



Arc User

Mapping Health Care Networks



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Managed care is big business. Based on government figures, the revenues of managed care companies in the United States exceeded \$320 billion. As the industry matures, a growing number of its clients are demanding more sophisticated health plans. Patients feel their providers should be close at hand. Businesses want employees to spend more time working and less time driving. Physicians within preferred provider networks want more control over the number of patients they are asked to treat. Managed care companies are discovering that GIS can help them address these issues.

PatientAccess, an application developed by GeoHealth Incorporated, an ESRI business partner, is used by managed care companies to make sure that patients are close to their physicians, and that the ratio of patients to physicians is constant throughout a given health care network.

Where's My Doctor?

GeoHealth Incorporated has developed an application that let managed care providers display the geographical relationships between a client's employees and the network of physicians that the provider has to offer. GeoHealth used ArcView GIS to create PatientAccess, an application that can operate as a stand-alone utility or as an extension to ArcView GIS. PatientAccess is now being used by hospitals, medical groups, government entities, consultants, and businesses to map the locations of patients and physicians.

Mapping Patient and Provider Locations

A hypothetical sales representative, Mike, will be used to illustrate how a managed care provider can operate more effectively using GIS. Mike has drawn up a proposal in response to a call for bids from a large firm in downtown Columbus, Ohio. He brings a copy of PatientAccess, a database listing doctors in Columbus who provide health care through his company, and his proposal to his meeting with the firm.

Finding the Closest Doctor

First, Mike displays the locations of his network's health care providers. Then he asks for a list of the street addresses of the firm's employees and adds and displays this data as a theme. He compares patient locations with the locations of the providers. Next, he builds a query to determine the number of providers within a specified distance of each employee. Mike's client wants to know how many employees live within five miles of two providers. Five miles seems like a reasonable driving distance and each employee should have a choice of more than one physician.

The query reveals that 92.8 percent of the employees in the database live within five miles of the two providers. Mike's client is happy with these results but also wants to know what types of providers are available within the network. How many of these conveniently located providers are general practitioners? How many are pediatricians? How many employees live within five miles of two hospitals, or even one hospital?

Finding the Right Doctor

To refine his analysis, Mike constructs a multipart query in which he divides up the providers by medical specialty. In each case, he still wants to know how many employees live within five miles of two providers. For the first query, however, he limits the search for providers to cardiologists. The second he limits to hospitals, the third to OB/GYNs, the fourth to primary care physicians, and the

fifth to pediatricians. Structuring the query in this fashion will reveal how many health care providers are available to each employee as well as how many of each type are available.

Approximately 45 percent of the employees in the database live within five miles of two cardiologists; 30 percent will be able to reach two hospitals within the same distance; 51 percent live within five miles of two OB/GYNs, and 63 percent will have the same access to two primary care physicians—but no one lives within five miles of two pediatricians.

Color coding the providers by specialty reveals a pattern in the map. Out of 25 providers, only three are pediatricians. Two of the



pediatricians are located several miles from the area around downtown Columbus, where the majority of the client's patients are clustered. Mike runs another query, this time to find out if there might be two pediatricians within 10 miles of each person. This query reveals that only 48 percent of the firm's employees will be able to choose from two

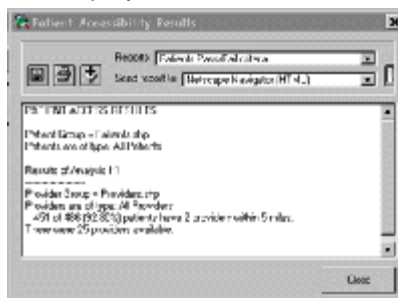
pediatricians within 10 miles. Mike needs to add another pediatrician to his health care network for this area.

Where Are My Patients?

At this point, 63 percent of the employees can reach two of the eight general practitioners from their homes without traveling more than five miles. However, this does not mean that each physician is within five miles of an equal number of employees. It's more likely that one or two providers will be overloaded.

Mike maps the results of his multipart query to show the dispersion of primary care physicians to employees. Combining these results with a Provider Accessibility report tells Mike how many employees are closest to each physician. When employees' addresses are mapped against the locations of the eight primary care physicians, the distribution looks fairly even. But looking at the final map, Mike sees that Dr.

Turner is the closest physician to only 37 employees, while his neighbor, Dr. Adams, could find herself wrangling with as many as 135 new patients. With this information, Mike will want to add another primary care physician located near Dr. Adams.



Fine-tuning Managed Care Networks

GIS is proving itself to be a useful tool in the evaluation of health care networks nationwide. By mapping out the providers and patients, managed care providers can easily identify system imbalances and move to correct them. With the integration of GIS the health care industry and the development of applications like PatientAccess, managed care organizations can optimize their provider networks and refine their health plans to better serve clients.

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