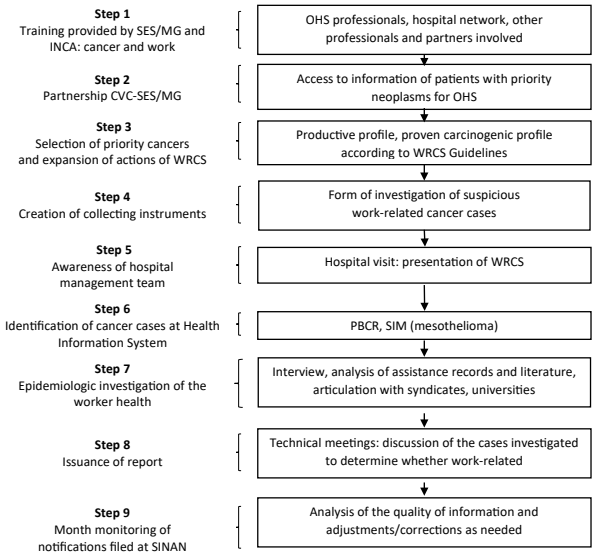

Figure 2. Flowchart of the steps of implementation of WRCS in Minas Gerais

Data of WRCS notified at SINAN were analyzed quantitatively before the implementation (2008-2018) and post-implementation (2019-2023).

In compliance with Directive 510[14] of April 7, 2016 of the National Health Council, ethical analysis is waived for studies with public and secondary data.

RESULTS

WRCS was implemented in Minas Gerais since 2019 for epidemiologic surveillance of the cases diagnosed. The results will be presented according to the steps following the chronology of the actions planned and performed by CSAT-SES/MG.

STEP 1 – TRAINING PROVIDED BY SES/MG AND NATIONAL CANCER INSTITUTE: CANCER AND WORK

CSAT-SES/MG in partnership with the National Cancer Institute (INCA) provided a training titled "Work Related Cancer Surveillance" in view of the necessity of establishing concepts and key information, align and guide actions for WRCS in the state in May 2019.

The attendees were: RT-ST of the 28 state's URS, CEREST technical staff, Technical References of CVC-SES/MG and Surveillance of Non-Communicable Diseases, further to RT-ST of a few municipalities and professionals of cancer hospitals of the Metropolitan Region of Belo Horizonte.

INCA addressed the theory and practice of WRC and environment, pesticides, mining carcinogenic agents, benzene, asbestos and compulsory notification diseases. CVC-SES/MG discussed WRC through population-based cancer registry information of Belo Horizonte (PBCR-BH) and HBCR and presented general aspects of WRC in Minas Gerais.

In the second day, INCA presented a proposal of notification flow for cancer cases included on the Guidelines of WRCS (DVCRT) (Figure 3), taking mesothelioma as reference.

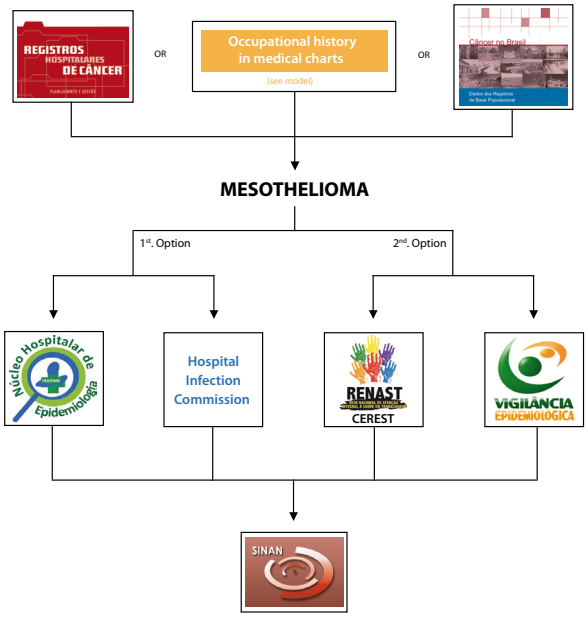

Figure 3. Notification flow

Source: Guidelines for Work Related Cancer Surveillance[4].

The notification flow was utilized as reference by CSAT-SES/MG, particularly to define how cases should be identified.

