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Children's National Puts Geospatial Data on the Map

Unlike some other major industries, health care incorporates geospatial data only sparingly. But that could change quickly with population health a priority.

By Gary Baldwin

When it comes to defining health care data, Brian Jacobs, M.D., takes a broad view. Serving a dual role as CIO/CMIO at Washington, D.C.-based Children's National Health System, Jacobs has overseen the system's expansion of EHR technology over the past eight years so it now operates across inpatient departments, ambulatory clinics, and a regional data exchange encompassing 240 independent physicians.

During the past six years, Jacobs also has championed the use of a technology not commonly deployed with EHRs. It's called GIS, short for geospatial or geographic information systems. Jacobs' most recent effort, tackling childhood obesity, blends standard EHR data with GIS software—which displays health data in conjunction with geospatial coordinates—a move he hopes can offer greater insights into obesity and what interventions might work. “For the first time, we are able to characterize the percentage of the population in different disease groups, where they reside, and the impact of gender and race,” he says, describing one of many health maps of Children's service area. “As you manage population health and try to keep people out of the emergency room, geospatial technologies will come into play.”

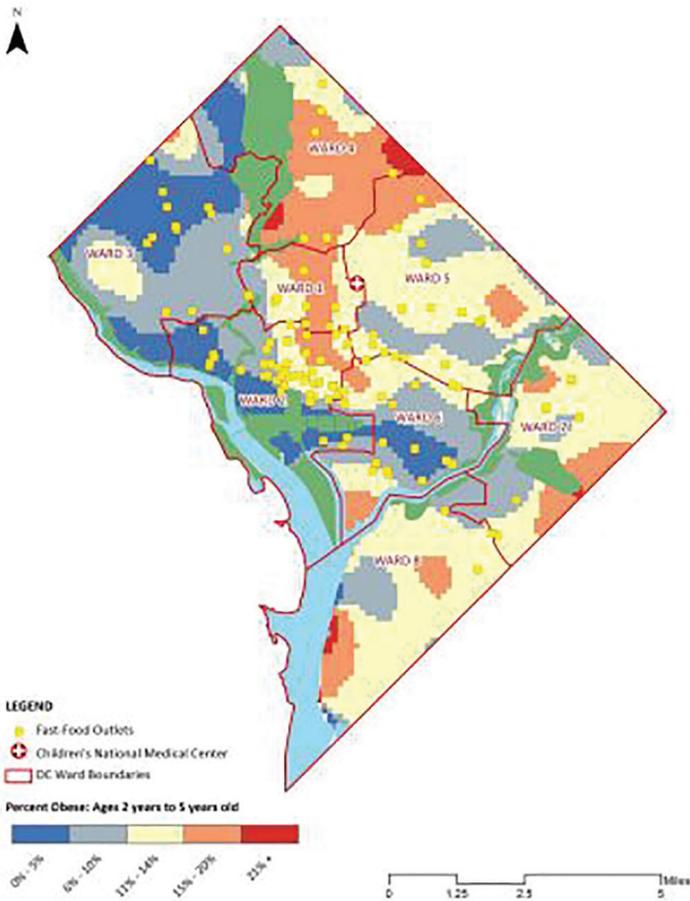
GIS proponents describe the technology as offering rich insights into otherwise static health data embedded in tables. Jacobs, for example, has produced maps showing precisely which neighborhoods in Children's service area are most afflicted with diabetes. And the emerging focus on population health all but begs for the technology as

administrators attempt to target interventions and assess factors contributing to ED visits, if not just make informed business decisions about where to expand various service lines—and analyze the local clinical labor pool's ability to support them.

Although GIS technology itself is mature, there are many reasons why it has yet to become part of the mainstream technologies in acute and ambulatory care delivery. Challenges include patient privacy, availability of relevant data that is easily mapped, and a daunting number of options in how to embed spatial coordinates into health data.

Burn prevention

Early efforts at Children's National Health System underscore the potential of GIS. In one of his first projects, Jacobs partnered with a trauma surgeon who wanted to reduce the incidence of burns in the community. The project combined data from the organization's Cerner EHR with geospatial mapping software, from ESRI, a not-for-profit organization whose GIS software is used in a wide variety of industries. Burn patients were linked to various data sets, including home address, ethnicity, cause of injury and season of injury. Mapping data and performing statistical analyses offered rich insights, Jacobs says. “When we drilled down in the data, we figured out most of the problems came from thermal burns caused by a water heater being set too high,” Jacobs says. Fed by EHR data, color-coded maps revealed that the majority of cases originated in a handful



This map from Children's National Health System shows the rates of childhood obesity overlaid with locations of fast food restaurants in the area.

of Hispanic neighborhoods. As a result, Children's partnered with the District of Columbia's Office on Latino Affairs to circulate handouts describing simple prevention tips. "We significantly reduced the number of thermal burns coming to the ED," Jacobs says. "It was very effective."

Jacobs' obesity project will take a similar approach on a far

more complicated problem, one with less clear-cut causes. Data on height, weight, age, gender, ethnicity, and address—"all the data you need to know obesity in a region of interest," Jacobs says—are extracted from Children's EHR and then presented spatially on a map, incorporating any number of variables. Jacobs cautions that understanding obesity is a difficult undertaking, and that Children's researchers have yet to draw conclusions about the best response. "For the researcher, the maps can help inform the focus of research, whether it is around drugs or better nutrition," he says. "But if you look at the map, you do see we need to focus our efforts on Ward 7 and 8, but not in Bethesda. We can tell where the problem is most severe."

Jacobs says the power of GIS technology is its ability to display health data in conjunction with a variety of environmental factors, which may play a role in health status. In that light, GIS enables researchers to analyze data spatially against factors diverse as the quality of the air, or the proportion of the smokers in a defined area. "An asthmatic living near high pollen counts or a huge smoking population is more likely to have exacerbation in their condition than someone living in another area," Jacobs says. Another recently launched effort tackles sickle cell disease and its impact on readmissions, an equation which may be influenced by environmental factors, he adds.

"Many conditions lend themselves to geospatial analyses," Jacobs continues. "To analyze them, you need a combination of geospatial software and statistical analysis (Children's use SAS for the statistical analysis). It is not enough just to get data out of the EHR." Children's is currently working with Stanford, Calif.-based Lucille Packard Children's Hospital to broaden its obesity analysis. Using data supplied by Lucille Packard, Children's researchers will compare the problem in two vastly different metropolitan areas, Jacobs says.



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