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LONG TERM CARE MANAGEMENT

feature article

INTERVIEW WITH DR. ANTHONY GLASCOCK
AND DR. DAVID KUTZIK, DREXEL UNIVERSITY

Where there's smoke...

The "Smart Home" concept comes home at last—with a few changes

In the last few years, there has been quite a buzz in the long-term care industry about the "Smart Home" concept—a new wave of technologies that aims to monitor elders in their homes electronically and with minimal interference to encourage aging in place. While conference audiences and magazine readers have embraced the idea, they are generally left wondering when exactly this futuristic technology would actually be ready to enter people's homes. For the most part, that question has gone unanswered.

Enter Dr. Anthony Glascock, a gerontologist and professor of anthropology at Drexel University, and Dr. David Kutzik, an associate professor of sociology at Drexel and a gerontologist with a background in technology. The pair are co-inventors of the technology used in New York-based Living Independently's QuietCare system. They hold the patents on the technology in both the United States and Canada, with patents pending in the European Union and elsewhere. The system strips the Smart Home idea of bells and whistles, using small wireless sensors placed throughout the home to monitor activities of daily living (ADLs). It reports these findings to the QuietCare-Status center for analysis 24/7, and immediately contacts a designated caregiver if anything seems amiss. The system is simple, affordable, and unobtrusive, but perhaps most significantly, it is available today, the first of its kind to actually hit the market.

Glascock and Kutzik talked with Nursing Homes/Long Term Care Management Assistant Editor Todd Hutlock about aging in place, their system and how it differs from the Smart Home concept, and other related topics.

How did the project begin?

Glascock: My area of research for the last 10 to 15 years has been home healthcare and home delivery of care. Dave and I have been working on this project for ten and a half years. Back in the late 1980s, I had been doing a lot of research on multisite, multicultural projects supported by the National Institute on Aging, in Africa, China, the United States, and Ireland. I lived in a small community in western Ireland for about 18 months, and as part of my research, I asked people there a series of questions, one of which was "Have you ever cared for or helped an older person?" Usually I got answers like, "Yes, we drive my mother to the hospital in Galway" or "We take my older aunt to Mass on Sunday." A

man named Sean said, "Yes, I get up every morning and I look across the valley at Paddy's house to see if smoke is coming out of the chimney." I had no idea what that meant. He said, "If I see smoke coming out of his chimney by half-seven in the morning, I know that he's up, he's started his fire, he's got his tea going, he's up and around, and everything's okay. If I don't see smoke by half-seven, I walk over there because there might be something wrong."

Fast-forward another two or three years, and my mother was experiencing some health problems and needed to change her medication regimen. At that time, she was extremely hard of hearing—now she's deaf—and I didn't want to make that phone call to ensure she was taking her medication for some fairly typical reasons—because it was in the morning, I was on my way to work, I was rushed, etc. Plus, that awkward role reversal—I have over time assumed the parental role, but it is still very difficult for children to become the parent. All I wanted to do was just see if she had taken her medication somehow. So I asked Dave if it would be possible for us to check via computer if my mother had taken her medication, following the idea of the smoke coming out of the chimney. Dave said no, that's too difficult. A day later, he came back and said yes, it can be done, let's do it. His father was very ill at that time, my mother was having health problems, and so we developed the system primarily to help our own parents and ourselves, to provide more security for them, and more peace of mind for us. Our philosophy, though, goes right back to the smoke out the chimney—to develop a system that is nonintrusive, passive, and doesn't ask people to change their behavior, and yet provides a record of what they are doing so changes can be seen and you can intervene before they become a crisis.

How did Living Independently get involved in the project?

Kutzik: They sought us out, but our contact there, George Boyajian [see sidebar], is someone whom we met years before when we were looking around to see how to commercialize. He contacted me, and then the main people behind Living Independently came and met Anthony and myself and our business representative in Philadelphia and the rest is history.

Glascock: We're not business people. We decided a long time ago that we are what we call "true believers in the system." We really just think it will help people. We did not take out second mortgages on our houses,



and we did not build these systems in a garage and sell them out of the back of our truck.

Kutzik: Though we did build them in a garage!

Glascock: True, we did do that in the research stage. But we decided a long time ago that the only way we could only have this system brought to market in the United States was through a company like Living Independently. We explored different options, and this seemed to be the best one.

So you got into building the system to help your own situations, and then somewhere along the way, it occurred to you that it could help others, as well?

Glascock: Yes, exactly.