STEP 2 - PARTNERSHIP WITH CVC-SES/MG

In order to expedite the actions required for the effective implementation of work-related cancer epidemiologic surveillance, it was necessary to identify eligible cases of epidemiologic investigation of the workers' health through the Health Information System

(HIS). Given the relevance and potentiality of HBCR, a partnership with CVC-SES/MG, responsible for the management and disclosure of information produced by this registry was established. The partnership was consolidated through periodic availability of cancer data entered at HBCR for CSAT-SES/MG routinely.

STEP 3 - SELECTION OF PRIORITY CANCERS AND EXPANSION OF THE ACTIONS OF WRCS

National and international literature highlights several types of cancer potentially related to exposure to carcinogenic agents in work environment and determine which types of neoplasms would be investigated. The productive profile of the state and types of WRC already endorsed by the literature based mainly on the Guidelines of WRCS were analyzed.

Additionally, the scarce experience of workers' health services in conducting surveillance actions of work related suspicious cancers was taken into account. Therefore, mesothelioma, a type of cancer holding inarguable work-related connection and barely registered at HIS due to low incidence was prioritized. In addition, due to Minas Gerais territorial extension, the URS BH SES/MG was defined as the regional-pilot.

A workgroup was created with CSAT-SES/MG, URS BH-SES/MG, CEREST Belo Horizonte, Betim and Contagem and a physician from a high complexity service in Belo Horizonte to organize and implement actions for epidemiologic surveillance of mesothelioma.

Other types of cancers as non-Hodgkin lymphoma, leukemias and non-melanoma skin cancer in hazardous occupations were incorporated as priority for WRCS actions in the state based on epidemiologic investigations of mesothelioma. Through Directive SES/MG 7,730, dated September 22, 2021[15], funds were granted to the municipalities for OHS actions. Currently, Directive SES/MG 8,383 dated October 19, 2022[16] determined that financial support to OHS should continue. For both Directives, WRCS is the priority, establishing goals for work related cancer surveillance actions and surveillance of environments and work processes (sites with potential or proven exposure to carcinogenic agents). The Guidelines of WRCS in the state were not limited to increasing the notifications at SINAN, the actions were integrated and organized to promote and protect the workers' health in the working environment.

STEP 4 - ELABORATION OF THE COLLECTION INSTRUMENT

As much information as possible about the occupational history of the workers is crucial to determine the causal connection between health and labor. A form to investigate suspicious cases of work-related cancer (complementary material) based on the proposal of the Guidelines of WRCS was elaborated.

The form to be applied in an interview or in cases of death, to their parents, collected data as identification of the interviewee, the neoplasm, details of the current occupation and respective occupational hazards. For each type of priority neoplasm, a specific form was created containing details of the agents and exposure, occupational and environmental conditions collected from reference literature, that could be updated and adjusted as needed by health professionals.

STEP 5 - AWARENESS BY HOSPITAL MANAGEMENT TEAM

All the entities of the health attention network are responsible for notifying cases at SINAN, but cancer diagnoses are mostly made on high complexity services and for this reason, cancer hospitals are prioritized within WRCS actions.

The initial proposal of work for WRCS was introduced to specialized cancer hospitals management teams, including strategy of implementation and importance of the services in this process. Overall, access to assistance information were granted to OHS professionals, especially those related to occupational history. However, information flows were not defined or discussed among the services after the identification of patients diagnosed with priority cancers.

As the actions evolved, other hospitals not directly connected to cancer treatment were visited to obtain information from medical charts, especially about the occupational history of the patient; furthermore, additional visits to a few hospitals were required to reintroduce and rediscuss the agenda to ensure the implementation of WRCS.

STEP 6 – IDENTIFICATION OF CANCER CASES AT HEALTH INFORMATION SYSTEMS

Priority cancers were collected at HBCR by technical staff of SES/MG. The following criteria were defined to select the cases: a) primary tumor location (according to ICD – International Classification of Diseases and Related Health Problems – ICD-10[17]); b) histological type of the primary tumor (based on the 3rd. edition of the International Classification of Diseases for Oncology – ICD-O-3[18]); c) age; d) occupational risk associated with the type of cancer; e) period: 2015 to 2021. The target period to extract data from HBCR was expanded annually as soon as the information became available at the system, especially the years 2019, 2020, 2021 and 2022.

HBCR[11] is a dynamic system that allows registers of retroactive cases. One case may have not been extracted

initially in a certain period and be identified in a later extraction for the same period.

