

Quality of the data in the information system for work accidents under exposure to biological materials in Brazil, 2010 to 2015

Qualidade dos dados do sistema de informação sobre acidentes de trabalho com exposição a material biológico no Brasil, 2010 a 2015

Sâmea Cristina Santos Gomes¹, Arlene de Jesus Mendes Caldas²

ABSTRACT | Background: Health information systems allow for the identification of problems in this field, and often represent the single source of information; therefore, accurate determination of their quality is crucial. **Aims:** To analyze accessibility, opportunity and completeness as criteria for the quality of the information provided by System of Information for Notifiable Conditions (Sistema de Informação sobre Agravos de Notificação – SINAN) on Work Accidents under Exposure to Biological Materials (Acidentes de Trabalho com Exposição a Material Biológico – ATEMB) from 2010 to 2015. **Methods:** Observational and descriptive study based on secondary SINAN data on ATEMB. The object of analysis was all ATEMB records from the 26 Brazilian states and Federal District from 1 January 2010 to 31 December 2015. **Results:** Information is accessible and timely, while the data for the ongoing year are only made available the following one. The percentage of incomplete data in SINAM-ATEMB was high for the following variables: educational level, length of work in the current job, organic materials, serological status of affected individuals and source-patient, measures adopted, case progression and Work Accident Notification (Comunicação de Acidente de Trabalho - CAT); therefore, these variables cannot be included in analyses of risk factors. **Conclusion:** Despite the accessibility of the database and the relevance of its variables, SINAN-ATEMB exhibits problems in its quality that indicate an indisputable need to improve the completeness of information.

Keywords | information systems; notification of occupational accidents; exposure to biological agents.

RESUMO | Contexto: Os sistemas de informação em saúde possibilitam conhecer problemas dessa área e, muitas vezes, representam a única fonte de informação, tornando-se fundamental conhecer sua qualidade. **Objetivo:** Analisar a acessibilidade, a oportunidade e a completude como critérios da qualidade das informações do Sistema de Informação sobre Agravos de Notificação a respeito de Acidentes de Trabalho com Exposição a Material Biológico (SINAN-ATEMB), no período de 2010 a 2015. **Métodos:** Estudo observacional, descritivo, baseado em dados secundários do SINAN sobre ATEMB. O objeto de análise do estudo foi composto por todos os registros de ATEMB ocorridos nos 26 estados e no Distrito Federal no período de 1º de janeiro de 2010 a 31 de dezembro de 2015. **Resultados:** Foi constatado que as informações são acessíveis e oportunas, com defasagem do ano vigente em relação ao início do estudo. O SINAN-ATEMB apresentou elevado percentual de dados incompletos nas variáveis: escolaridade, tempo de trabalho na ocupação, material orgânico, *status* sorológico do acidentado e do paciente-fonte, condutas adotadas, evolução do caso e emissão da Comunicação de Acidente de Trabalho (CAT), levando a consideração de que não é possível o uso dessas variáveis em análises de fatores de risco. **Conclusão:** Conclui-se que, apesar da acessibilidade da base de dados e da relevância de suas variáveis, o SINAN-ATEMB possui problemas de qualidade que apontam para a indiscutível necessidade de melhorias na completude de suas informações.

Palavras-chave | sistemas de informação; notificação de acidentes de trabalho; exposição a agentes biológicos.

Study performed at Federal University of Maranhão (Universidade Federal do Maranhão – UFMA) – São Luís (MA), Brazil.

¹Medical Course, Center of Social Sciences, Health and Technology, Federal University of Maranhão (Universidade Federal do Maranhão – UFMA) – Imperatriz (MA), Brazil.

²Department of Nursing, Graduate Program in Nursing and Collective Health, UFMA – São Luís (MA), Brazil.

DOI: 10.5327/Z1679443520170036

INTRODUCTION

Work accidents involving exposure to biological materials (WAEBM) are characterized as body injuries resulting from direct contact with blood or organic fluids at the workplace. They might occur through percutaneous inoculation, needles or other sharps or direct contact with disrupted skin and/or mucous membranes^{1,2}, whereby pathogens might cause serious diseases. Within this context, infection with the human immunodeficiency virus (HIV) and hepatitis stand out³.

According to the Brazilian Ministry of Health, the high incidence of WAEBM is a cause of considerable concern⁴. Data from the Information System for Notifiable Conditions (Sistema de Informação sobre Agravos de Notificação — SINAN) show that 203,709 cases of WAEBM involving workers with known occupation occurred from 2007 to 2013^{5,6}.

