



Commentary: Data storytelling to aid health system decision-makers with population health issues for a specific location

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ABSTRACT

Modern society is awash in data for health science, health system, and public health decision-making. These public data are often presented in various formats: Data tables, reports with data and bar charts, press releases with data, dashboards of key performance indicators, the traditional professional paper with data table and statistical results, etc. Software can display these data in various ways. The tacit assumption is that the reader/consumer of the data has the means to interpret these often complex health data for individual use and professional decision-making. We do not think that it is reasonable to make this assumption in all situations. Instead, maybe those of us who collect and analyze health data should include data storytelling as a way to make it easier for health system decision-makers to know and appreciate the next steps to be taken in the decision-making process given the data we prepared. The interpretation of data for action using a charticle and other techniques of infographics and health data storytelling may be more useful to health system decision-makers than the presentation of detailed facts and data and a scientific interpretation of those facts and data. This commentary illustrates the process of data storytelling using a charticle to help health system decision-makers interpret health data and use it as a foundation for action.

Keywords: Population health; data visualization; data storytelling; health systems decision-making

“Evidence suggests that the representation of information in graphic format enhances our understanding and ability to make decisions.”

McCrorie, Donnelly, and McGlade (2016)

Every individual generated an estimated 1.7 MB of data every second in 2020 (2). Given this estimate, the proportion of health data generated by individuals may at least be in a proportion similar to that of economic activity represented by the health-care industry within the U.S. economy. Whatever the actual amount, a lot of health data are generated on a daily basis. In the face of so much data (2), how can health and community data be harnessed for use by health system decision-makers? We think that a type of infographic known as a *charticle* for data storytelling might be useful for harnessing various types of data for health system decision-making. Our professional goal here is to use our understanding of health data sources, health data

analytics, and health policy to illustrate how health and community-level data could be more actionable for health system decision-makers.

The role of infographics in health-care communication and its contribution to decision-making has been expertly reviewed (1,3). Additional insights on data visualization, infographics, data storytelling, and cognitive information processing of health data for health system and medical care decision-making have been published (3-7). The description of the charticle is particularly meaningful (1): The charticle synthesizes high-quality data from various sources and combines written narration and easy-to-understand graphical designs to communicate the intended message. Simply, a charticle combines “attractive colors, easily understood text, and key graphs or charts that aid in the delivery of a central message” (1). The graphs and charts come from an underlying dataset(s) using combined elements of a charticle to deliver a message that can facilitate decision-making and action. Data storytelling in health care (6,7) may be an aid to health system decision-makers if the interpretation of data points to an action.

The availability of data in various types and in various phases of data quality complicates the meaningful interpretation of

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data for any type of decision-making challenge, including health system decision-making to advance population health improvement efforts. Epidemiological thinking and the tools of descriptive managerial epidemiology may contribute to the proper use of these data types for health planning and health program evaluation (8) and could inform the development of a charticle. Yet for the value of these data to support health system decision-making, the health data need to be in a usable format for the intended reader to increase practicality for health policy decisions and program implementation (9).

A typical way to report health data is to construct a data report with data tables and graphs. We briefly examined health system performance data. We began by considering publicly available hospital system performance for the Veterans Health Administration (VHA) system from 2014 through 2019 (10). The data from five VHA medical facilities included in this report came from various sections of the country and all were assigned by the VHA classification “Surgical Operative Rating: Complex:” Washington, DC; West Haven, CT; Shreveport, LA; Omaha, NE; and Loma Linda, CA. A descriptive ecologic study design (8) was used to examine the same hospital system performance measures within the VHA system from 2014 to 2019. These aggregated data were reported by the VHA as part of their Strategic Analytics for Improvement and Learning Value Model. Publicly available online, these data were also part of a data collection system for summarizing hospital system performance within the VHA. The data for the nine measures for each of five years were downloaded, prepared, and modeled, resulting in 225 charts and five tables of aggregate measures (not shown).

It was time consuming to prepare and analyze these data, and might be beyond the time available to some health system decision-makers given their multiple duties (9). After reviewing the evidence, we chose to rephrase and narrow the approach. We thought that it would be more useful to focus specifically on improving the access of a selected subgroup of veterans to primary care appointment within 30 days in a specific, geographic area for health system decision-makers in the same area. We combined specific data from our initial effort with health-related demographic data pertaining to the geographic area. We constructed a charticle (Figure 1).

In this figure, we attempt to operationalize the definition of the charticle (1). The design and text point to at least three practical matters related to making data actionable in this situation:

- Probing questions/issues were addressed to the group practice manager for use in local decision-making supporting veteran population health.
- For veteran population health purposes, health behaviors identified for adult residents of San Bernardino County were included with data for veterans using the Loma Linda VA Medical Center.
- For veteran population health purposes, key socioeconomic indicators related to health status were included for veterans living in the county.

To help make the hospital system performance data more usable, it was necessary to find useful community-level health data from reputable sources and for the same geographic area. We created an outline of a story and information that would be imparted with the data to craft a

population health message for health system decision-makers. Finally, we designed a data visualization product with text to create an actionable message (1,6,7).

