Ciência & Saúde Coletiva
cienciaesaudecoletiva.com.br
ISSN 1413-8123. v.29, n.11
DOI: 10.1590/1413-812320242911.04142024EN

Epidemiological data monitoring dashboards as a surveillance and healthcare management strategy

Vanessa Coelho de Aquino Benjoino Ferraz (https://orcid.org/0000-0003-1758-4703) [1]
Victor Vohryzek Ferezin (https://orcid.org/0000-0002-8929-8653) [1]
Margarete Knoch (https://orcid.org/0000-0001-6026-8891) [1]
Betina Durovni (https://orcid.org/0000-0002-5555-8015) [2]
Valéria Saraceni (https://orcid.org/0000-0001-7360-6490) [2]
Veruska Lahdo (https://orcid.org/0009-0004-4922-1215) [1]
Mara Lisiane de Moraes dos Santos (https://orcid.org/0000-0001-6074-0041) [3]
Alessandro Diogo De-Carli (https://orcid.org/0000-0002-4560-4524) [3]

Abstract *This study aimed to analyze the interval between the dates of notification and data entry of suspected dengue cases and discuss the properties of epidemiological data monitoring dashboards. Applied research with quantitative analysis of the time between notification and data entry, using the Cross-Industry Standard Process for Data Mining (CRISP-DM), for the construction of the dashboards. This was developed at the Center for Strategic Health Surveillance Information in Campo Grande. The results revealed a period exceeding seven days in 93.33% of cases. The monitored dashboards included Arboviruses, Respiratory Syndromes, Attendance, and quantitative and qualitative notifications. We observed data integration, as information process are performed in Power BI, consolidating data from two to four health information systems. The contextual study and its temporal relationship are complied with in all dashboards with epidemiological indicators. The study concludes that using interactive epidemiological dashboards for surveillance and healthcare management decision-making is relevant.*

Key words *Public Health Surveillance, Health Information Systems, Decision-making, Data Analysis*

[1] Secretaria Municipal de Saúde de Campo Grande. R. Bahia 280, Centro. 79002-530 Campo Grande MS Brasil. enf.vanessa.aquino@gmail.com
[2] Secretaria Municipal de Saúde do Rio de Janeiro. Rio de Janeiro RJ Brasil.
[3] Programa de Pós-Graduação Stricto Sensu em Saúde da Família, Universidade Federal de Mato Grosso do Sul. Campo Grande MS Brasil.

Introduction

In recent decades, the outbreaks and epidemics of respiratory syndromes, arbovirus and other infectious diseases have occurred frequently, with seasonal and geographical variation, generating significant demands to health systems. The control and proper management of diseases depend on the availability of data that adequately express the epidemiological situation and the dynamics of disease behavior[1].

The International Health Regulation (IHR) advised that public health emergency surveillance services were implemented to seek and develop work strategies and methods to detect, process, and produce relevant information from the data generated in many healthcare points[2].

In Brazil, the Ministry of Health significantly fostered health surveillance by implementing strategic nationwide health surveillance centers, the CIEVS Network. The national CIEVS was established first, and the network comprises 190 centers[2,3]. The activities developed by CIEVS, such as coordinating actions facing the Zika Virus Public Health Emergency in 2015, COVID-19 in 2020, and interventions in environmental disasters, show their relevance in the performance of accurate and timely response actions[3].

Therefore, to improve the performance of response to public health emergencies and guide care and management actions, we should analyze the health situation based on complete, real-time epidemiological data that can predict possible scenarios. Thus, epidemiological intelligence includes the surveillance of diseases and conditions and the ability to trigger quick responses, including risk assessment, prevention, and promotion strategies, information subsystems, and health situation analysis from the multisector and geopolitical perspective[4].

Franco Netto[5] highlights the need for systematic collection and use of epidemiological data to plan, implement, and evaluate disease control. The analysis of the most sensitive epidemiological situation of diseases prioritizes suspected cases when individuals first contact the health system seeking care. Thus, surveillance services need to recognize that the date of notification and the onset of symptoms indicate outbreaks and disease epidemic peaks and inform us about the local surveillance system's work and data quality.

The Notifiable Diseases Information System (SINAN) contains the official data on the epidemiological characteristics of diseases. The time elapsed from the identification of the suspected case, the completion of the epidemiological investigation form, and the availability of laboratory diagnosis information up to entering data in the system hamper the timely analysis and use of data for decision-making. Therefore, there is a limitation in analyzing SINAN's data information, as records in the tokens and subsequent entry in an offline environment and the export with weekly periodicity implies a significant delay in processing and visualizing information. This situation generates difficulty in using these data for immediate decision-making in the face of increased service, the emergence of suspected cases, or with altered epidemiological clinical profile.