Availability of high-quality information on occupational and work-related diseases and conditions is crucial to recognize the urgency of and define priorities for actions to improve the working and health conditions of workers, and thus reduce the incidence of work accidents⁷. In this regard, through Administrative Rule no. 777 the Ministry of Health made the notification of work-related accidents, including WAEBM, compulsory⁸.

In addition, Administrative Rule no. 104/2011⁹ made notification of WAEBM to SINAN compulsory. Administrative Rule no. 1,271, published in 2014, establishes that WAEBM should be notified on a weekly basis by both public and private health care services¹⁰. The stipulations in this was later reproduced in Administrative Rules no. 204¹¹ and 205¹², from 17 February 2016.

An exclusive system for WAEBM notification is a relevant tool for the consolidation of the surveillance of diseases affecting workers in Brazil by affording data for quantitative and qualitative evaluation. This is the case of other health information systems available in the country, such as the Mortality Information System (Sistema de Informações sobre Mortalidade — SIM) and the Information System for Live Births (Sistema de Informações sobre Nascidos Vivos — SINASC)⁸.

However, despite the availability of information systems for a wide variety of contexts and the increasing relevance attributed to the information produced by health care

services, the monitoring of the quality of the data^{13,14} is still incipient. Problems in the creation and management of high-quality records¹⁵ are still neglected, which leads to put the consistency of the information and the quality of secondary data for efficient and fact-grounded analyses with a minimum of distortion into question^{16,17}.

International organizations, such as the Economic Commission for Latin America and the Caribbean (ECLAC), observe that countries that employ statistical systems broadened the scope of the traditional notion of quality, by including attributes that measure continuous improvement in information systems. The attributes and domains usually employed and included within such broadened notion of quality concern the following aspects: relevance, timeliness, accessibility, methodological clarity, coherence and completeness¹⁸.

Therefore, the aim of the present study was to analyze the quality of the information on WAEBM through investigation of the accessibility, timeliness and completeness of SINAN information from 2010 to 2015.

METHODS

The present observational and descriptive study was based on secondary SINAN data on WAEBM. The object of analysis was all WAEBM records from all the 26 Brazilian states and the Federal district for the period from 1 January 2010 to 31 December 2015.

The survey was performed on January 2017, therefore, the database was up-to-date, since time enough had elapsed for timely inclusion of the notifications made in 2015 and for the data to have been transferred.

Access to SINAN-ATEMB (Acidentes de Trabalho com Exposição a Material Biológico — WAEBM) notifications database was granted by the General Coordination of Workers' Health, Secretariat of Surveillance, Ministry of Health (Coordenação-Geral de Saúde do Trabalhador, da Secretaria de Vigilância em Saúde do Ministério da Saúde — CGSAT/SVS/MS) through the Collaborating Center for Surveillance of Work Accidents, Institute of Collective Health, Federal University of Bahia (Universidade Federal da Bahia UFB) available at: <http://www.ccvisat.ufba.br>. The data were obtained by downloading files available

at the just mentioned URL and were later entered in a single Microsoft Excel 2010 spreadsheet.

The data quality aspects analyzed in the present study were accessibility, timeliness and completeness.

Dimension accessibility concerns the availability of the data and how they can be obtained (for a fee or free of charge), type of information (individual or combined), where to and procedure to request the data, time to delivery and file format (physical or electronic)¹⁶.

Dimension timeliness analyzes the availability of the data to users as concerns the measure in which they are available when and where the users need¹⁹.

Dimension completeness assesses the measure in which all fields were filled through calculation of the ratio of filled to blank fields. This is to say, it measures the proportion of properly notified cases by health authorities for all the variables included in the data collection form. This indicator allows assessing the quality of data collection for the health condition under surveillance¹⁷⁻¹⁹.

For assessment of completeness, we investigated the association between the investigated variables and the sociodemographic and occupational profile of health care workers who were victims of accidents and the characteristics of WAEBM. The socio-occupational variables considered were:

- sex;
- age;
- educational level;
- professional characteristics;
- employment status;
- length of work.

Accident-related variables included:

- type of exposure;
- type of biological material;
- causative agent;
- accident circumstances;
- use of personal protective equipment (PPE);
- immunization status of accident victims for hepatitis B;
- serological status (anti-HIV, HBsAg, anti-HBV, anti-HCV);
- known source;
- serological status of source (anti-HIV, HBsAg, anti-HBV, anti-HCV);

- measures adopted at the time of accident;
- issuance of Work Accident Report (WAR) form;
- progression of cases.

