MALIGNANT MESOTHELIOMA CASES IN 20 YEARS OF A HOSPITAL CANCER RECORDS

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ABSTRACT

Objective: To analyze the quality of data from cases of malignant mesothelioma reported in the Hospital Records in a Cancer hospital in Curitiba-PR.

Methods: A retrospective cross-sectional study conducted at a High Complexity Center for Oncology in Curitiba, Paraná, Brazil, from January to December 2017. The sample consisted of 142 records of adult patients with topography cancer (International Classification of Diseases for Oncology (ICD-O) 3rd Review) C38 (heart, mediastinal and pleural cancer) and C48 (retroperitoneum and peritoneum cancer) from January 1995 to December 2015. For statistical analysis, Stata 15® software was used.

Results: A total of 16 cases of malignant mesothelioma (11 pleural and five retroperitoneal) were identified, diagnosed by anatomopathological and immunohistochemical exams. Of these, three were reported with inadequate topographies. Differences were found between the diagnoses in medical records and those recorded in five death certificates. The sensitivity of the Cancer Hospital Records of a reference cancer hospital in Curitiba when reporting malignant mesothelioma was 81% and the specificity when reporting pleura cancer was 97%.

Conclusions: There was underreporting for cases of malignant mesothelioma (13 instead of 16) and one overestimation was observed in pleural cancer reports (4 instead of 0), due to the mistaken coding of the description of the disease in the record. Early diagnosis, comprehensive clinical follow-up, training of professionals who generates data and interpretation are central pillars for the correct definition of the epidemiology of malignant mesothelioma.

Descriptors: Mesothelioma; Asbestos; Public health; Epidemiology; Information systems.

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INTRODUCTION ────────────

Malignant mesothelioma (MM) is an aggressive and incurable cancer that rapidly kills, originated from the mesothelial and submesothelial cells that make up the pleura (> 90% of cases), peritoneum, pericardium, and testicles vaginal tunic[1]. It can lead to metastases in adjacent lymph nodes, lungs, liver, pancreas, kidneys, adrenal glands and bone marrow[2].

According to the International Agency for Research on Cancer (IARC), since 1960 the main environmental factor recognized in the development of MM is the inhalation and deposition of asbestos fibers or asbestos in respiratory tissue derived from a group of metamorphic rocks naturally found in nature and largely used as industrial raw material[3].

In most cases of MM in men (less in women) there is a relationship with exposure to asbestos in the workplace, which allows to define it as an occupational disease[4-5]. However, there is also the possibility of contamination through environmental exposure[6] or even through occupational exposure through contact with fibers impregnated in clothing of workers who had previous contact with asbestos, or while handling objects composed of such fibers, for example gloves and thermal blankets[7].

Due to the recognition of its carcinogenic potential in the 1970s, asbestos is banned in all its forms (serpentines - chrysotile and amphibole - crocidolite, amosite, tremolite, anthophyllite, actinolite) in over 60 countries. Brazil began its use in 1940, with a fast growth whose apex occurred between 1985 and 1991, when amphiboles were banned). In recent years Brazil was one of the five largest producers, consumers and exporters of chrysotile or white asbestos[8].

Research that considers the particular history of asbestos-producing and consuming regions has found that the incidence and prevalence of mesothelioma has been steadily increasing. For Brazil, by 2030 there are an estimated 1,911 deaths from MM, with a peak between 2021 and 2026; for cases of malignant pleural neoplasia (primary tumors without histological confirmation), an estimated 2,406 deaths, with a peak in a similar period. Both total an estimated 4,301 deaths. These rates are later than the other industrialized countries, about 15 to 20 years, which is compatible with their consumption chronology[4].

Given the studies confirming the harmfulness of asbestos as well as the numerous struggles of various entities and Public Ministry of Labor in defense of the end of its use, the Federal Supreme Court (STF) declares, on November 29th, 2017, the prohibition of extraction, industrialization and commercialization of any product containing chrysotile asbestos in its composition in the national territory, and the Congress and the States cannot approve laws to authorize the use of the fiber[9]. However, the ban on asbestos solves in part the problem generated by the fiber since it takes about 40 years or more to manifest the MM[10]. For this reason, the monitoring of workers, their families, and environmentally exposed people is central for knowledge and risk control for the population[11-12].