In addition to HBCR, mesothelioma data were collected at SIM from 2006 to 2023 and the fields "basic cause of death" and "basic cause associated with death" of the Death Certificate, specific for mesothelioma were investigated utilizing the code ICD 45 (and all the subdivisions).

Data obtained from HBCR[11] and SIM[12] were offered to CSAT-SES/MG through Excel spreadsheets. Next, the cases identified at SIM were paired by name with HBCR and compiled in one spreadsheet and thoroughly analyzed to verify the highly relevant fields to investigate the workers' health.

Some columns of the spreadsheet compiled were eliminated to facilitate the management of the information, but those containing the name, the name of the mother, date of birth, address, occupation per HBCR, date of the diagnosis, primary location of the tumor, histological type, hospital of treatment and for mesothelioma, date of death and occupation according to SIM were kept.

STEP 7 – EPIDEMIOLOGIC INVESTIGATION OF THE WORKER'S HEALTH

The Excel spreadsheet containing the cancer cases identified was subdivided by URS (28), considering where the patient lived and only for the cases within the URS jurisdiction.

Each specific spreadsheet was sent to the respective URS which, on its turn, sent to the municipal worker's health services within its jurisdiction for epidemiologic investigation.

The investigations were performed by: a) municipal RT-ST, considering the municipality where the patient lived or has lived, except when lived or has lived on CEREST-covered areas; b) CEREST's technical staff when the patients lived or has lived in municipalities where these services were provided.

The investigation form was utilized to collect detailed information, mainly occupational history, mostly where the patient/parents lived or remotely by telephone. In addition, OHS teams utilized other sources as charts, articulation with hospitals, Health Primary Attention, syndicates and universities to complete, obtain or analyze information.

All these information and details of each step were recorded on the investigation form and copies of assistance and labor documents were attached if obtained. SINAN's notification/investigation file of WRC was utilized as reference for epidemiologic essential information.

STEP 8 - ISSUANCE OF REPORT

OHS professionals of the municipalities reviewed all the data collected in working environments and forms of occupational exposure and compared with literature findings, in addition to the particularities of suspected WRC for the elaboration of key concepts: whether occupational risk exposure occurred before the diagnosis, biological plausibility – was cancer possible in view of the toxicology of exposure agents? – and consistency – similar findings in different population groups.

These professionals deemed the case as work-related, rejected or inconclusive. If difficulties to prepare the report were found, the cases were discussed with CSAT-SES/MG and/or RT-ST of the URS, and for complex and specific situations, with INCA.

Because the active search at HIS have identified cases with conclusive diagnosis before the current year, surveillance actions occurred when these cases were identified and notifications at SINAN were dated when the epidemiologic investigation was completed, later than the diagnosis date.

Prior to entering the data in the system and for better qualification at SINAN, the reliability and adequacy of the information in each field were checked. All the investigators were guided to fill in the histological type, local of the treatment, and if the patient died, the number of the death certificate and where it occurred in the field "Additional information and comments" for standardization, trackability among the systems and reliability of the data entered at SINAN.

As shown in Figure 4, after the implementation of WRCS in the state, the number of notifications of WRC increased substantially from 73 cases in 2008-2018 to 1,148 cases in 2019-2023, reflecting the quality of the actions taken.

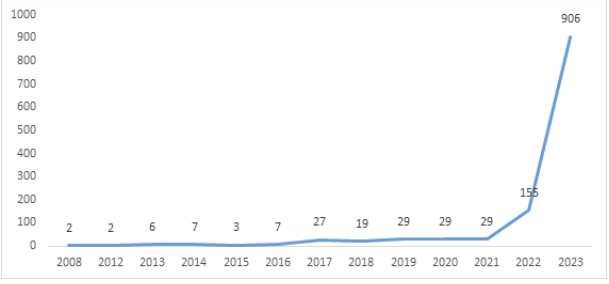

Figure 4. Number of cases of WRC notified at SINAN per year from 2008 to 2023 in Minas Gerais

Source: The authors based on Sinan Net[6].