Regarding the information generated by health surveillance services, the high volume of data distributed in various health and database information systems, whose integration is partial and with low visibility, is known. There is, therefore, a difficulty in accessing and visualizing data simultaneously for comparative and more complete analysis. Also, some data are inconsistent and redundant[6,7].

Therefore, another fragility of the information environment is the dispersion of data from several sources that do not allow data interoperability or automatic consumption by analysis tools. The challenge set developing monitoring dashboards that would enable data visualization in a timely and integrated fashion. Dashboards are performance measurement tools that monitor structure, process, or result variables through questions. They consist of an electronic dataset and presentation of graphic format results. Dashboard properties comprise database integration, context study, and their relationship with time (retrospective, real-time, or prediction), a visualization proposed per the monitored process type, and usability[8,9].

This article aims to analyze the delayed inclusion of notifications in the official system and measures to mitigate the effects of the delay and discuss the properties of monitoring dashboards to view epidemiological information for several surveillance and healthcare management levels.

Methods

This applied research focuses on the problems in the activities of institutions and organizations to elaborate diagnoses, identify issues, and seek solutions[10]. The study was developed at the Cen-

ter for Health Surveillance Strategic Information of Campo Grande, the Municipal Health Secretariat of Campo Grande, MS. The project was approved by the Human Research Ethics Committee of the Federal University of Mato Grosso do Sul (UFMS) CAAE 7540023.6.0000.0021, under Opinion No. 6.511.491. The first stage was quantitative research from the 2022 and 2023 secondary data of SINAN Online based on the notification and entry dates used to analyze the behavior of this interval. The second stage employed the secondary data from the search in the SINAN database, SIVEP Gripe, Urgent and Emergency Care Network Service Management System (Hygia), and CIEVS Notification Forms. The analysis developed was subsidized in epidemiological and information technology studies.

The methodology used for the construction of monitoring dashboards was CRISP-DM, which is a structured and comprehensive framework for data analysis[11]. The process of building interactive epidemiological dashboards using Microsoft Power BI, based on this methodology, comprises six distinct and interrelated stages.

The first stage was Business Understanding, in which we sought to understand the dashboard's objectives, identify the critical issues and indicators to be addressed, and define the needs of the analysis in question. At this stage, one of the main activities was to determine the business objectives related to the data mining project, which means identifying the main issues or challenges that the organization faces and can be addressed with data analysis. Translating these issues into clear and measurable goals for the project is crucial. Moreover, it was crucial to understand the business' current state of affairs, which involves investigating existing processes, available resources, and any restrictions that can affect the data mining project. Understanding the context in which data is being generated and used is essential to ensure the relevance and effectiveness of proposed solutions.

In CIEVS monitoring dashboards, we considered the scenario of monitoring a condition and its characteristics under analysis. Indicators and calculation formulas are established at government levels and accessed in the surveillance guides or ministerial manuals. We aimed to identify the information usually searched for and required by high management, the press office, health professionals, and researchers.

The next stage was Data Understanding, which includes identifying data sources, performing a quality assessment, understanding relevant variables, and undertaking an exploratory analysis. In CIEVS monitoring dashboards, we identified the databases needed for the analysis with the technical area responsible for the condition. Then, we searched for data with the Ministry of Health data dictionaries to identify the variables for building the dashboard.

The third stage was Data Preparation, which aimed to feed the dashboard. It involved data cleaning, addressing missing values, standardization, and transformation, as needed. In CIEVS monitoring dashboards, this stage was primarily performed under Power BI's Extract, Transform, Load (ETL), the Power Query. Files were extracted manually through database export modules to ministerial systems and stored in a predetermined location with a standard nomenclature in local folders to facilitate the incremental update process and consumed via Power Query or Power BI web data retrieval tool when stored in Google documents, such as notification forms data. At this point, we can group annual databases, remove unused variables per the data understanding stage, create new variables such as age and age range from the date of birth using the M language, correct the type of variables, create auxiliary databases such as consolidated data tables and dimension tables, as per the business understanding stage.

The next stage, called Modeling, focused on creating effective data models to support dashboards and creating layout and graphic elements to provide information in an organized and visually understandable way. In CIEVS, monitoring dashboards include creating measures within Power BI, such as incidence and mortality rates using DAX language, making the layout to guide visual positions in FIGMA, and creating graphs and tables per the business understanding stage.

