

Family Van Creates Online Calculator To Tally Worth of Mobile Health Clinics

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make it part of their practice,” said Gawande. The United Kingdom, Ireland, Jordan, and the Philippines have already started nationwide plans to implement the checklist in all operating rooms. In the U.S., State Hospital Associations in Washington, North Carolina, South Carolina, and New York have also committed to using it.

—Nuño Domínguez

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Quest Finds Tool To Measure Energy Levels in Brain Cells

HMS neurobiologist Gary Yellen likes the double meaning of *Perceval*, his latest invention. *Perceval* is an acronym for Permuted Reporter of Cellular Energy Value, a new protein-based tool to monitor cell metabolism. It is also a reference to a knight of the Round Table who searched for the Holy Grail. “We like to be well rounded in our education,” said Yellen.

Yellen’s own Holy Grail is resolving a longtime mystery: why a high-fat, low-carbohydrate diet known as the ketogenic diet reduces seizures in epilepsy patients. He suspects it has to do with how energy is produced inside brain cells. That’s why his team is probing ATP, the main energy currency within cells. The researchers think low ATP levels just under the surface of neurons may quench firing and reduce epileptic convulsions. To test his theory, Yellen wanted to find a new tool to measure ATP.

He came up with something better. After combining a bacterial regulatory protein with a green fluorescent protein, Yellen and HMS graduate student Jim Berg discovered that it not only measured the ATP concentration but showed the ratio between ATP and ADP. Both ATP and ADP are involved in neuron firing and knowing their ratio may be more useful than knowing their individual concentrations. “It was a serendipitous discovery,” said Yin Pun Hung, co-author of the study, published online in *Nature Methods* on Jan. 4.

Perceval, a tuned-up version of their prototype reporter, works as an optical probe of the ATP:ADP ratio. When expressed in cultured cells, Perceval varied its fluorescence depending on the ATP:ADP levels. The tool is the first to measure ATP:ADP directly, said Hung. Additionally, Perceval showed a stronger optical signal than con-

What if there were roving health clinics that brought medical advice and preventive services directly to the people who need them most—those living in inner city neighborhoods and the remote rural corners of America? What if these facilities screened so many vulnerable and forgotten people that they spotted public health epidemics before they became obvious? What if these peripatetic clinics saved the country millions of dollars in emergency room visits and early-detection efforts and yet depended for their existence on the fluctuating support of private donations rather than reliable insurance or government funds?

That’s exactly what is happening in cities and communities across the country. Fleets of medical vans venture out daily, carrying social workers, nurses, and medical students who dispense medical advice and support, screen people for a wide variety of conditions—pregnancy, hypertension, diabetes, glaucoma, high cholesterol—and at the same time collect information about medical conditions occurring among these populations. But many of these programs struggle for survival due to lack of funds.

Several years ago, Nancy Oriol, founder of the Boston-based Family Van, hit upon a way to turn this situation around—namely, by calculating exactly how much each van is saving the healthcare system. Now, she and colleagues, with a \$400,000 grant from the Boeing Corporation, are building their “return on investment (ROI) calculator,” essentially a set of algorithms that will turn data about van visits and services into a dollars-and-cents figure that shows how much the Family Van, or any other mobile health clinic, is saving the country.

ventional ATP sensors based on the enzyme luciferase, the researchers said.

“There are many fundamental questions in energy metabolism that this tool would be useful to address,” said Yellen. Perceval could yield a better understanding of cancer cell metabolism. It could also track energy levels in pancreatic beta cells and show how they are linked to insulin release.

Yellen and his team are already working on fine-tuning Perceval so they can use it to test their hypothesis about epilepsy. They are also developing new probes for other important metabolites within the cell.

—Nuño Domínguez

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The Family Van saves the healthcare system tens of thousands of dollars each year by providing medical education, counseling, and testing by staff; aboard the van above are Doris Gilliam (left) and health educator Davette Roundtree. “We provide whatever healthcare services the system is lacking—it’s our mission to fill in the holes,” said van founder Nancy Oriol.

“Our funders will love this because we will finally have an answer to the question, ‘How much good did you do this year?’” said Oriol, HMS associate professor of anesthesia at Beth Israel Deaconess Medical Center and dean for students.

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She had the first glimmers of the idea in 2004 while attending a conference of the Mobile Health Clinic Network (MHCN). Though the Family Van had been the darling of philanthropists in the early 1990s when it first hit the streets, it has required continual focused fund-raising since the late 1990s, as have many vans. “I realized we all had the same problem of proving our worth,” she said. She knew that the Family Van, which receives more than 6,000 patient visits each year, was saving the healthcare system thousands of dollars. She also knew if the van prevented just one pregnant woman from having a very low-birth weight baby—by educating her about nutrition and self care and referring her to an obstetrician—it could save \$250,000, half the annual cost of the van itself.

The Family Van counsels many women and men each year and performs many other cost-effective medical screenings. Working with Jennifer Bennet, executive director of the van, Oriol and colleagues, including Anthony Vavasis of the MHCN, came

up with the idea of an ROI calculator.

It works like this: using published data from health policy studies that estimate the number of dollars saved by each of a variety of interventions, the calculator multiplies that dollar amount by the number of interventions performed by a given van. Preliminary runs show that the rate of return for the Family Van is more than 30 to 1. “For every dollar spent by us, we save the healthcare system more than \$30,” said Oriol.

There is an additional payoff. “Vans are at curbs so we see health problems before anyone else does,” she said. Working with John Brownstein, HMS assistant professor of pediatrics, and Isaac Kohane, the Lawrence J. Henderson professor of pediatrics, both at Children’s Hospital Boston, Oriol, Vavasis, and colleagues are developing an early-sensing system—essentially an interactive map that locates public health problems as they happen, much the way Brownstein and Kohane’s healthmap.org does for outbreaks of infectious disease.

This unusual combination of global and community outreach appealed to Boeing. “Boeing works to ensure that families are economically empowered and recognizes that good health is a crucial part of a person’s ability to work and provide for his or her family,” said Anne Roosevelt, vice president of global corporate citizenship. “We are pleased to partner with the Family Van and other mobile health units around the country to reach people, both rural and urban, who otherwise lack access to crucial healthcare.”

—Misia Landau

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