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Mark Masselli: This is Conversations on Health Care, I'm Mark Masselli.

Margaret Flinter: And I am Margaret Flinter.

Mark Masselli: Well Margret, another year has flown by and to say it was tumultuous would be an understatement.

Margaret Flinter: Yeah that is what I call pretty safe to say, and certainly at least in terms of health care we're ending this year with more uncertainty and unanswered questions.

Mark Masselli: Well it's pretty sure to say that there will be some form of repeal and replace. Our most recent guest, the honorable Michael Leavitt feels that the administration really has no choice but to deliver some form of what was promised on the campaign trail.

Margaret Flinter: And if it's repealed much of the progress that's been made in insuring more than 20 million Americans may be lost. Many likely to lose their coverage in the wake of repeal which will certainly impact not only their access to health care but it really impacts everybody on the frontlines of care as well, and facing some very real challenges at the same time at the start of 2017 certainly continuing to look at opioid overdose deaths as a huge problem across the country, just a devastating public health crisis for which there just is no simple fix.

Mark Masselli: No, there really isn't Margaret, and something that our guest thinks a lot about, Dr Adam Gazzaley is a neuroscientist and founder of the Neuroscience Imaging Centre and the Gazzaley Lab at UC San Francisco.

Margaret Flinter: He has been doing some really fascinating and groundbreaking work, developing 3D brain imaging technology that allows researchers to observe brain function in real time and we are really looking forward to that.

Mark Masselli: He is also developing virtual reality systems already proving highly effective in helping treat such conditions ADD, PTSD and even addiction. What's so exciting about this is that it offers a non-pharmaceutical approach to treating a number of brain disorders. Really looking forward to that conversation Margaret.

Margaret Flinter: And Lori Robertson will stop by, the Managing Editor of FactCheck.org. You can hear all of our shows by going to [www.chcradio.com](http://www.chcradio.com).

Mark Masselli: And as always, if you have comments please e-mail us at [www.chcradio.com](http://www.chcradio.com) or find us on Facebook or at CHC radio on Twitter, we love hearing from you.

Margaret Flinter: We'll get to our interview with Dr. Adam Gazzaley in just a moment.

Mark Masselli: But first here is our producer Marianne O'Hare with this week's Headline News.

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Marianne O'Hare: I'm Marianne O'Hare with these Healthcare Headlines. 2016 was a bad year for the resurgence of the mumps with more than 4000 cases reported by the Centers for Disease Control and Prevention; that's nearly triple the number of cases reported in 2015. College campuses seem to be a hotbed of infection. Most of these students who contracted the mumps had been vaccinated, leading to discussion of whether there needs to be a new approach to the vaccine booster protocols. Two doses of the vaccine is the standard protocol for immunization but experts at the CDC are looking at the efficacy of recommending a third booster shot in areas where outbreaks are underway.

Ebola took a devastating toll on West Africa, the outbreak starting back in 2014 and leaving more than 11,000 people dead. And there is good news from the lab, an experimental vaccine has proven to be 100% effective in blocking the virus. The new vaccine has some flaws experts say, it may not give long-lasting protection. Lab tests were so successful 300,000 doses have been produced and preserved should another outbreak occur. Bird flu is also on the rise across parts of Asia and even Europe. Hong Kong reported its first death from bird flu, an elderly man who had contracted the H7N9 virus while in China. Officials in Germany where bird flu was also detected are doing the same, the H7N8 strain known to be highly contagious, and in India a strain H5N1 has shown up as well.

And pregnancy and women's brains, a study has shown a link between women's pregnancy and growth in the part of the brain wired for responding to social and emotional cues. A recent study showed many of these changes appeared to last at least two years after giving birth. Mothers who had the most pronounced alterations in their brains also scored higher on tests of emotional attachment to their babies than women whose brains underwent more subtle changes. And being a single dad seems to have an impact on brain health as well. According to a Canadian study single dads are twice as likely to report poor physical and mental health as fathers with partners do. Study found that single mothers generally had more stresses due to financial challenges, whereas men experience more stress as lone caregivers. Researchers suggest men are less likely to ask for help when they are in trouble and urge better screening of single dads in the primary care setting. I'm Marianne O'Hare with these Healthcare Headlines.