Kutzik: Also, I got into gerontology through work in the planning department of the local area agency on aging. I was involved in the design and redesign of long-term care case management systems, and I've done a lot of work in medication adherence. So our research interests came into this from the beginning, and as a research tool, this system is incredible. No one has ever known what people are actually doing other than asking someone—who also might potentially have a memory problem—“Have you remembered to remember to take your medication today?” or, “Have you done x, y, or z?” Retrospective interviewing, essentially. Now, for the first time, in an unobtrusive way, we know what people are doing, and sometimes more importantly what they are not doing, 24/7, automatically.

Glascock: Let me give you an example. A few years ago, I had an infection of the prostate. As you know, males are pretty sensitive about this, so I went to my urologist. The doctor said to me, “Has your behavior changed? Are you getting up more at night to go to the toilet?” Now, I do a lot of cycling and I put incredible amounts of fluid in my

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body and I normally get up several times a night. I had no idea of the change. In fact, I had no idea how many times a night I usually got up before the infection. So, even if you are not cognitively impaired—and some elders are—even if it's an important thing, you just might not know. The doctor asked me if this behavior had changed, and I said, “I don't know.” So I asked my wife, “Do I get up more? How many times do I get up on average?” Well, this system tells you that sort of thing—you don't have to remember. David put it in my house and actually monitored me when we were on a trip once, for which I have great gratitude, but at least I was able to tell the doctor the next time what my average was.

Kutzik: To make it clear, I did not perform any sort of prostate exam on him.

Glascock: [laughs] Well, the point is that the activities of daily living, the things that we do 10,000 times in our life without thinking about them, are the hardest things to remember, even if you aren't cognitively impaired. We went to a whole series of professionals—physicians, geriatric nurses, geriatric social workers, case managers, discharge planners, etc.—and asked them what we should monitor. The top ten items were very consistent. We developed a system that was software-

driven, where you can add and subtract and monitor different things, could monitor different types of people—children, the elderly, etc.—and any caregiver can assess the information exactly and then take steps. The key is to deliver the appropriate care by the appropriate person at the appropriate time. When things are not looking good or have changed, the longer you wait, the more chances that it can turn into a crisis and the more chances that the person will end up in some sort of a facility rather than in his or her own home. We want to keep people living independently as long as possible with the highest level of security and peace of mind.

Can you fill me in a little bit on the history of the research for this project?

Kutzik: Our first installation, after prototyping the system in a lab, was in a large medical center's ADL suite in a rehab wing, where people were brought in to spend time overnight independently and to carry out the ADLs. We had our monitoring system set up, and we monitored everything in the world there with motion detectors and appliance monitors, and validated it with TV cameras that recorded what they were doing. So we had cases such as asking a person, “Did you use your reacher to grab that item instead of getting on top of a chair?” and she replied that of course she used the reacher—but we would know from the TV cameras that she didn't. We learned a great deal from things like this, in addition to cross-validating the fundamental measurement concept. The main thing was that we didn't really have to monitor so many things to really get a good picture of the ADLs, as long as we targeted what we're monitoring, and those objects that are invariably interacted with or used or passed by in the environment when you carry out these tasks. From there, we basically took this larger system, put it in a suitcase, took it on the road, and did a series of different tests in the homes of folks living alone. Through those trials, we basically showed that a few motion detectors and a couple of reed switches can tell you an amazing amount of detail about the people's ADLs. From there, we basically went Web.

We saw this as a Web-based system and a Web-based business, essentially.

Glascock: Remember, this was academic research. We built these on Dave's kitchen table. We installed them, checked them, and developed the algorithms. We're social scientists so we believe in trend analysis, but we're also minimalists—the fewer things you need to monitor, the cleaner the data and the easier they are to interpret. We narrowed this down to as little equipment as possible, but behind that is a very sophisticated computer software package that actually continuously analyzes the data, looks for trends, and looks for variations from the trends. That's the intellectual property. Many of the other people who are working with this sort of technology and in similar areas started with the technology and tried to develop a dual use for it, be it submarine technology or security systems or whatever. We started with a need and then tried to use only existing technology that was readily available, the idea being to keep it cost-effective. We're the anti-Smart Home people.

How do you see what you're doing as different from what the Smart Home researchers are doing?

Glascock: You might call it “impaired Smart Home.” We deliberately dumbed-down Smart Homes. There's nothing wrong with the Smart Home philosophy, it's just very expensive. It asks people to do a lot of things. For example, we were at a meeting and we saw a Dutch Smart Home project that tried to do a lot of very sophisticated things, but as people grow older, they become less willing and able to deal with change. So they put all of this very nice, sophisticated stuff in, and they had to take it all out. People just did not want it. I think much of the Smart Home technology is built by young people and is aimed at relatively well-off

younger people who want to do interesting, technologically sophisticated things in the home.