In the present study, fields filled in the database as “unknown”, with number 0, left blank or filled with a term indicative of missing information were defined as incomplete. The score used to analyze completeness was the one formulated by Romero and Cunha¹⁶, according to which it is categorized as follows:

- excellent: less than 5% of incomplete fields;
- good: 5 to 10%;
- fair: 10% to 20%;
- poor: 20 to 50%;
- very poor: 50% or higher.

The variables analyzed in the present study were tabulated per year. The absolute and relative frequencies of missing, incomplete or unknown data on SINAN-ATEMB were calculated and then categorized according to Romero and Cunha's¹⁶ scale.

In compliance with the National Health Council Resolution no. 466/2012, the present study was submitted to the research and ethics committee of President Dutra University Hospital, Federal University of Maranhão (Universidade Federal do Maranhão — HUUFMA) being approved by ruling no. 2,039,925/2017.

RESULTS

We analyzed 280,099 cases of WAEBM involving Brazilian workers and notified to SINAN from 2010 to 21015. Along this period, the number of notifications increased in all the Brazilian states (Table 1).

SINAN-ATEMB database proved to be accessible; it is available open access in electronic format. The name of workers who were victims of accidents is encoded for confidentiality and ethical reasons. The database further provides information on variables such as: worker's address, municipality of residence, urban or rural area and employer's address. As a result, the database enables studies on geographical inequality in health. Files are compressed to .dbc and .rar format and need to be decompressed to .dbf or .xls before reading.

Table 1. Distribution of work accidents involving exposure to biological materials per year and federal administrative division (UF). Brazil, 2017.

| UF | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---------------------|--------|--------|--------|--------|--------|--------|
| North | | | | | | |
| Rondônia | 97 | 144 | 140 | 181 | 214 | 282 |
| Acre | 19 | 12 | 25 | 22 | 53 | 108 |
| Amazonas | 109 | 150 | 708 | 965 | 1,188 | 1,215 |
| Roraima | 137 | 143 | 166 | 204 | 201 | 194 |
| Pará | 227 | 338 | 358 | 358 | 486 | 458 |
| Amapá | 68 | 74 | 93 | 151 | 130 | 128 |
| Tocantins | 403 | 485 | 545 | 544 | 634 | 516 |
| Northeast | | | | | | |
| Maranhão | 316 | 418 | 362 | 383 | 414 | 445 |
| Piauí | 116 | 212 | 295 | 271 | 296 | 443 |
| Ceará | 690 | 828 | 1,053 | 1,335 | 1,410 | 1,259 |
| Rio Grande do Norte | 644 | 800 | 760 | 860 | 950 | 1,080 |
| Paraíba | 206 | 344 | 489 | 641 | 450 | 687 |
| Pernambuco | 291 | 512 | 1,149 | 1,674 | 2,154 | 2,157 |
| Alagoas | 744 | 785 | 849 | 769 | 825 | 792 |
| Sergipe | 483 | 427 | 488 | 448 | 817 | 431 |
| Bahia | 1,266 | 1,809 | 1,835 | 2,176 | 2,448 | 2,589 |
| Southeast | | | | | | |
| Minas Gerais | 3,906 | 5,368 | 5,960 | 5,891 | 6,402 | 7,093 |
| Espírito Santo | 501 | 582 | 652 | 733 | 1,086 | 1,021 |
| Rio de Janeiro | 3,403 | 4,292 | 4,445 | 4,707 | 4,689 | 3,857 |
| São Paulo | 13,226 | 13,337 | 13,783 | 14,166 | 14,662 | 14,482 |
| South | | | | | | |
| Paraná | 3,129 | 3,352 | 4,473 | 4,625 | 4,640 | 4,250 |
| Santa Catarina | 1,394 | 1,700 | 2,176 | 2,856 | 3,278 | 3,125 |
| Rio Grande do Sul | 792 | 1,362 | 1,152 | 2,194 | 2,936 | 3,696 |
| Center West | | | | | | |
| Mato Grosso do Sul | 420 | 603 | 684 | 703 | 804 | 901 |
| Mato Grosso | 450 | 565 | 679 | 637 | 602 | 705 |
| Goiás | 1,404 | 1,303 | 1,739 | 2,146 | 1,956 | 2,210 |
| Federal District | 442 | 531 | 501 | 482 | 568 | 541 |
| Brazil | 34,883 | 40,476 | 45,959 | 50,122 | 53,994 | 54,665 |

In regard to timeliness, the database might be requested to CGSAT/MS or state health surveillance secretariats through a formal letter including clearance by a research ethics committee. Only the access to the information for the ongoing year is delayed, since the data become available only at the beginning of the following year.