Figure 1 was tailored for the specific location and type of reader/health system decision-maker. This figure might be more useful than a static data table, metrics on a dashboard, or multipage report filled with hospital system data in the following ways:


- Title: The title of the figure indicates the central message for the health system decision-maker
- Data in top portion: Public data in the top portion of the figure present important demographic and risk factor information applicable to the specific population – veterans and adults living in the same area.
- Data in the middle portion: The bar graph presents public data on the access of veterans to primary care appointments in a specific location with a reminder of the racial composition of veterans living in the same location.
- Comment in the bottom portion: The question to help health system decision-makers put the data into context and offers a suggestion/question to help decision-makers discuss next steps for the health system at a specific location.

All stories have a beginning, middle, and end (1,6,7). With this in mind, the charticle has several elements that we tried to operationalize in the story (Figure 1) that could be derived from examining the data. The collection, synthesis, and interpretation of health system data both pertaining to the health-care system and the community that lead to an action may help health system decision-makers better explore opportunities for increasing patient access to primary care appointments. These opportunities may include collaborating with hospital system professional staff and community-level public health professionals to improve population health status of individuals living in the specific geographic location.

In the figure, we attempt to illustrate five important factors for creating a useful infographic that could facilitate health system decision-making (6):

1. Consider the cognitive processing of information: Consider how purpose, quality of data and evidence, and good graphical design work together in practice.
2. Develop a specific purpose: Can the charticle inform, educate, or call to action?
3. Organize a message: Craft a message with a beginning, middle, and end that include narrative text, data, and graphical design.
4. Collect data and information from good sources: Use good principles for data collection and data utilization and use appropriate descriptive methods.
5. Call to action: Gently help the audience realize that data and information in the charticle/infographic could be the basis for decision-making and action.


To help health decision-makers plan strategically, a charticle or other form of infographic should be logical and orderly and presented in a way to tell a story while at the same time synthesizing facts and information and this can lead to informed decision-making in a health-care



VA-VHA Medical Center is located in the City of Loma Linda, San Bernardino County, California.**


There were approximately 2,180,080 residents in the county in 2019.

In the same year, approximately 99,090 veterans lived in the county.



Veterans: Period of Service Living in County (2019)**

- Gulf War (9/2001 or later): 23.6%
- Gulf War (8/1990 to 8/2001): 21.58%
- Vietnam: 33.5%
- Korean War: 5.26%
- World War II: 1.85%




Population Health: Health and Wellness Behaviors of Adults Who the County Health Department (and partners) Attempted to Address for 2020**

- Adults with Diabetes: 11.4%*
- Adults with High Blood Pressure: 31.1%*
- Health Disease Hospitalizations: 82.4%
- Adult Obesity: 36%*

*Did not meet target, December 2020

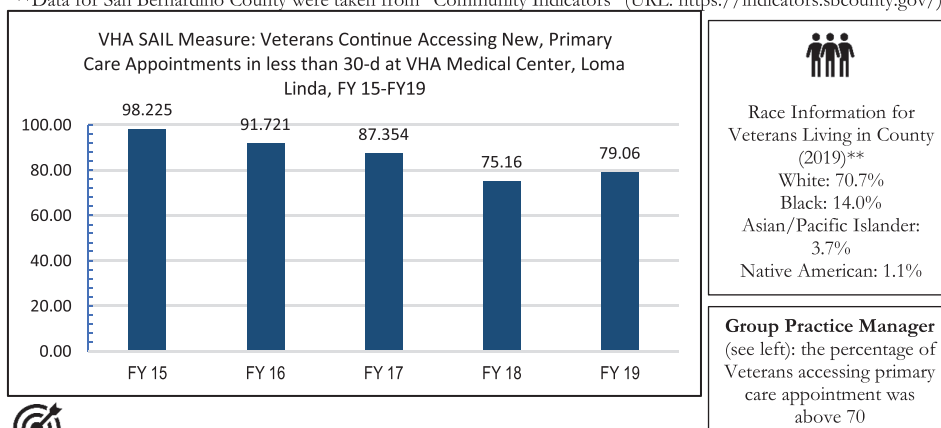
Group Practice Manager: Are these health behaviors, also, of concern for veterans in the county?



Key Economic Indicators of Veterans Living in the Country (2019) that Have a Bearing on Population Health**

- Median Income: \$43, 324
- Living in Poverty: 6.2%
- Unemployment Rate: 3.1%
- High School Diploma or Higher: 94.1%
- Living with a Disability: 27.9%

**Data for San Bernardino County were taken from "Community Indicators" (URL: <https://indicators.sbcounty.gov/>)




 **Opportunity for Group Practice Manager:** Could increasing Veteran access to VHA primary care appointments and collaborating with county health officials on the needs of veterans, including connecting Veterans to health and wellness services in the county, improve veteran access to services (e.g., diabetes management, high blood pressure control, etc.)?

FIGURE 1 (CHARTICLE). Opportunity for VHA Loma Linda Group Practice Managers: Increasing veteran access to primary care appointment while addressing population health for veterans

system (7). A new team of professionals (to include an epidemiologist with expertise in managerial epidemiology (8), a health policy expert, a health data visualization expert, etc.) could be assigned the duties related to making health data actionable for health system decision-makers. Having a team of professionals available to collect, analyze, interpret, and visualize the data in a meaningful way seems a prudent way to extract meaningful information that can help improve the performance of the health system organization for those utilizing its services, and perhaps, others problem areas calling for public health action.

DISCLAIMER

The commentary expressed in this report are those of the authors and do not represent the official position of the US Government or the US Department of Veterans Affairs.

CONFLICTS OF INTEREST

None.

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