DATA STRATEGIES *for a Changing Health Care System*

By David Hartzband and Feygele Jacobs

Data is at the core of how we think about both clinical care and operational planning in health centers today. Reliable data is essential to meaningful use certification, PCMH qualification, ACO participation – not to mention newer topics like aggregation and/or warehousing of data and analytics for clinical and operational use. But what is data? Where do we get it? How can we use it to improve what we're doing? Using and understanding information is central to many of the decisions currently facing health centers. As they work to improve their operations and outcomes, a clear and well-defined data strategy is all the more important.

Data 101

In order to understand how to manage and use data, we need to have some understanding of what data is, and what its characteristics are. Data, in the context of health care organizations, is the specific values associated with a label such as "%FederalPovertyLevel " or "HbA1c". The values assigned to these labels are the pieces of information we use every day such as 140% of the FPL or HbA1c of 9.85%. These pieces of information are stored as data; a single HbA1c value, in this case 9.85, is stored as four (4) bytes of data. A basic EHR record (excluding images) for a healthy individual may be as large as 4-5 megabytes (million bytes) of data, approximately the size of all of the written works of Shakespeare. The EHR record of a person with several chronic conditions, which could include multiple images related to diagnosis and treatment, may be 4 gigabytes (4GB) of data or the equivalent of about 1200 songs — 80 hours — of music on iTunes. If your center serves 30,000 patients, the amount of data you're keeping is 120,000 GB (117 terabytes or TB) or about 10 times the amount of printed material in the Library of Congress! This seems like a lot of data, but in an information technology context, it is only a moderate amount.

Data is generally stored in tables in a database. All commercial EHRs use some form of structured data storage, with data stored in the rows and columns of a relational database where each individual patient's record is a row, and the columns are discrete elements of demographic and clinical data. In this form, data can be recombined (joined) in various ways and queried with standard query languages, usually SQL. If we were to look at a list of these tables with the column labels, they would, for the most part, make sense to us. The same is true of how practice management systems, or most other systems in use at health centers, store data.

Putting Data to Use

So we know a good deal about what data is and how it is stored by automated systems, but how is it used by health centers? The first and most obvious use is for clinical and operational management, employing a variety of applications, including EHR, practice management and other systems. Data reporting, such as UDS reporting which extracts information from the practice management system, is another example. As the health care system evolves, so too does the need for data aggregation, which may involve extraction of local data into data marts for specific purposes such as performance analysis, or the aggregation of data into a larger data warehouse that might contain data from multiple sources. This type of aggregation might be used, for instance, in ACO risk calculations or regional public health evaluations or even national analyses of outcomes for specific clinical conditions.

Data Use in the Future

Increasingly, data is being used to generate insights into both operational/financial planning and clinical treatment and care planning, as distinct from merely management. Analysis of even relatively small amounts of data can yield insights into the financial distribution of patients, visit and admission patterns, and other indicators useful for developing priorities for health center development, staffing and capacity. In clinical planning, the analysis of larger data sets allows for the identification of patients with similar patterns of disease and therefore allows insights into diagnosis and treatment. The data have operational as well as predictive value.

Particularly useful as the number of patients served by health centers grows, and becomes more complex, is aggregate clinical and outcomes data for patients with given diagnoses or conditions. Any one health center, even a large health center network, may see only a very limited number of cases of a given or rare condition. More often, a center may see patients with a narrower range of conditions, making treatment planning for those with less common conditions, or with multiple complexities or comorbidities, difficult. Using a much larger amount of data obtained through an aggregated data mart or warehouse could change the whole way we look at analysis of clinical information. This is because the use of very large amounts of data for analysis allows us to evaluate many more cases than might be seen in any single organization and also raises our confidence level in the analysis. The difference between a 90% confidence level when making a diagnosis (1 in 10 incorrect results) and 99.999% confidence level (1 in 100,000 incorrect results) is a very big difference.

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Setting Your Objectives

So what can health centers do now to be in a position to make the best use of data in the near future? First, build on what you already have. The amount of data in EHR and practice management (PM) systems at any single health center is already pretty big, and is getting larger daily. Review how data is stored in your clinical and operational systems. Be sure that the information is internally reliable. Determine if you already have the capability to aggregate this data into data extracts or data marts for specific analysis. Many EHRs as well as PM systems and their underlying database systems have facilities for doing extraction and combination of data. Such extraction and combination (aggregation) should be planned in terms of both overall objectives as well as specific operational practice-research questions.

Start by defining your overall objective. Is it UDS reporting? Demographic analysis for growth planning? Clinical classification? It is important to identify your objectives and prioritize the efforts that will be affected by your use of data. Perhaps more efficient UDS reporting is a priority, or perhaps it is meaningful use qualification, PCMH certification, or some other objective such as more sophisticated financial management. ACO participation gets a special mention because ACOs are driven, in large part, by analysis. This analysis may be provided through the ACO, but the ability to aggregate your center's data and possibly do preliminary analysis is important. Operational and clinical performance analysis is already an important use of the data from single health centers and ACOs will look toward and facilitate aggregated data from multiple health centers, health center controlled networks and other groupings.

Clearly define what questions you need to address consistent with these broader objectives, because no matter how robust the data, analysis is only as good as the questions you ask. In addition to focusing on the research question, develop a plan for how you will analyze this data and report on your results and make sure your systems support this capacity.

Going forward, health centers will need sophisticated capability to exchange and share data with other providers in large, shared data warehouses. This will require personnel resources to work with increasingly large quantities of data, using more complex and granular forms of analysis, both to do the technical work required and to assist in interpretation of analytic results. In preparing for the longer term, structuring and data management is essential, and go beyond the technical effort to establish and maintain systems. It includes an approach that values data as an organizational resource and asset, and that engages the whole center so that the use of data and its transformation into useful information becomes something that both providers and staff are aware of and comfortable with. When data becomes useful information, it can guide both the operational and clinical efforts of a health center.

The next few years will be very exciting as more and more uses for small and very large amounts of data are developed. Starting now to develop a "data-based" approach to the management and delivery of care will allow health centers to be prepared for the evolution in the use of data that is just now starting, and to help lead and guide that evolution into the future.

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Chicago, IL

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San Diego, CA

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