One of the strategies adopted in Brazil for the identification and follow-up of cancer cases in the national territory is the Hospital Cancer Registry (RHC), a systematic source of information, installed in general or specialized oncology hospitals. Its objective is to collect data related to the diagnosis, treatment and evolution of confirmed cancer cases treated at these institutions, whether public, private, educational or philanthropic. Together with the Population-Based Cancer Registries (RCBPs) and the Mortality Information System (SIM) they form the structuring axis of the cancer care policy in the country, and are considered by the National Cancer Institute (INCA) as "as powerful tools for the epidemiological surveillance of cancer in the country"[13].

RHC has a clinical role in providing valuable information to hospital management that should be used to directly benefit its users. From its indicators, the quality of care offered by the hospital can be observed, including the results achieved in cancer treatment. It also assumes the important role of monitoring and evaluating the care provided to these patients, providing statistical data that needs to be reliable as they help the healthcare team to guide their management.

This study aims to describe the quality of diagnoses of MM cases and malignant pleura and peritoneal neoplasms seen at a referral oncology hospital in Curitiba.

METHOD ⸺⸺⸺⸺⸺⸺⸺

Retrospective and cross-sectional study, carried out at the RHC of a High Complexity Oncology Center (CACON) in Curitiba-PR, southern Brazil, from January to December 2017.

Inclusion criteria were: medical records of patients ≥ 18 years at the time of admission to the institution, International Classification of Diseases for Oncology (ICD-O) 3rd Review

with C38 and C48 topography or with M905_ / 3 morphology (malignant tumor) for primary malignant heart tumors (C38.0), mediastinum (C38.1, C38.2, C38.3), pleura (C38.4), retroperitoneum (C48.0), peritoneum (C48.1, C48.2), and specific morphological codes for malignant mesothelioma (9050/3, 9051/3, 9052/3 and 9053/3), reported in the period 1995-2015. The establishment of the temporality of the searches was according to the availability of complete data recorded in the researched RHC.

Initially, we extracted data from the institution's RHC integrator (iRHC), whose coding is from ICD-O3, in which 54 medical records with Group C38 codes and 88 medical records with Group C48 codes were identified, totaling 142 medical records eligible. After this filtering, data were extracted from physical and electronic medical records (when available) with through a data collection tool.

For analysis, data were tabbed using the Microsoft Excel® 2010 program and results were expressed in simple (n) and absolute (%) frequency and analysis and at 95% confidence intervals (CI).

In order to verify the sensitivity (Se) and specificity (Sp) of the RHC, a chart was elaborated based on the morphology and diagnosis found in the RHC and the anatomopathological (AP) and/or immunohistochemical (IHC) reports (gold standard) present in the analyzed medical records, as they are related to the medical evolution records and examination reports that supported the diagnosis. Sequentially, the diagnostic coding was performed, as recommended by the ICD-O3. After this step, all codes found (used by RHC and those obtained after data collection) were converted to ICD-10 (International Classification of Diseases (ICD) 10th Revision). Thus, cases with malignant mesothelioma morphology (ICD-O-3: 90503, 90513, 90523, 90533) were reclas-

sified as C45 (ICD-10). Results were expressed as simple (n) and absolute (%) frequencies and 95% confidence intervals (CI). Statistical analyzes were performed using Stata 15® software.

This study was approved by the Research Ethics Committee of the research scenario institution, under number 2514, supported by Resolution 466/2012.

RESULTS

From the RHC data, 54 cases of cancer with topography C38 (malignant neoplasia of the heart, mediastinum and pleura) and 88 cases of cancer with topography C48 (malignant neoplasia of the retroperitoneum and peritoneum) were identified, totaling 142 cases.

The evaluation of the diagnoses found in medical records showed that of the cases registered with codes of group C38, 38 were related to mediastinal lesions, being: two cases in Anterior Mediastinum (C38.1), 35 cases in Mediastinum of Other Specific Types (OST, C38.3), a case in Heart (C38.0). Among the 15 cases identified by code C38.4 (Pleura, OST), 11 were related to patients diagnosed with Pleura Malignant Mesothe-

lioma; the others referred to the use of the code to report cases of Non-Hodgkin's Lymphoma, Squamous Carcinoma Cell (SCC) and Adenocarcinoma.

Of the 88 cases of retroperitoneal and peritoneal cancer, 74 were in Retroperitoneum (C48.0), 10 were in Peritoneum, OST (C48.2), four in specific parts of Peritoneum (C48.1), and one with overlapping lesion of Retroperitoneum and Peritoneum (C48.8). Only five cases of MM were identified.

The RHC Se for MM (C45) was found to be 81% (95% CI: 54-96%) as three of the 16 cases of the disease were reported with inappropriate topographies (C49.3, C48.0 and C34.9) (table 1). It is noteworthy that the inappropriate topography invalidates the notification of the disease, even if the morphological code is correct, since the final conversion to the equivalent ICD-10 is not feasible. Examination of the medical records did not show any case of C38.4.