STEP 9 – MONTH MONITORING OF NOTIFICATIONS ENTERED AT SINAN

WRC notifications entered at SINAN were analyzed periodically by CSAT-SES/MG to check whether the fields have been correctly filled and consistency of the information. However, certain fields were thoroughly investigated: if occupation was consistent with the worker

exposure to carcinogenic agents/risk factor for each type of neoplasm under investigation, if the information about the company was correctly described, if the option of exposure to agent/risk factor that contributed to the development of the disease occupational risks was checked, if the diagnosis was described correctly (as it was not a mandatory field, many notifying units fail to fill in the field, even in possession of an accurate data) and if standardized guidelines for the field "Additional information and comments" have been met.

After checking, inconsistent notifications were sent to the respective URS for adjustments.

DISCUSSION

WRCS standardized actions targeted to epidemiologic surveillance were developed by the state's municipal OHS. Critical topics identified during the implementation were adjusted to ensure continuous actions of WRCS and encouragement of practices by RT-ST. Step 1 provided knowledge and elaboration of a possible action of WRCS. Steps 2 and 3 consisted of in-depth analysis of the theme and feasibility of the strategy. Step 4 attempted to guide RT-ST and standardize the collection of information through investigation forms. Step 5 ensured the access of RT-ST to high complexity services to collect information on epidemiologic investigation and qualifying steps 7 and 8. Step 9 allowed to check the outcomes of the work process and ensure reliable information to support epidemiologic analysis.

Despite the efforts of the Ministry of Health, especially INCA, WRCS practice in Brazil are punctual and based on partnership with high complexity units.

Great part of Minas Gerais municipalities is not covered by regional or municipal CEREST and the actions of OHS are performed by municipal RT-ST. For that reason, the structuring of WRCS actions took into account the organization of OHS services at SUS and did not focus assistance services, especially those of high complexity. Silva Baldo[19], based on the experience of implementation in the municipality of Londrina-Paraná, affirmed that the actions of WRCS, focused on the notification of WRC, should not be limited to specialized diagnosis services and treatment of neoplasms, but, instead, involve workers health services since the investigation and analysis of the occupational history, establishment of the causal connection and entering the cases at the information systems.

The strategy of identification of the cases through information at HIS, mainly HBCR, allowed to detected suspicious cases of WRC in hazardous occupations with confirmed diagnosis in the state of Minas Gerais.

OHS team faced difficulties to retrieve labor activities for epidemiologic investigation due to the interviewee unawareness of the risks he/she was exposed to, difficulty of access to the patient's documents (as work card, for instance), few or none information of interest in the assistance related documents when the access was allowed. Santos[20], in a study conducted in the state of Acre with rural workers identified at SIM was unable to find the entire occupational trajectory due to difficulties of obtaining detailed historical facts, and only the information registered at death or retirement was obtained.

Nearly all the investigation forms were applied by OHS, however, in one of the investigations, it was applied by a high complexity service. The information obtained were qualified and reliable and allowed to determine the causal relation with work and subsequent notification at SINAN.

Studies show the importance of tertiary attention in the actions of WRCS, particularly those related to notification of WRC. Scherer et al.[21] showed that during the notification process of work related diseases at SINAN, better qualified information about occupational history was reached when the patient was still in treatment at the institution than those already discharged, whose data were collected by telephone.

Rocha et al.[22] indicated that oncology health professionals of "*Hospital Regional do Vale do Ribeira*" instructed by a regional CEREST led to a significant increase of the number of notifications of WRC. Vazquez et al.[23] showed positive results of notification of WRC at "*Hospital de Barretos*" since the implementation of an online collection service to obtain occupational history at the working sites, a simple, easy to apply tool in a short time and utilized in clinical environment. Baldo et al.[24] emphasized that these services are important to identify the cases of patients assisted, search and register of information of interest (as occupational exposure and history) in medical records and articulation with OHS services to discuss and refer the cases.

The great difficulty in closing the causal connection with labor activities was poor familiarity of the professionals with WRCS and even concepts inherent to epidemiologic surveillance, showing the importance of qualifying and work continuously the essential concepts to perform the surveillance, searching for adequate strategies and matched to the reality of the services.

Notifications of WRC were evaluated monthly to improve the quality of the data. According to Ferreira et al.[25], the identification and correction of inconsistencies for improved reliability of the information and trustworthiness of the indicators and optimization of actions plans focused to the population health are relevant.