Evaluation was the fifth stage and involved evaluating the dashboards regarding effective information communication. End users participated in practical tests to provide valuable feedback. This interactive process aimed to ensure that the dashboards met the needs identified in the business understanding stage and identify possible errors and divergent information. In CIEVS monitoring dashboards, the validation was made with the technical area responsible for the condition, which provided the business rules for the dashboard and the CIEVS team. The dashboard was appreciated concerning the data presented and information layout. Data preparation and modeling processes are reviewed if non-compliances are found and, if necessary, corrected.

The final stage is Deployment and making dashboards accessible to end users. Continuous maintenance plans and regular updates have been established to ensure the continuous relevance of data and insights presented. In CIEVS monitoring dashboards, this stage included publishing and disseminating the dashboard address available to the entire population, health professionals, and public management, ensuring timely access and data transparency.

Results

SINAN dengue database analysis contains the system of notification and entry in the system so that the difference between the variables informs the time interval between the two, as shown in Graph 1. Regarding the study of the period between the notification and entry dates, we analyzed 17,544 datasheets of 2022 and 15,789 datasheets of 2023, totaling 33,333 datasheets.

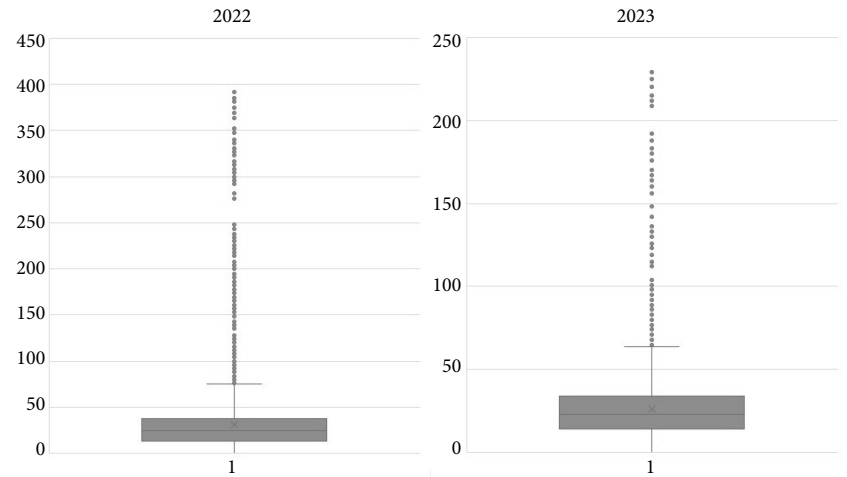
We can observe from Graph 1 and the data selected from SINAN that the mean, median, first, and third quartiles of entry time were 31, 25, 13, and 28 days in 2022 and 26, 23, 14, and 34 days in 2023, which shows a lack of timely data to be made available for management to make decisions.

In order to obtain notification information in real-time, CIEVS implemented links in the form to register diseases, conditions, and notifiable events to promote timely notification by health services. This process is conducted via Google Forms, which allows immediate search of all notifications made in Campo Grande to CIEVS and the technical areas related to conditions since March 2022. The forms are completed by all 10 emergency care units in the capital and the 16 public and private hospitals, receiving, on average, 236 monthly reports only of notifiable conditions or conditions of local health interest. As a result, the previously mentioned delay in the availability of information was overcome, enabling more agile decision-making, aligned with the conditions' severity/emergency.

The dashboards presented operate with SINAN's national databases, the Influenza Epidemiological Surveillance System (SIVEP-Gripe), and the National Dengue Control Program System (SisPNCD), along with two municipal systems (Hygia and *Planilha Geral de Ovos*) and two databases developed in the very service (qualitative and quantitative notification). Monitoring dashboards highlight data integration and visualization.

The arbovirus dashboard retrospectively presents the characteristics of the disease by age group, sex, place of residence, and care, including an interactive map. The dashboard presents epidemiological indicators, such as incidence and lethality rates, which compare years and other local realities at the level of neighborhoods, districts, or other municipalities. Besides this temporal comparison, one of the main features in the dashboard is the control diagram, which indicates whether or not the number of cases reported in the current year is within normal limits according to the epidemic threshold per the method adopted by the Ministry of Health. The dashboard is fed with databases from 2008 to 2023 from SINAN Online, with 274,835 notifications, of which 156,067 are positive cases and 80 deaths, which shows mean lethality, mortality, and incidence rates of 0.03%, 8.49/100,000 inhabitants, and 29,178/100,000 inhabitants, respectively. The age distribution displays the same behavior as the population distribution as a whole, with more robust ranges in the 10-49 years range. The distribution by sex shows most cases in females, with 55.8% of cases, as per Figure 1. The dashboard also provides georeferencing of cases reported by neighborhood and health district of the municipality, where one can see the highest incidence of cases in the Anhanduizinho, Imbirussu, and Segredo districts, which coincide with the largest populations in Campo Grande. Besides epidemiological data, the dashboard provides care information on dengue care in PHC units and urgent and emergency care units in the city. Consolidating all this information in a single location allows timely analysis and decision-making by managers. The dashboard is used in all arbovirus situation room meetings that occur weekly in the municipality.