Regarding the Sp of the record when notifying pleural cancer (table 1), it is presented with 97% (95% CI: 92-99%), in which four cases were mistakenly reported as C38.4 (false positives, a lung cancer, one mediastinal cancer and two metastatic cancers in the pleura).

Table 1 – Sensitivity and specificities of the Hospital Cancer Registry for reporting malignant mesothelioma cases. ICD-10 codes. Curitiba, PR, Brazil, 2017.

RHC	Medical Record			
	C45	C38.4 Pleura	Other cancer	Total
C45 − Mesothelioma	13 (81%)*	0	0 (0%)	13
C38.4 − Pleura	0 (0%)	0	4 (3%)***	4
Other cancer	3 (19%)**	0	122 (97%)****	125
Total	16 (100%)	0	126 (100%)	142

SUBTITLE: RHC: Hospital Cancer Registry
*TP: True Positive for MM
**FN: False negatives for MM
***FP: False Positive for pleura cancer
****TN: True negative for pleura cancer

The observation of the chronology of admissions and deaths showed that there was less than one admission of MM/year. Records of communication by family members of two deaths outside the institution, and another 10 that occurred during hospitalization were found. No information regarding death was found under any circumstances in the medical records of three patients (table 2). The median survival was 10.2 months (in 9 pleural MM: 6.8 months; in 4 peritoneal MM: 11.4 months). Only for one case (pipe technician) was reported asbestos exposure in the chart.

Table 2 – Cases of malignant mesothelioma registered in the Hospital Cancer Registry and evaluated in the medical records (codes ICD-O3) from 1995 to 2015. Curitiba, PR, Brazil, 2017.

Gender	Age at diagnosis	Year of diagnosis	P TOPO	P MORPHO	RHC TOPO	RHC MORPHO	Survival (months)	Occupation
F	53	2002	C48.2	9052/3	C48.1	9050/3	17,9	Commerce and similar workers
M	58	2010	C38.4	9053/3	C38.4	9050/3	NR	NR
M	56	2006	C48.2	9050/3	C48.2	9050/3	12,6	Cooks and similar workers
M	75	2003	C38.4	9052/3	C49.3	90503	5,6	Commerce and similar workers
M	68	2005	C38.4	9053/3	C38.4	9050/3	0,9	Office clerks and similar workers
F	69	2013	C48.2	9050/3	C48.2	9050/3	3,6	Professor
M	56	2001	C38.4	9050/3	C38.4	9050/3	79,7	Commerce and similar workers
M	64	2010	C38.4	9050/3	C34.9	9050/3	18,9	Metallurgical and steel workers
M	59	2014	C38.4	9051/3	C38.4	9051/3	6,8	Servant workers
M	49	1998	C38.4	9050/3	C38.4	9050/3	6,4	Industry production workers
F	34	1997	C38.4	9051/3	C38.4	9050/3	2,2	Servant workers
F	29	2013	C48.2	9050/3	C48.0	9050/3	10,2	Office clerks and similar workers
M	63	2010	C38.4	9050/3	C38.4	9050/3	13,5	Pipe technician
F	74	2004	C38.4	9052/3	C38.4	9052/3	NR	Servant workers
M	61	2007	C38.4	9050/3	C38.4	9050/3	19,3	Metallurgical and steel workers
F	45	2007	C38.4	9050/3	C38.4	9050/3	NR	Unclassified workers

SUBTITLE: P TOPO: topographic code found in the medical record;
P MORPHO: morphological code found in the medical record;
RHC TOPO: topographic code reported by RHC;
RHC MORPHO: morphological code reported by RHC
NR: not reported

From the analysis of the Death Certificates found, five presented as the main cause of death different diagnoses from those found in the medical records - which justify reporting to the RHC - either due to incompleteness of information or use of other nomenclatures, as shown in table 1.

No. of Cases	Diagnosis in the medical record	Diagnosis in the death certificate
2	Pleural Mesothelioma	Pleura Malignant neoplasia; Pleura cancer with pulmonary and peritoneal metastases
1	Peritoneal Mesothelioma	Intestinal leiomyosarcoma
2	Mesothelioma	Fusocellular neoplasia with brain metastasis; Retroperitoneum Tumor

Chart 1 – Description of the diagnoses found in the death certificates and the diagnoses established in the medical records of malignant mesothelioma cases. Curitiba, PR, Brazil, 2017.