As concerns the dimension of completeness, identification variables, such as source of notification, victim's place of residence, sex and age, were rated "excellent" for all the analyzed years. In turn, the ratings for variable educational level varied from "fair" (2010, 2014 and 2015) to "poor" (2011, 2012 and 2013) (Tables 2 and 3).

In regard to the socio-occupational variables, the information on the workers' occupation was rated "excellent" for the full analyzed period. The information on variable employment situation was rated "good" only for 2011 and "fair" for all other years. The information for variable length of work was rated "poor" for the full analyzed period (Tables 2 and 3).

The information on variables accident circumstances and type of exposure was rated "excellent" and "good", respectively, for all the analyzed period. The information on variable causative agent was rated "excellent" for 2011 and 2012 and "good" afterward. The information on biological materials involved in accidents was rated "fair" for the full analyzed period.

Information on use of PPE at time of the accident was provided in more than 90% of the forms and was rated "good." Also the information on the immunization status of workers was rated "good," however, the frequency of incomplete data increased in 2014 and 2015 and was rated "fair" (Tables 2 and 3).

Relative to the serologic status of victims and source-patients, almost 50% of fields were incomplete or described as unknown, for which reason they were rated "poor." The same was the case of variables measures adopted, progression of cases and WAR issuance (Tables 2 and 3).

DISCUSSION

Some studies retrieved in our literature review stress the low reliability of health information systems as a function of the poor quality of the data, due to lack of filling of some fields, mainly the ones corresponding

to sociodemographic information, or to duplication or inconsistency of the data¹⁶⁻²⁰.

Despite such observations on health information systems, the knowledge resulting from the information contained in them has been crucial for the planning, organization and evaluation of health care services in Brazil²¹. Some authors emphasized the relevance of improving the quality of the information, mainly in regard to its completeness, for the data to faithfully represent the recorded events^{22,23}.

From the perspective of availability, SINAN-ATEMB includes an easy-to-access database in electronic format. This is currently a common aspect for all Ministry of Health databases with the purpose of spreading information in a way it can reach all health system users.

In regard to the aspect of timeliness, the files containing the data recorded in SINAN forms are sent by health care units to municipal secretariats on a weekly basis. The latter send the files to the state secretariats of health via the Health Information Board (Diretoria de Informações em Saúde — DIS). Technicians specialized in workers' health periodically check the information. Finally, state secretaries send the data to the Ministry of Health. This flow allows for the data to be available to users without delay. The only instance of delay is the one of the ongoing year, since the corresponding data are still being recorded.

Although the number of notifications of WAEMB is increasing every year in Brazil, starting from the implantation of a specific form for this type of event in 2006, the

Table 2. Absolute and relative frequencies per year (2010–2012) of missing data for epidemiological variables relative to work accidents involving exposure to biological materials in Brazil and corresponding categorization.