The respiratory syndromes dashboard retrospectively presents the characteristics of the disease by age group, sex, etiological agent, evolution, and reporting unit. It also separates data on Flu Syndrome (FS) and Severe Acute Respiratory Syndrome (SARS), comparing the last two years of these conditions. It is fed with 2020 to 2024 SIVEP-Gripe and e-SUS Notifica systems databases. It displays 29,980 SARS notifications and 381,720 FS notifications. On the comparative pages, we can observe the milder behavior of both diseases in 2023 against 2022, including the change in the backdrop of SARS etiological agents. The municipality recorded 6,869 SARS cases in 2022 and 3,133 SARS cases in 2023. The age profile has also changed, with a higher rela-



Graph 1. Difference between the date of notification and the date of entering data in dengue notification forms, in days, in Campo Grande-MS, 2022 and 2023.

Source: Online Dengue SINAN Municipal Health Secretariat of Campo Grande, 2024.

tive incidence in older adults in 2022 (36.48%) against 2023 (22.06%). Considering the etiological agent, COVID-19 represented fewer cases in 2023 (10.44%) than in 2022 (28.74%), while rhinovirus showed an increase with a share of 6.57% in 2022 and 11.49% in 2023, along with the respiratory syncytial virus, which accounted for 4.09% of cases in 2022 and 13.53% of cases in 2023. Data on respiratory syndromes are shown in Figure 2.

The qualitative and quantitative notification monitoring dashboard (Figure 3) shows data on completing the notification links consolidated, bringing information about the notifying units, notification shift, notified condition, historical series, and neighborhood of residence of the notified case. The data provided by this dashboard allow us to understand the health situation now more assertively, as its information is, among the analyzed to date, the one with the shortest interval between notification and availability on the dashboard.

The customer service dashboard provides care information promptly, quantifying care by epidemiological week, incident unit, shift, procedure, and condition (using the customer service ICD-10 to create this distinction). With care data from emergency care units, information on what occurs at the entry points of the municipal health system is available more quickly, which allows for identifying changes in epidemiological patterns before notifications are recorded. The dashboard is fed with 2022 and 2023 databases from the Hygia system, which is a medical record system used by urgent care units in Campo Grande. The dashboard presents 4.57 million services from 2022 to 2023, with a predominance of females (63.72%). The services are distributed by reporting unit and show that the Leblon Emergency Care Units (UPA), UPA Coronel Antonino, and UPA Universitário are the units with the highest number of services provided, with 653,003, 604,757, and 521,546 services each, respectively. Regarding health problems, the most frequent services are for tests and investigations, respiratory syndromes, and musculoskeletal system diseases, with 804,510, 414,890, and 104,070 services each, respectively. The distribution of services throughout the year is uniform despite the region's seasonality, as shown in Figure 4.

Discussion

The results indicate that in 2022 and 2023, most dengue case notifications were entered later than seven days after their date – 91.57% in 2022 and 95.29% in 2023. The seven days were considered the parameter because according to the Ministry of Health's ordinance on notifiable diseases, conditions, and events (DAE), dengue is notifiable