The implementation of WRCS in the municipalities, regardless of their size and technical support by CEREST, although challenging, was the right choice. In 2023, 206 municipalities notified some kind of WRC at SINAN showing to what extent the actions are scattered in the state[6]. Notwithstanding the strengthening of the actions of WRCS in OHS services, it is necessary to improve the structure of more specific lines of action and focused to assistance services as Primary Health Attention and specialized attention to reinforce an agile and watchful surveillance system and investigation of suspicious cases of WRC.

The search and tracking of cases via HBCR and SIM (mesothelioma) were effective, allowing to qualify SINAN and guide professionals to follow the main steps of epidemiologic investigation.

However, there were some limitations and due to sub-notification some cases may have not been captured by these systems. Particularly in relation to HBCR, it was not possible to find cases of the current year because of the time reporters take to file the information and the time to create reports in the system, an obstacle to find some patients to perform the investigation.

One of the key and most challenging stages was the epidemiologic investigation because OHS teams were poorly aware of the essential concepts of epidemiology and WRC. Vazquez et al.[23] affirm that health professionals know little or nothing at all of work processes and carcinogenic agents found in working environments. Nevertheless, there are national documents, among them the Guidelines of WRCS which present technical and epidemiological rules favoring professional activities and facilitating the access to detailed information of potential carcinogenic agents in working environments. CSAT-SES/MG intensified actions of continuous education through workshops and technical meetings to discuss and study the cases in addition to the publication of supporting documents as technical notes to disseminate in-depth knowledge about the theme and strengthen WRCS.

Part of the records were inconsistent in regard to occupation, national register of economic activities, race/color/risk factors and diagnosis. For the majority of the notifications of WRC, the diagnosis should be qualified because they have been confirmed and obtained from HBCR. Marques, Siqueira and Portugual[26] emphasize that SINAN files have an expressive number of fields, part of them essential and non-mandatory for notification at the system, and some of them end up incomplete. And they highlight the necessity of more awareness of health teams and municipal managers about the importance of the quality of register of mandatory notifications.

Regardless of the challenges, the comparison of the scenarios before the implementation of WRCS in 2008-20218 and after in 2019-2023, given the annual mean of notifications, shows the efficacy of the actions adopted because of the expressive increase of notifications. Minas Gerais was the Federative Unit that notified more WRC at Sinan, 906 cases (62% of Brazil's cases), followed by Paraná, (182), and Santa Catarina, (76), in addition to 500% increase in 2023 in comparison with 2022 of the cases notified[6].

The present study proposed an innovative, low-cost, applicable methodology for WRCS and accessible to any type of WRC and health services, specifically those related to the workers' health. The proposal could be extended to other Brazilian states. It is possible and feasible that WRC notifications at SINAN increase considerably and qualitatively to stimulate actions of health promotion and protection and intervention in working processes and environment.

It is suggested a closer relation of the OHS team with high complexity services to ensure the improvement of the quality of the data and awareness of specialized services for timely notification according to the current directives. This partnership, together with active search by OHS team would potentially minimize the limitation of utilizing HIS exclusively to search the cases. In addition, it would be important to structure actions with Primary Health Attention, for instance.

CONCLUSION

This study contributed to strengthen the creation of routine WRCS actions in SUS and materialization of the actions, specifically for epidemiologic investigation of the workers' health, given the paucity of specific technical tools that cover the particularities of OHS actions. The qualified and routine notification at SINAN may best characterize the epidemiologic scenario of WRC in the state, whose details were not addressed herein.

Based on WRCS strengthening in the state, many URS and municipalities have implemented initiatives and actions such as educative materials, surveillance of work processes and environment in productive segments with proven exposure to carcinogenic agents, training, active search of cases in high complexity services, partnership with SIM to identify cases, and qualification of information registered in death certificates, among others.

Additionally, notification flows involving CVC-SES/MG, specifically for cancer data sharing have been created, a critical point to boost the implementation and expansion of WRCS initiatives in the state.

CSAT-SES/MG has organized spaces for discussions as seminars and online courses to expand the knowledge of WRCS in addition to the elaboration of supporting documents to perform the actions.