| Variables | Missing data (SINAN-ATEMB) | | | | | | Romero & Cunha's (2006) rating | | |
|----------------------------|----------------------------|-------|--------|-------|--------|-------|--------------------------------|------|------|
| | 2010 | | 2011 | | 2012 | | 2010 | 2011 | 2012 |
| | n | % | n | % | n | % | | | |
| Sex | 0 | 0.00 | 10 | 0.02 | 0 | 0.00 | E | E | E |
| Age | 368 | 1.05 | 477 | 1.17 | 643 | 1.39 | E | E | E |
| Educational level | 7,034 | 20.00 | 8,161 | 20.16 | 9,513 | 20.69 | F | P | P |
| Occupation | 50 | 0.14 | 72 | 0.17 | 138 | 0.30 | E | E | E |
| Employment status | 4,077 | 11.68 | 3,959 | 9.78 | 5,287 | 11.50 | F | G | F |
| Length of work | 9,433 | 27.04 | 10,371 | 25.62 | 12,588 | 27.38 | P | P | P |
| Type of exposure | 1,835 | 5.26 | 2,336 | 5.77 | 2,752 | 5.98 | G | G | G |
| Biological material | 4,003 | 11.47 | 4,573 | 11.29 | 5,222 | 11.36 | F | F | F |
| Accident circumstances | 1,571 | 4.50 | 1,433 | 3.50 | 1,448 | 3.15 | E | E | E |
| Agent | 1,813 | 5.19 | 1,843 | 4.55 | 2,282 | 4.90 | G | G | G |
| PPE | 2,895 | 8.29 | 2,376 | 5.87 | 2,835 | 6.16 | G | G | G |
| Vaccination | 3,048 | 8.73 | 3,653 | 9.02 | 4,251 | 9.24 | G | G | G |
| Serologic status (victim) | 9,560 | 27.40 | 11,117 | 27.46 | 12,160 | 26.45 | P | P | P |
| Source | 2,454 | 7.03 | 2,664 | 6.58 | 2,958 | 6.43 | G | G | G |
| Serologic status of source | 14,449 | 41.42 | 16,252 | 40.15 | 18,684 | 40.65 | P | P | P |
| Measures | 7,191 | 20.61 | 8,307 | 20.52 | 9,942 | 21.63 | F | F | F |
| Progression | 12,422 | 35.61 | 15,476 | 38.23 | 17,153 | 37.32 | P | P | P |
| WAR | 12,100 | 34.68 | 13,792 | 34.07 | 15,813 | 34.40 | P | P | P |

Source: MS/SVS/SINAN — System of Information for Work Accidents Involving Exposure to Biological Materials.

WAR: Work Accident Report; PPE: personal protective equipment; SINAN-ATEMB: System of Information for Notifiable Conditions relative to Work Accidents Involving Exposure to Biological Materials. Excellent (E): less than 5% of missing data; Good (G): 5% to 10%; Fair (F): 10% to 20%; Poor (P): 20% to 50%; Very Poor (VP): 50% or more incomplete fields.

true magnitude of the problem is difficult to estimate, as work accidents are still underreported^{23,24}.

The completeness of most fields in the notification/epidemiological investigation forms for WAEBM involving health care professionals which occurred in Brazil in 2015 was rated from “fair” to “poor.” Only the fields relative to identification variables had their completeness rated “excellent.” It is worth observing that the high level of completeness of such fields and the ones corresponding to the source of notification and place of residence of victims was possibly due to fact that failing to provide this information precludes the inclusion of notifications in SINAN.

These same considerations were pointed out by Oliveira et al.²⁵ and Moreira and Maciel²⁶, who analyzed

the completeness of records of tuberculosis in Espírito Santo and typhoid fever in Bahia, respectively. Therefore, one might infer that flaws in the filling of epidemiological investigation form fields occur for different data recording systems, with consequent impairment of the quality and pertinence of the available information, and thus also of the establishment of effective epidemiological surveillance.

Also in other countries, like the United States, the information system records are incomplete. A study conducted in the United States quantitatively assessed the completeness of reports of infectious diseases from 1970 to 1999 in different systems. The results showed that incompleteness varied from 9 to 99% in strong association with the disease targeted in the reports²⁷.

Table 3. Absolute and relative frequencies per year (2013–2015) of missing data for epidemiological variables relative to work accidents involving exposure to biological materials in Brazil and corresponding categorization.