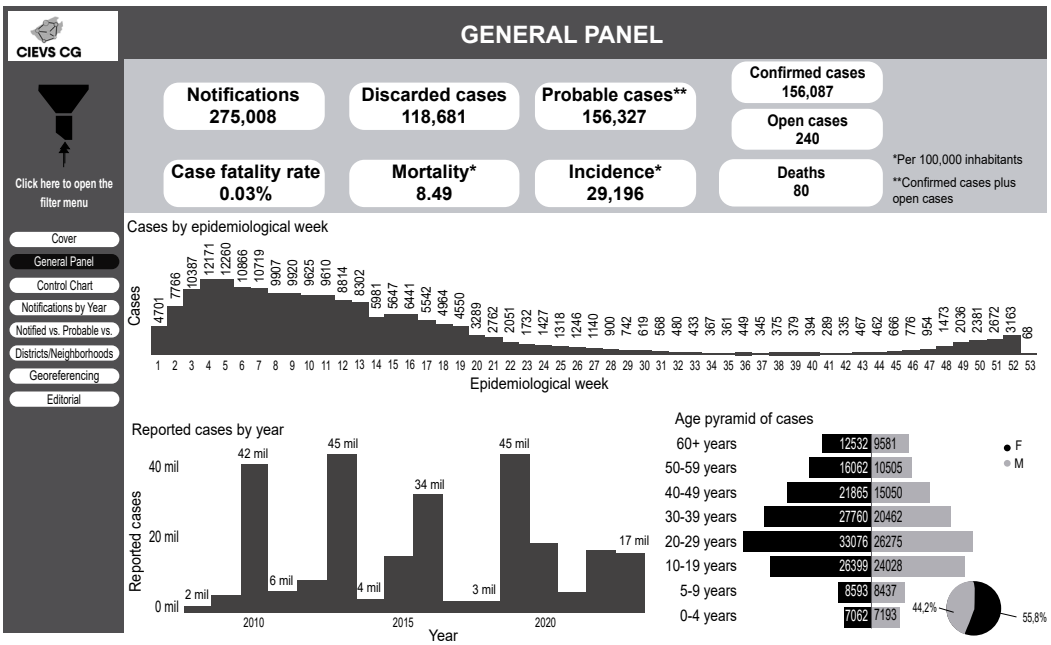


Figure 1. CIEVS Arboviruses Dashboard, Campo Grande-MS, 2023.

Source: CIEVS-CG/SESAU Arboviruses Dashboard (https://bit.ly/3GCdH39).

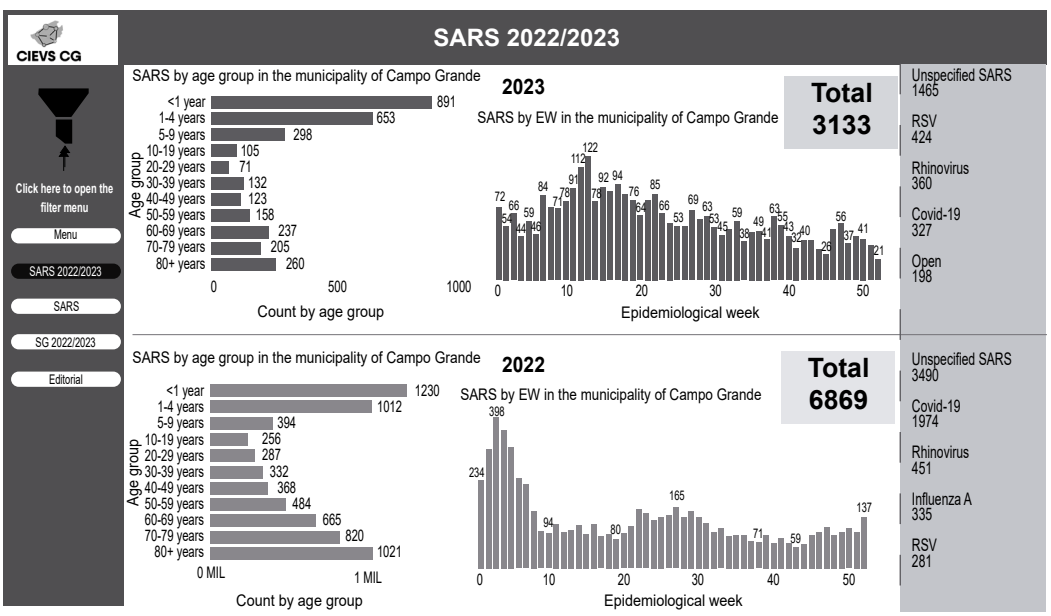


Figure 2. Respiratory syndromes dashboard.

Source: Respiratory Syndromes Dashboard (https://bit.ly/3H4qImH.

weekly[12]. However, it is known that the increase in demand from people with suspected dengue fever, even in a shorter period, can lead to work overload and a drop in the quality of care. Other mitigation measures often need to be implemented frequently.