CONTRIBUTIONS

Cristiane Moreira Magalhães Andrade contributed to the study design, acquisition, analysis and interpretation of the data and wording of the manuscript. Eleonora Assunção Morad Arantes, Ubirani Barros Otero and Mery Natali Silva Abreu contributed to the study design and critical review. All the authors approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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REFERENCES

1. Ministério da Saúde (BR). Departamento de Vigilância, Prevenção e Controle das Doenças. Câncer relacionado ao trabalho [Internet]. Brasília, DF: Ministério da Saúde; 2024. [acesso 2024 ago23]. Disponível em: https://portalsinan.saude.gov.br/drt-cancer-relacionado-ao-trabalho
2. Ministério da Saúde (BR). Atlas do câncer relacionado ao trabalho no Brasil [Internet]. Brasília, DF: Ministério da Saúde; 2021. [acesso 2024 ago23]. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/atlas_cancer_relacionado_trabalho_brasil.pdf
3. International Agency for Research on Cancer. IARC monographs on the evaluation of carcinogenic risks to humans [Internet]. Lyon: IARC; 2023. [acesso 2024 nov4]. Disponível em: https://publications.iarc.fr/593
4. Instituto Nacional de Câncer. Diretrizes para a vigilância do câncer relacionado ao trabalho. 2. ed. [Internet]. Rio de Janeiro: INCA; 2020. [acesso 2024 out 8]. Disponível em: https://www.inca.gov.br/sites/ufu.sti.inca.local/files/media/document/diretrizes-vigilancia-cancer-relacionado-2ed.compressed.pdf
5. Ministério da Saúde (BR). Portaria nº 777, de 28 de abril de 2004. Dispõe sobre os procedimentos técnicos para a notificação compulsória de agravos à saúde do trabalhador em rede de serviços sentinela específica, no Sistema Único de Saúde - SUS [Internet]. Diário Oficial da União. Brasília, DF. 2004 abr 29; Edição 81; Seção 1:37-8. [acesso 2024 jun 12]. Disponível em: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2004/prt0777_28_04_2004.html
6. SINAN: Sistema de Informação de Agravos de Notificação [Internet]. Brasília, DF: DATASUS. [data desconhecida]. [acesso 2024 jun 24]. Disponível em https://datasus.saude.gov.br/transferencia-de-arquivos/#
7. Silva LMB, Oliveira IA, Santos RV. Impacto do trabalho na saúde dos trabalhadores expostos a agentes cancerígenos. Rev Bras Saúde Ocup. 2024;49(1):e14. doi: https://doi.org/10.1590/S0303-76572012000100001
8. Melo MAS, Silva LLM, Melo ALS, et al. Subnotificação no Sinan e fatores gerenciais e operacionais associados: revisão sistemática da literatura. Rev Adm UEG. 2018;9(1):1-20.
9. Silva Neto BR. Prevenção e promoção de saúde. 1. ed. Atena Editora; 2019. doi: https://doi.org/10.22533/at.ed.434191812
10. Silva Baldo RC, Romaniszen CSR, Ribeiro FSN, et al. Eleição de prioridades para a vigilância do câncer relacionado ao trabalho no município de Londrina - Paraná, Brasil. Rev Bras Cancerol. 2014;60(3):215-22. doi: https://doi.org/10.32635/2176-9745.RBC.2014v60n3.466
11. Integrador RHC: Registros Hospitalares de Câncer [Internet]. Rio de Janeiro: INCA. [2012]. [acesso 2024 maio 20]. Disponível em: https://irhc.inca.gov.br
12. SIM: Sistema de Informação sobre Mortalidade [Internet]. Versão 3.2.1.2. Brasília (DF): DATASUS. [data desconhecida]. [acesso 2024 maio 20]. Disponível em: http://sim.saude.gov.br/default.asp
13. Assembleia Legislativa (MG). Decreto nº 48.920, de 2024. Altera o Decreto nº 48.661, de 31 de julho de 2023, que dispõe sobre a organização da Secretaria de Estado de Saúde [Internet]. Diário Oficial Minas Gerais, Belo Horizonte. 2024 out 19; Ano 132; Edição 209:1-2. [acesso 2024 ago 2]. Disponível em: https://www.almg.gov.br/legislacao-mineira/texto/DEC/48920/2024/#:~:text=Altera%20o%20Decreto%20n%C2%BA%2048.661,o%20inciso%20VII%20do%20art
14. Conselho Nacional de Saúde (BR). Resolução nº 510, de 7 de abril de 2016. Dispõe sobre as normas aplicáveis a pesquisas em Ciências Humanas e Sociais cujos procedimentos metodológicos envolvam a utilização de dados diretamente obtidos com os participantes ou de informações identificáveis ou que possam acarretar riscos maiores do que os existentes na vida cotidiana, na forma definida nesta Resolução [Internet]. Diário Oficial da União, Brasília, DF. 2016 maio 24 [acesso 2024 abr 7]; Seção 1:44. Disponível em: http://bvsms.saude.gov.br/bvs/saudelegis/cns/2016/res0510_07_04_2016.html
15. Secretaria de Estado de Saúde (MG). Resolução SES/MG nº 7.730, de 22 de setembro de 2021. Institui o repasse de incentivo financeiro, em caráter excepcional, para o fortalecimento das ações de Vigilância em Saúde do Trabalhador (VISAT), no Estado de Minas Gerais.