| Variables | Missing data (SINAN-ATEMB) | | | | | | Romero & Cunha's (2006) rating | | |
|---------------------------|----------------------------|-------|--------|-------|--------|-------|--------------------------------|------|------|
| | 2013 | | 2014 | | 2015 | | 2013 | 2014 | 2015 |
| | n | % | n | % | n | % | | | |
| Sex | 0 | 0.00 | 6 | 0.01 | 8 | 0.01 | E | E | E |
| Age | 729 | 1.45 | 391 | 0.72 | 754 | 11.37 | E | E | E |
| Educational level | 10,385 | 20.71 | 7,493 | 13.87 | 10,859 | 19.86 | P | F | F |
| Occupation | 1,005 | 2.00 | 179 | 0.33 | 217 | 0.39 | E | E | E |
| Employment status | 5,516 | 13.00 | 6,228 | 11.53 | 6,600 | 12.07 | F | F | F |
| Length of work | 13,845 | 27.62 | 14,550 | 26.94 | 15,433 | 28.23 | P | P | P |
| Type of exposure | 3,184 | 6.35 | 3,573 | 6.61 | 3,323 | 6.07 | G | G | G |
| Biological material | 5,938 | 11.84 | 6,238 | 11.55 | 6,553 | 11.98 | F | F | F |
| Accident circumstances | 2,068 | 4.12 | 1,980 | 3.66 | 2,023 | 3.70 | E | E | E |
| Agent | 2,734 | 5.45 | 3,048 | 5.64 | 3,130 | 5.72 | G | G | G |
| PPE | 3,372 | 6.72 | 4,003 | 7.41 | 4,235 | 7.74 | G | G | G |
| Vaccination | 4,968 | 9.91 | 5,434 | 10.06 | 6,135 | 11.22 | G | G | G |
| Serologic status (victim) | 13,322 | 26.57 | 13,653 | 25.28 | 13,513 | 24.71 | P | P | P |
| Source | 3,403 | 6.78 | 3,433 | 6.35 | 3,993 | 7.30 | G | G | G |
| Serologic status (source) | 20,776 | 41.45 | 21,589 | 39.48 | 22,667 | 41.46 | P | P | P |
| Measures | 11,510 | 22.96 | 11,493 | 21.28 | 12,271 | 22.44 | P | P | P |
| Progression | 13,795 | 27.52 | 21,244 | 39.71 | 22,174 | 40.56 | P | P | P |
| WAR | 17,392 | 34.69 | 18,211 | 33.72 | 18,410 | 33.67 | P | P | P |

Source: MS/SVS/SINAN – System of Information for Work Accidents Involving Exposure to Biological Materials.

WAR: Work Accident Report; PPE: personal protective equipment; SINAN-ATEMB: System of Information for Notifiable Conditions relative to Work Accidents Involving Exposure to Biological Materials. Excellent (E): less than 5% of missing information; Good (G): 5% to 10%; Fair (F): 10% to 20%; Poor (P): 20% to 50%; Very Poor (VP): 50% or more incomplete fields.

Analysis of the SINAN-ATEMB database evidenced flaws in the filling of data relative to relevant variables, such as educational level, which completeness was rated “fair” or “poor.” Omission of data on this variable compromises epidemiological studies, as it is a significant indicator of the socioeconomic status of workers.

The degree of completeness of the information on variable occupation was rated “excellent” for the full analyzed period. Although less used than variable educational level, it is considered useful to measure the socioeconomic status of people, as well as to achieve better understanding of the social dynamics of Brazilian workers.

The completeness of the information on variables employment status and length of work was rated “fair” and “poor,” respectively. Knowing whether workers perform formal or informal work is important to determine the working conditions to which they are subjected. The same is the case of variable length of work in his/her occupation. The completeness of these fields would increase were their relevance to be more widely recognized and the filling of the corresponding fields easier.

Field length of work in his/her occupation includes three boxes to be filled. The first two concern the length of work in the occupation described in field “occupation.” One should bear in mind that this item alludes to length of work in the worker’s *occupation* and not in the *current or previous company*. The last box is meant to describe the length of work in terms of:

1. hours;
2. days;
3. months;
4. years²⁶.

The high complexity of this field might explain why its completeness was rated “poor.”

In regard to the accident-related variables, the degree of completeness of field causative agent, i.e., the agent present at the time of the accident, decreased from 2013 to 2015. The increase in the number of notifications along these years might explain the rise in the number of missing data, which seems to suggest that the amount of records does not have a relationship with the quality of the information.

The completeness of the information on the type of biological material involved in accidents was rated “fair” for all the analyzed period, attended by increase of the percentage of incomplete data. In turn, information on the use of PPE at the time of the accident was provided in more than 90% of the forms, whence its rating as “good.” The difference in the degree of completeness of the information on these two variables might be accounted for the value attributed to them by the professionals who collect and analyze the data, which is related to their relevance for the workers’ health epidemiology²⁸.

The completeness of the information on variables serologic status of victims and source-patients, measures adopted, progression of cases and WAR issuance was rated “poor.” This fact evidences the need to investigate the reasons that contribute to fail to establish a relationship between victim and source-patient, as well as to the incoherence between work accident records and WAR issuance.

Completeness is a key metrics for surveillance systems and should be periodically assessed, as it might reflect delays in any of the response steps in the process of public health surveillance²⁹. The degree of completeness of surveillance systems depends on several factors, and its evaluation should include consideration of how the data will be used and of the nature of the condition under surveillance³⁰ (for, instance, communicability of accidents in the case of work accidents).