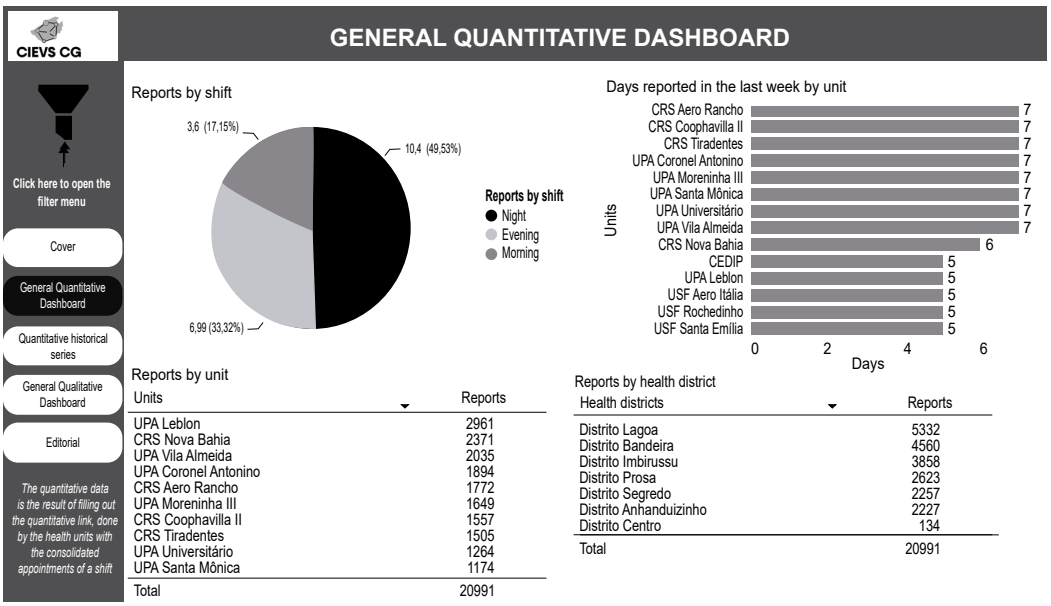


Figure 3. CIEVS monitoring dashboard for qualitative and quantitative notifications, Campo Grande-MS, 2023.

Source: CIEVS-CG/SESAU monitoring dashboard for qualitative and quantitative notifications (https://bit.ly/3L5nFwv).

Adopting technology for communicating suspected DAE cases via Google Forms showed its relevance, as health professionals can report immediately after care. The CIEVS team accesses the spreadsheet in real-time to monitor and communicate cases. This tool was critical for timely surveillance and adequate response.

The database integration property is found in all the dashboards to meet the dashboards' desirable properties, as information is consumed and handled by the Power BI ETL platform, and each dashboard consolidates two to four health information systems and other databases. Regarding the study of the context and its temporal relationship, this property is fulfilled in all dashboards, as its construction starts from the first stage of the CRISP-DM methodology, which aims to understand what information should be included in the dashboard, including retrospective data and the principal epidemiological indicators. Considering data visualization and usability, the graphics and visual elements allow an easier understanding of consolidated data using color patterns, graphics known and frequently used by users, user guides, and maps.

The data presented here show the relevance of building and using interactive epidemiological dashboards for streamlining surveillance and healthcare management, standing out as an essential tool for exploring information in several sectors. Dashboards are relevant in data analysis, given the ability to provide a systematic and iterative approach adapted to address epidemiological data's complexity and heterogeneity. By guiding healthcare professionals through distinct stages, from understanding the context to the practical implementation of solutions, CRISP-DM offers a precise roadmap for developing robust and interpretable analyses. This methodology contributes to adequately structuring data, ensuring quality and reliability. It facilitates the identification of patterns, trends, and crucial insights for making informed decisions in public health without forgetting the importance of data quality[8].

Gartner Magic Quadrant analysis was critical in choosing which platform to use, objectively assessing Power BI's capabilities, and positioning against other BI solution providers. This analysis guided the methodological decision, ensuring that the chosen platform offered innovative functionality in data analysis and visualization, besides a solid foundation of support and ongoing development.

The multidimensional nature of monitoring dashboards plays a crucial role in building healthcare data transparency. This transparency