Kutzik: It's also built by engineers. We worked with a large company early on and there was a real divergence of opinion. Basically, they had the view that if you monitor everything and have a gigantic artificial intelligence system to figure out what is going on, then you basically have a Smart Home that can assist or even conduct caregiving. The fact is that ADLs do not afford task analysis structures and databases the way factories that produce paper do since people are not working on automated assembly lines in their homes. So we have a theoretical difference as well as a gerontologic difference. Personally, I do not want to be in a nursing home like the one in Japan where a teddy bear with wires in its back asks you how you are feeling today and times how long your response takes and makes measurements based on that sort of information. I don't want to be messed with in my house like that, and older people are sensitive about those things. It gets into the areas of dignity, as well as environmental press—you must not do everything for people that they are still capable of doing. The house and the environment should not intervene all the time, or the people will become dependent, and that is not good. That's the main difference between us and many of the Smart Home people.

How important was keeping the cost of the system low in the design stages?

Glascok: We want this to be so cost-effective that it becomes widely used. We believe that the people who need it the most are people who have the least ability to pay for sophisticated systems. If you have lots of money, you can buy support; you can have an all-day nurse or the like. The people who can't afford that, who need to have a relatively inexpensive system that allows them to remain in their own homes and to feel secure—those people need it.

Kutzik: The other thing is, unlike any other system that you might want to compare it to, it does not require a high-speed Internet connection or a fancy digital cable or DSL or what have you. It basically uses the existing phone line, dialing in to an 800-number. It is intended to be as simple as possible, and it can be done very cost-effectively, and that's not even factoring in the cost savings of keeping someone out of a facility such as a nursing home or hospital longer.

Glascok: Our thinking was if you can keep a person out of the hospital for one night, the savings will pay for the system for a whole year. Dave and I had early discussions about how much it was going to cost to build these systems. When we first came up with this idea, we couldn't do half of the things we wanted to do—the technology just wasn't there. But we were able to look down the road a bit and we thought that by the time we get all of this together, the technology will be there to allow us to do it, and that is what happened. When we first started doing this, we weren't working on the Web, we were doing it with phone lines and microwaves. We've come a long way. But underlying all of this is the story about Sean watching to see if smoke is coming out of the old man's chimney. That's the most simple, cost-effective, and noninvasive medium you can find. We wanted something that was like smoke, basically, and it turned out to be the Internet. We have this presentation that we make to our fellow researchers called "From Smoke to E-mail" which basically explains how the Internet actually comes as close as you can to being smoke, sort of the electronic smoke metaphor. I mean, we

milks this metaphor to the point where we're not even embarrassed by it anymore. We're academics so we don't really have monetary rewards, so when people tell us it's a great story, we just tell it over and over and over again.

Do you feel like you were thinking ahead of the curve with all of this back when you started? It must have all seemed very high-tech and futuristic a decade ago.

Glascok: People always say to us now, "Wow, what a brilliant idea. You were ahead of the curve." Well, it's not always best to be first, because no one gets it. You have to figure it all out and explain it to companies and then they invariably tell you, "Well, that's not a bad idea. Give us a call when you get it a little further developed. Are other people doing this?" As if it's not a good idea unless there are competitors.

Kutzik: Well, they'll say you are brilliant and that it's a good idea, they just won't give you any money.

Glascok: Right—you'll hear that it's a brilliant idea, but they will question whether it is a good business idea. We are at the stage now where we will be able to prove it's a great business idea.

What's next for the two of you, and how do you see this type of technology growing in the future?

Glascok: The next stage is what we call the basic homecare platform. What we do is essentially behavioral monitoring because we monitor ADLs. We think there is going to be a platform that is going to unite the behavioral monitoring with the nascent telemedicine, security, and

environmental technology that is coming out now, and we happen to think that our platform is the logical one to make that step. We are already talking to people who want to add blood pressure and diabetes monitoring to this platform. We've taken a different approach because we didn't have endless resources. We developed a platform that is extremely simple and extremely cost-effective. Cost drives the

market in America. If we have a simple platform that you can attach other things to, and it keeps that cost extremely low, why wouldn't we be that platform for the future? We are in discussions to add more simple technologies—simple things like a scale or temperature.

Kutzik: Or knowing that the stove was left on, or if the person has left the apartment with the door open or unlocked.