The present study has a limitation derived from the number and type of indicators selected for assessment. For instance, we did not include measurements of the consistency of the information contained in the analyzed records.

Identification of flaws in WAEMB records is crucial to improve the steadiness and precision of the data. Then, while information systems are attributed much value as documents of considerable epidemiological relevance, it is still incipient.

The flaws in WAEMB records further lead us to reflect on professional actions. The reason is that workers should see themselves as professionals needing:

Orientation and training;

- Incentives to participate in prevention campaigns, with emphasis on raising the awareness about proper hospital waste disposal;
- Orientation on the mandatory nature work accident notification;
- Medical consultations and periodical testing;
- Medications when indicated.

CONCLUSION

The present study found that the percentage of incomplete data in SINAN-ATEMB database was high

for the following variables: length of work in the worker's occupation, type of biological material involved, serologic status of victims and source-patients, measures adopted, progression of cases and WAR issuance. As a result, one might conclude that such variables should not be considered in the analysis of risk factors.

Analysis of the information available for the investigated variables shows that the filling of investigation forms should be urgently improved all across Brazil. Any analysis of WAEBM based on SINAN should consider the need for interventions to improve the filling of notification forms and the rate of completeness of the data.

REFERENCES

1. Duarte Valim M, Palucci Marziale MH. Avaliação da exposição ocupacional a material biológico em serviços de saúde. *Texto Contexto Enferm*. 2011;20(1):138-46.
2. Galdino A, Santana VS, Ferrite S. Os Centros de Referência em Saúde do Trabalhador e a notificação de acidentes de trabalho no Brasil. *Cad Saúde Pública*. 2012;28(1):145-59.
3. Tibães HBB. Análise dos dados referentes aos acidentes de trabalho por exposição a material biológico com contaminação por hepatites virais "b" e "c", em uma capital brasileira [dissertation]. Belo Horizonte: Universidade Federal de Minas Gerais; 2012.
4. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância em Saúde Ambiental e Saúde do Trabalhador. Exposição a materiais biológicos. Brasília; 2011.
5. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância em Saúde Ambiental e Saúde do Trabalhador. Dados da Vigilância em Saúde do Trabalhador, 2007 a 2013. Brasília; 2014.
6. Paz AA, Santos C, Lautert L. Fatores associados aos acidentes de trabalho em instituição hospitalar. *Enferm Foco*. 2014;5(1/2):25-8.
7. Santana VS, Moura MCP, Soares J, Guedes MH. Acidentes de Trabalho no Brasil - Dados de Notificação do SINAN em 2007 e 2008. Universidade Federal da Bahia. Instituto de Saúde Coletiva. Vigilância dos Acidentes de Trabalho; 2009.
8. Brasil. Ministério da Saúde. 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. *Diário Oficial da União*. 2004.
9. Brasil. Ministério da Saúde. Portaria nº 104 de 25 de janeiro de 2011. *Diário Oficial da União*. 2011.
10. Brasil. Ministério da Saúde. Portaria nº 1.271, de 06 de junho de 2014. Define a Lista Nacional de Notificação Compulsória de doenças, agravos e eventos de saúde pública nos serviços de saúde públicos e privados em todo o território nacional, nos termos do anexo, e dá outras providências. *Diário Oficial da União*. 2014.
11. Brasil. Ministério da Saúde. Portaria nº 204, de 17 de fevereiro de 2016. Define a Lista Nacional de Notificação Compulsória de doenças, agravos e eventos de saúde pública nos serviços de saúde públicos e privados em todo o território nacional, nos termos do anexo, e dá outras providências. *Diário Oficial da União*. 2016;32(1):23.
12. Brasil. Ministério da Saúde. Portaria nº 205, de 17 de fevereiro de 2016. Define a lista nacional de doenças e agravos, na forma do anexo, a serem monitorados por meio da estratégia de vigilância em unidades sentinelas e suas diretrizes. *Diário Oficial da União*. 2016;32(1):24.
13. Silva GF, Aidar T, Mathias TAF. Qualidade do Sistema de Informações de Nascidos Vivos no Estado do Paraná, 2000 a 2005. *Rev Esc Enferm USP*. 2011;45(1):79-86.
14. Zillmer JGV, Schwartz E, Muniz RM, Lima LM. Avaliação da completude das informações do Hiperdia em uma unidade básica do sul do Brasil. *Rev Gaúcha Enferm*. 2010 Jun;31(2):240-6.
15. Barbosa JR, Barrado JCS, Zara ALSA, Siqueira Júnior JB. Avaliação da qualidade dos dados, valor preditivo positivo, oportunidade e representatividade do sistema de vigilância epidemiológica da dengue no Brasil, 2005 a 2009. *Epidemiol Serv Saúde*. 2015;24(1):49-58.
16. Romero DE, Cunha CB. Avaliação da qualidade das variáveis epidemiológicas e demográficas do Sistema de Informação sobre Nascidos Vivos, 2002. *Cad Saude Pública*. 2007;23(2):701-14.
17. Rede Interagencial de Informações para a Saúde. Indicadores básicos para a saúde no Brasil: conceitos e aplicações. 2nd ed. Brasília: Organização Pan-Americana da Saúde; 2008.
18. Arribas C, Casado J, Martínez A. Gestión orientada a asegurar la calidad de los datos en los Institutos Nacionales de Estadística. Santiago: Comisión Económica para América Latina y el Caribe; 2003. 14 p.
19. Lima CRA, Schramm JMA, Coeli CM, Silva MEM. Revisão das dimensões de qualidade dos dados e métodos aplicados na avaliação dos sistemas de informação em saúde. *Cad Saúde Pública*. 2009;25(10):2095-109.