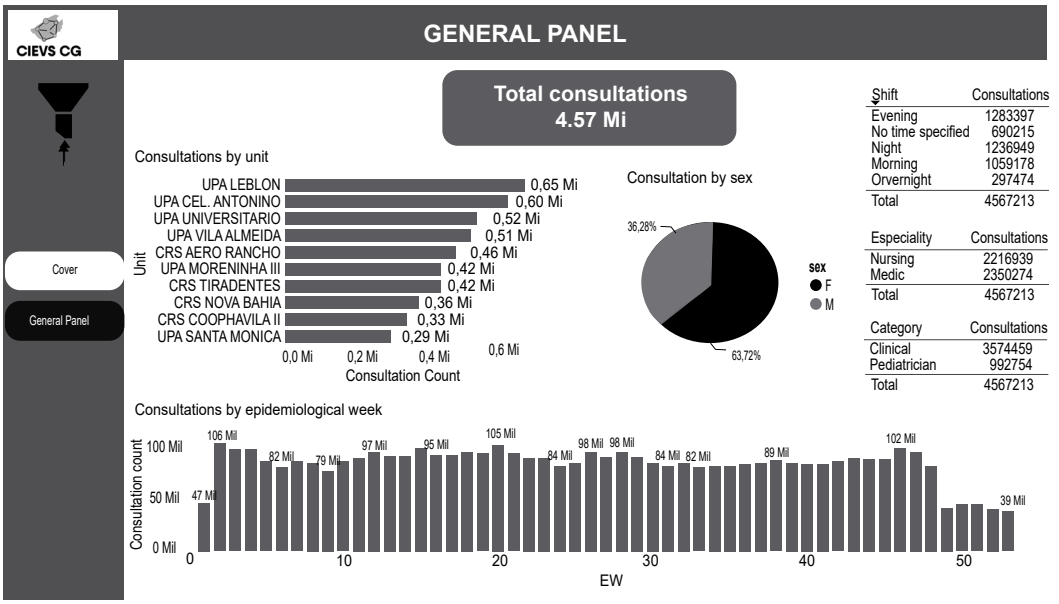


Figure 4. Customer service dashboard.

Source: Customer service dashboard (https://bit.ly/3pq8HJf).

indicates care quality and is essential for establishing trust and collaboration between health professionals, managers, the media, local councils, and the population. Comprehensive data visibility creates a solid foundation for very active community participation in health promotion, resulting in a more collective and engaging approach.

Monitoring dashboards are strategic tools that provide a comprehensive and detailed view of community health conditions. These dashboards direct health professionals to provide more localized, territory-centered, preventive care. The ability to anticipate needs and identify emerging trends reinforces PHC as the solid foundation for the health system.

Implementing disease monitoring dashboards affects how health actions are planned and implemented. Healthcare managers can quickly respond to disease outbreaks by adopting a data-driven approach and adjusting prevention strategies and resource allocation based on real-time data. This situation increases operational efficiency and allows more effective response to epidemiological events, contributing to the rapid containment of public health threats.

The next step in the evolution of monitoring dashboards is integrating with electronic medical records, replacing traditional notification and surveillance methods. This change represents a technological modernization and transformation in understanding and responding to community health. According to Bastos *et al.*[13], the ability to perform nowcast and forecast provides a more predictive and proactive vision, allowing for a more efficient allocation of resources, personalized interventions, and highly resilient management in the face of emerging challenges.

The Campo Grande-MS study reveals challenges in health surveillance, such as case notification delays, data dispersion across different sources, and the need to guarantee the quality of information. The delayed data entry in the SINAN system hinders the analysis and real-time decision-making. However, solutions such as integration with electronic medical records and Google Forms can reduce this problem. Data dispersion hampers access and comparison, but building interactive epidemiological dashboards and integrating different data sources can help resolve this issue. Data quality is fundamental to achieving reliable results. However, the study does not present specific measures to guarantee its quality. We should note that the study results are specific to Campo Grande/MS and may not be generalizable to other realities, requiring us to

consider each region's socioeconomic, cultural, and epidemiological characteristics.

The study brought some perspectives, such as investigating the use of artificial intelligence and machine learning to analyze epidemiological data, evaluating the impact of monitoring dashboards on decision-making and population health, and exploring the use of monitoring dashboards for other public health fields, such as human and financial resource management.

By addressing these perspectives, future research can strengthen health surveillance and contribute to more effective and efficient decision-making, aiming to improve the population's health.

Final considerations

The interval between notification and entry of forms, as shown by the dengue data, evidence the need to obtain information related to diseases of public health interest quicker, as done by CIEVS-CG.

The transition of healthcare data analysis from a retrospective perspective to a more up-to-date and proactive scenario is a significant milestone in the evolution of healthcare management. By adopting grievance monitoring dashboards, we move beyond the traditional notary method, entering an era of intelligence that informs and transforms decision-making processes and strategic actions, which implies better health management and promotes timely, comprehensive, and equitable care for the community and territories.

The data presented here reveal the relevance of building and using interactive epidemiological dashboards to streamline surveillance and healthcare management. Through analyzing arbovirus dashboards, services, and respiratory syndromes, we identified and understood the main challenges and opportunities for controlling dengue, streamlining the management of health services, and making strategic data-based decisions.