DISCUSSION

Since its implementation in the 1980s, the RHC system has been responsible for recording and analyzing cancer cases treated in a hospital setting, specifying the details of topographic location and morphological behavior, treatment, relapses, metastatic behavior and mortality rate from the disease. It also allows the determination of the sociodemographic profile of cases, helping to map the health conditions of a given population[14].

In this study we found nonconformities in the records of three of the 16 cases of MM attended, where the topographic codes used were incompatible with the location of mesothelioma (C34.9, C48.0 and C49.3), so that the final conversion for ICD-10, a worldwide way of expression for tracking the number of cases of all diseases, probably cannot be established. Thus, RHC sensitivity (Se) for case reporting of MM was 81%.

Scanning through the chart, we found no cases of C38.4 (pleural cancer). The specificity (Sp) of the registry for diagnosis of pleura cancer was 97%, highlighting that four cases of pleura cancer were coded incorrectly, since one was lung cancer, the other mediastinal cancer and two were related to metastasis in the pleura cancer.

This result corroborates the study conducted in Brazil[15] which showed the

MM records from the states of Paraná, Santa Catarina and Rio Grande do Sul, concluding that of the 58 cases registered with morphology for MM, 13 cases had C34 (lung) topography. However, it is possible that the sensitivity and specificity of the studied RHC is different from other RHCs in the country, as it happens with other notification systems (SIM, SINASC, SISCOLO), because these, although adopted for more than four decades, still vary by region, coverage and quality[16].

Regarding the chosen morphological codes, the code 9050/3 (malignant mesothelioma) was generically used to report four cases of the disease, and in two cases the code 9051/3 (malignant fibrous mesothelioma) could have been used, two cases 9052/3 (malignant epithelioid mesothelioma), one case 9053/3 (malignant biphasic mesothelioma). An analogous result was found in Italy in a study comparing morphology between the Mesothelioma Records and Population-Based Cancer Records[17].

The choice of using ICD-O3 to report cancer cases in specialized services, to pass information directly to INCA, is a recommendation of IARC and is due to the possibility of precise detailing of cancer, something desired by oncologists since the 50's and not viable with ICD-10 codes[14]. Although these four MM cases were reported, the RHC objective was not fully met.

Using RHC is a recent experience and requires the adoption of quality control procedures. Error situations, as established by the Sis-RHC, require re-evaluation of the information and validation of oncology consultants who advise the RHCs. Blank fields are not accepted and must be filled in with the "no information" option code[18]. In this sense, an alliance between the HRC and the healthcare professionals who generate the computed data may be a way to produce consistent information, which will positively influence clinical and administrative decision making.

In Brazil, over 596,000 new cancer cases were estimated for 2016, making it the second leading cause of death, with the highest incidence in the Southern Region[19]. Advances in diagnostic and therapeutic procedures provide longer survival for cancer patients, but not necessarily better quality of life after treatment, which will only be possible through accurate registration and epidemiologically based decision making.

The Brazilian Ministry of Health believes that there will be an improvement in the

quality of the epidemiological information collected, as a direct consequence of improved medical records, greater involvement and development of the health team, and critical data analysis[20]. The adoption of strategies such as the use of protocols, continuing education, case discussion in a multidisciplinary team and concurrent auditing can be of great help to reach such evolution.

Although Brazil has approved laws prohibiting the use of asbestos, studies estimate that the country will face a high number of cases of pleura and MM cancer in the near future, due to the period of exposure to asbestos and the interval required for its onset of the first signs and symptoms. By pointing out the possible underreporting of diseases, this study contributes socially by encouraging that training and qualifications are adopted in the reporting institutions. It also aims to contribute to the strengthening of actions that provide early diagnosis and comprehensive care to individuals exposed to asbestos, potentially subject to illness.

CONCLUSION

For the Hospital Cancer Registry, all cases of MM occurring in the institution were identified, registered and reported. However, it was observed that, for 25%, we chose to use the morphological code 9050/3, which refers only to Malignant Mesothelioma, when other codes could have been used to further detail the type of MM to which referred to. Since the ICD-O3 allows this detail, it is appropriate to use it in order to better portray the epidemiology of MM. Also, in situations where the codes available in ICD-O3 were not correctly assigned, the conversion to ICD 10 cannot be established, causing a probable underreporting of MM cases.

In addition, the high number of information not filled in by health professionals at the time of patient care represents another weakness in the definition of the epidemiological profile of malignant mesothelioma, highlighting the need for sensitization of professionals involved in data generation through actions of continuing education.

ACKNOWLEDGMENTS

FINANCING

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