[Internet]. Diário Oficial Minas Gerais, Belo Horizonte. 2021 set 27. [acesso 2024 ago 12]. Disponível em: https://www.saude.mg.gov.br/index.php?option=com_gmg&controller=document&id=22726-resolucao-ses-mg-n-7-730-de-22-de-setembro-de-2021?layout=print

16. Secretaria de Estado de Saúde (MG). Resolução SES/MG nº 8.383, de 19 de outubro de 2022. Altera a Resolução SES/MG nº 7.730, de 22 de setembro 2021, que institui o repasse de incentivo financeiro, em caráter excepcional, para o fortalecimento das ações de Vigilância em Saúde do Trabalhador (VISAT), no estado de Minas Gerais [Internet]. Diário Oficial Minas Gerais, Belo Horizonte. 2023 jan 4. [acesso 2024 ago 12]. Disponível em: https://www.saude.mg.gov.br/index.php?option=com_gmg&controller=document&id=24322-resolucao-ses-mg-n-8-383-de-19-de-outubro-de-2022?layout=print
17. Organização Mundial da Saúde. CID-10: Classificação Estatística Internacional de Doenças e problemas relacionados à saúde. São Paulo: Edusp; 2008.
18. Fritz A, Percy C, Jack A, et al., editores. International classification of diseases for oncology (ICD-O). 3. ed. Geneva: World Health Organization; 2013.
19. Silva Baldo RC. Implantação da vigilância do câncer relacionado ao trabalho em Londrina-PR entre 2011 e 2014 [tese]. Botucatu: Universidade Estadual Paulista; 2016.
20. Santos ESG. Atividade Ocupacional e câncer e o estado do Acre: análise exploratória da incidência e mortalidade [dissertação]. Rio Branco: Universidade Federal do Acre; 2014.
21. Scherer V, Miranda FMD, Sarquis LMM, et al. SINAN NET: um sistema de informação à vigilância na saúde do trabalhador. Cogitare Enferm. 2007;12(3):330-7.
22. Rocha MP, Douvletis E, Silva Neto ZG, et al. Characterization of work-related cancer in the territory of cerest registro, SP: descriptive study, 2015-2021. Res Soc Dev. 2022;11(12):34339. doi: https://doi.org/10.33448/rsd-v11i12.34339
23. Vazquez FL, Silveira HCS, Otero UB, et al. The usefulness of an online simplified screening questionnaire (SSQ) in identifying work-related cancers. Healthcare. 2023;11(11):1563. doi: https://doi.org/10.3390/healthcare11111563
24. Baldo RCS, Romaniszen CSR, Spagnuolo RS, et al. Nexo epidemiológico do câncer relacionado ao trabalho no município de Londrina-PR. Rev Bras Cancerol. 2021;67(3):e-141328. doi: https://doi.org/10.32635/2176-9745.RBC.2021v67n3.1328
25. Ferreira JSA, Vilela MBR, Aragão PS, et al. Avaliação da qualidade da informação: linkage entre SIM e SINASC em Jaboatão dos Guararapes (PE). Ciênc Saúde Colet. 2011;16(Supl 1):1241-6. doi: https://doi.org/10.1590/S1413-81232011000700056
26. Marques CA, Siqueira MM, Portugal FB. Avaliação da não completude das notificações compulsórias de dengue registradas por município de pequeno porte no Brasil. Ciênc Saúde Colet. 2020;25(3):891-900. doi: https://doi.org/10.1590/1413-81232020253.16162018

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