Glascok: It's not our area, but we've developed a platform that can accommodate these things. Something like a thermometer costs very little to add, but it gives people an added sense of security. And how cost-effective is that compared to sending case workers out knocking on doors during heat waves?

Kutzik: It's 10,000 times more efficient.

Glascok: And that had better make it into the article! [laughs]

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Bringing New Technology Home

Marketing and selling a product that the world has never seen before can be a challenge for any company. In the case of the QuietCare system—the first such monitoring system of its kind—that challenge is being taken up by the New York-based company Living Independently.

The QuietCare system uses infrared sensors and a sophisticated computer program to analyze ADLs of the elderly. Wireless sensors are placed in five areas of the home—such as the bedroom, bathroom, and kitchen—to monitor specific ADLs. The system “learns” a person’s specific behavior patterns using proprietary algorithms. The sensors continuously track motion and transmit the data to a base station (about the size of a paperback book); the base station then sends the data over the existing telephone line to the company’s secure server for analysis. The data are then updated at least 12 times daily. This information is posted on a private Web page, accessible to the designated caregiver. According to how the data match a person’s normal measurements, the indicators given to the caregiver can be “green,” “yellow,” or “red.” “Red” alerts are sent directly to the caregiver via telephone, cell phone text message, e-mail, pager message, or fax.

George Boyajian, PhD, executive vice-president—Strategy, Research and Development of Living Independently, sums up the appeal of the QuietCare system with a simple metaphor that most every consumer can grasp: “If you look at the traditional personal emergency response systems—alarm bracelets, necklaces, and watches, etc.—they are like the airbag in a car. The system goes off after the ‘crash,’ or the medical crisis occurs, if it goes off at all, and many times the elders are not wearing them or won’t use them anyway. Our system is the brakes and the steering wheel that help you avoid accidents before they occur.”

According to Boyajian, the entire project came about rather quickly: “In 2002, I joined forces with my business partner John Lakian, and we were interested in starting biotech businesses. I told John that I knew of Dave Kutzik and Anthony Glascock’s work and that I thought it would be very good to pursue. In late 2002, we licensed the patents from Dave and Anthony (they own the patents, and we have the exclusive commercial license to them, which is generally the way these deals are done). We went from an idea that they had and built an entire software/hardware system and platform and tested it over about 12 to 14 months, and then fielded it and started selling it—an absurdly quick turnaround.” Since its arrival in the marketplace in early 2004, the QuietCare system has sold well, Boyajian reports.

To what does Boyajian attribute the early success of the QuietCare system? “Part of the success is knowing people who can get things done, and so part of it is just experience,” Boyajian explains. “Another thing is keeping the system as simple as possible. The problem with most new technologies and new products, especially those based on the Internet, is that they overbuild and

don’t listen to the experts in the field. Large technology companies are overbuilding these spectacularly engineered, measure-everything-in-the-house systems, but when you talk to geriatricians, they don’t want or need all of that information. What they need are the ADL reports that indicate changes in functional health. Many companies haven’t focused on these key indicators of health.”

Another key to success has been the system’s relatively low cost, a pleasant surprise to those who picture new technology as being prohibitively expensive. “Give Dave and Anthony credit for that—and mainly Dave—in that they worked mainly with off-the-shelf hardware,” says Boyajian. “We aren’t dependent on anyone’s hardware, per se: We can use anyone’s motion detectors, for instance. What really makes our system work and makes it cost-effective is that the communications device is unique. We found a company that had produced this type of product for another purpose, and then we had them redesign it for us and they now build it custom for us. We can get all of the hardware for under \$150, which again is unheard of in this business.

“Most technology companies say, ‘We’ve got a hammer. Let’s go look for nails.’ They’ll use their ‘hammer’ to bang in anything, and these big companies doing Smart Home research have all of these notes and mites and these tiny little sensors, and that is their hammer,” Boyajian continues. “We need to get away from that. The problem here is that caregivers are stressed because they don’t have enough information to make the proper decision. We figured out what needed to be monitored and made a simple system to do that—in other words we built the simplest and least expensive hammer to do the job. We took our time and with Dave and Anthony’s help built an efficient system. As Ben Franklin said, ‘If I had more time, I would have written a shorter letter.’

“Most of our sales to date have been institutional sales,” says Boyajian. “We’re working with healthcare systems, government agencies, and not-for-profit agencies who are putting this into their facilities and their patients’ or clients’ homes and using it to serve their constituents better.”

For information on the QuietCare system, call (866) 216-4600, e-mail contact@livingindependently.com, or visit www.livingindependently.com.