Collaborations

All authors participated in the preparation of the manuscript and approved its final version for submission. VCAB Ferraz, VV Ferezin and M Knoch conceived the research question. VCAB Ferraz participated in the planning, data collection, supervision, validation and review of the manuscript. VV Ferezin worked on data collection and analysis, system development and writing of the manuscript. M Knoch led the writing and review of the manuscript. B Durovni and V Saraceni participated in the investigation, methodology, validation and review of the manuscript. V Lahdo participated in the validation and supervision. MLM Santos participated in the methodological construction and review of the manuscript. AD De-Carli participated in the methodological construction, validation, visualization and review of the manuscript.

Acknowledgments

We are grateful to the teams from the Coordenadoria de Informações Estratégicas em Vigilância em Saúde de Campo Grande-MS (CIEVS-CG) and the Territórios Integrados de Atenção à SaúdeProject (TEIAS) of the Municipal Health Secretariat of Campo Grande-MS and Fiocruz-MS.

References

1. Teixeira MG, Carmo EH, Saavedra RC, Costa MCN. *Vigilância epidemiológica e emergências em saúde pública produzidas por agentes infecciosos.* Rio de Janeiro: Fiocruz; 2021. [Textos para Discussão, n. 57].
2. Agência Nacional de Vigilância Sanitária (Anvisa). *Regulamento Sanitário Internacional (RSI)*, *2005* [Internet]. Brasília: Anvisa; 2009 [acessado 2023 jun 10]. Disponível em: https://www.gov.br/anvisa/pt-br/assuntos/paf/regulamento-sanitario-internacional/arquivos/7181json-file-1.
3. Brasil. Ministério da Saúde (MS). *Departamento de Emergências em Saúde Pública. Relatório de gestão 2023*. Brasília: MS; 2024.
4. Rodrigues Junior AL. A inteligência epidemiológica como modelo de organização em saúde. *Cien Saude Colet* 2012; 17(3):797-805.
5. Franco Netto G, Villardi JWR, Machado JMH, Souza MS, Brito IF, Santorum JA. Vigilância em saúde brasileira: reflexões e contribuição ao debate da 1a Conferência Nacional de Vigilância em Saúde. *Cien Saude Colet* 2017; 22(10):3137-3148.
6. Coelho Neto GC, Chioro A fragmentação e integração entre sistemas de informação em saúde no Sistema Único de Saúde In: Cunha FJAP, Barros SS, Pereira HBB, organizadores. *Conhecimento, inovação e comunicação em serviços de saúde: governança e tecnologias*. Salvador: EDUFBA; 2020.
7. Coelho Neto GC, Chioro A. Afinal, quantos Sistemas de Informação em Saúde de base nacional existem no Brasil? *Cad Saude Publica* 2021; 37(7):e00182119.
8. Wilbanks BA, Langford PA. A review of dashboards for data analytics in nursing. *Comput Inform Nurs* 2014; 32(11):545-549.
9. Concannon D, Herbst K, Manley E. Developing a Data Dashboard Framework for Population Health Surveillance: Widening Access to Clinical Trial Findings. *JMIR Form Res* 2019; 3(2):e11342
10. Fleury MTL, Werlang SRC. Pesquisa aplicada: conceitos e abordagens. In: GV Pesquisa Anuário 2016-2017 [Internet]. [acessado 2023 jun 10]. Disponível em: https://periodicos.fgv.br/apgvpesquisa/article/view/72796/69984.
11. Chapman P, Clinton J, Kerber R, Khabaza T, Reinartz T, Shearer C, Wirth R. *CRISP-DM 1.0: Step-by-step data mining guide*. Vol. 9. SPSS Inc; 2000.
12. Brasil. Ministério da Saúde (MS). Portaria nº 3.148, de 6 de fevereiro de 2024. Altera o Anexo 1 do Anexo V à Portaria de Consolidação GM/MS nº 4, de 2017, para incluir a infecção pelo vírus Linfotrópico de Células T Humanas -HTLV, da Infecção pelo HTLV em gestante, parturiente ou puérpera e da criança exposta ao risco de transmissão vertical do HTLV na 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. *Diário Oficial da União* 2024; 15 fev.
13. Bastos LS, Economou T, Gomes MFC, Villela DAM, Coelho FC, Cruz OG, Stoner O, Bailey T, Codeço CT. A modelling approach for correcting reporting delays in disease surveillance data. *Statistics Med* 2019; 38(22):4363-4377.

Article submitted 10/03/2024
Approved 06/05/2024
Final version submitted 08/05/2024

Chief editors: Maria Cecília de Souza Minayo, Romeu Gomes, Antônio Augusto Moura da Silva

This is an Open Access article distributed under the terms of the Creative Commons Attribution License