20. Glatt R. Análise da qualidade da base de dados de aids do sistema de informação de agravos de notificação (SINAN) [dissertation]. Rio de Janeiro: Fiocruz; 2005.
21. Mascarenhas MDM, Gomes KRO. Confiabilidade dos dados do Sistema de Informações sobre Nascidos Vivos em Teresina, Estado do Piauí, Brasil - 2002. *Ciênc Saúde Coletiva*. 2011;16(Suppl. 1):1233-9.
22. Giancotti GM, Haeffner R, Solheid NLS, Miranda FMA, Sarquis LMM. Caracterização das vítimas e dos acidentes de trabalho com material biológico atendidas em um hospital público do Paraná, 2012. *Epidemiol Serv Saúde*. 2014;23(2):337-46.
23. Dias MAC, Machado AA, Santos BMO. Acidentes ocupacionais com exposição a material biológico: retrato de uma realidade. *Med (Ribeirão Preto)*. 2012;45(1):12-22.
24. Barbosa ASA, Diogo GA, Salotti SRA, Silva SMUR. Subnotificação de acidente ocupacional com materiais biológicos entre profissionais de Enfermagem em um hospital público. *Rev Bras Med Trab*. 2017;15(1):12-7.
25. Oliveira MEP, Soares RAL, Costa MCN, Mota ELA. Avaliação da completude dos registros de febre tifóide notificados no SINAN pela Bahia. *Epidemiol Serv Saúde*. 2009;18(3):219-26.
26. Moreira CMM, Maciel ELN. Completude dos dados do Programa de Controle da Tuberculose no Sistema de Informação de Agravos de Notificação no Estado do Espírito Santo, Brasil: uma análise do período de 2001 a 2005. *J Bras Pneumol*. 2008;34(4):225-9.
27. McNabb SJN, Jajosky RA, Hall-Baker PA, Adams DA, Sharp P, Anderson WJ, et al. Summary of notifiable diseases - United States. 2005;54:2-92.
28. Souza NSS, Evangelista Filho D, Costa e Silva MM (Eds.). Bahia. Secretaria da Saúde do Estado. Superintendência de Vigilância e Proteção da Saúde. Centro Estadual de Referência em Saúde do Trabalhador. Manual de normas e rotinas do sistema de informação de agravos de notificação - SINAN - saúde do trabalhador. Salvador: CESAT; 2009.
29. Jajosky RA, Groseclose S. Evaluation of reporting timeliness of public health surveillance systems for infectious diseases. *BMC Public Health*. 2004;4(1):29.
30. Doyle TJ, Glynn MK, Groseclose SL. Completeness of notifiable infectious disease reporting in the United States: an analytical literature review. *Am J Epidemiol*. 2002;155(9):866-74.

Correspondence address: Sâmea Cristina Santos Gomes - Universidade Federal do Maranhão, Campus Imperatriz, Unidade Avançada - Avenida da Universidade, s/n, Residencial Dom Afonso Felipe Gregory - CEP: 65900-000 - Imperatriz (MA), Brazil - E-mails: cris_samea@hotmail.com, ajmc@elointernet.com.br