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Mark Masselli: We're speaking today with Dr Adam Gazzaley, Founding Director of the Neuroscience Imaging Center, Neuroscape Lab and Gazzaley Lab at UC San Francisco. Dr. Gazzaley is also Cofounder of Akili Interactive Labs, a digital medicine company. He's authored over a hundred scientific papers and delivered

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over 500 presentations around the world, including the PBS Special and accompanying book *The Distracted Mind*. He earned his MD and his PhD in neuroscience at Mount Sinai School of Medicine and completed his internship in internal medicine and his clinical residency in neurology at the University of Pennsylvania. Dr. Gazzaley, welcome to Conversations on Health Care.

Dr Adam Gazzaley: Thank you, pleasure to be here.

Mark Masselli: Yeah. You are among a handful of notable cognitive neuroscientists who are helping to forge a path to a new frontier of brain scientists. You know I think over the last probably 15 months we've had a number of interesting figures in the brain world. We had Dr. William Newsome who was co-directing the BRAIN Initiative where they are mapping out the brain. Your lab has been developing technological and gaming interventions for the development of healthy brains and also treatment of a number of common and debilitating brain disorders. I wonder if you could share with our listeners some of these new technologies that you're developing and the potential to usher in a new era of brain health.

Dr. Adam Gazzaley: Sure. Well as a neurologist I have felt frustrated with our current tools that we use to treat conditions of the mind, from attention problems to mood like depression and anxiety, but certainly aging-related impairment and cognition so things associated with Alzheimer's disease and other neurodegenerative processes. Medications that we use which are really small molecules, are not well-targeted and they are not well-personalized to the individual and so we either wind up with only modest effects or lots of side effects. And so the idea that I had pushed into practice almost eight years ago now was to use experiences to help rewire neural circuits and strengthen different neural processes. And the experiences that we have really latched on to as being very powerful and interactive, we deliver in the form of video games. So in our center here at Neuroscape at UCSF, usually working with professionals in the video game industry very interactive challenges that push one of our participants to engage in an activity for long periods of time and then record carefully how that type of interactivity improves their brain function.

Margaret Flinter: Well Dr. Gazzaley, that is totally fascinating and there's about a million steps between what you just said and where my mind goes to in terms of some of the things that we are trying to grapple with. Let me pick one that's so much on our minds these days which is the opioid crisis, managing chronic pain which has so often led to addiction, treating conditions like post-traumatic stress disorder. These are just huge issues that we have terrible outcomes for too many patients. You have spoken of your grand vision of the future of brain health where we will have this far more personalized as you say and specifically targeted approach. Can you talk about how technologic interventions that you are exploring might make a dent on some of the just seemingly almost intractable problems?

Dr. Adam Gazzaley: Because these experiences can be constructed in a very precise way to challenge an individual just on those abilities and most need to be optimized, we can direct our medicine, our digital medicine as we like to think about it, much more precisely. We use this closed-loop system of a game to adjust its challenge in a way that's appropriate to their abilities, and when someone gets better overtime, because our brains are plastic so that's the natural process, the game gradually pushes these processes into a more optimal state just being there pushing the system. And so we're already seeing impact across the wide range of conditions, things that seem almost counterintuitive for a video game to be therapeutic on such as addiction and attention disorders which many people blame on this (cross talk). We think it can have a positive impact, now it's just doing the hard work and proving that.

Mark Masselli: So that is counterintuitive, video games doing good work as somebody who has two adolescent boys, but you actually see the same vehicle but you see it in a different way and you are seeing some real progress on treating ADHD or PTSD beyond that realm so tell us about how all this works.

Dr. Adam Gazzaley: Sure. So video games are this interesting beast where they have been many ways thought of as the enemy, but that's true of everything. You know there is always yin and yang and video games are certainly very clearly in that category. You know they are a genre. They include many, many different types of interactivity and challenges and how we think about it is that if you create this type of interactivity and the closed-loop and while you're playing, your accuracy, how fast you are. We even feed other physiological information for example your heart rate into some of our games, that they can be used to create this very personalized challenge such that it's not too difficult where you just give up and you are frustrated, or too easy where it's boring and so you just put your play right in that sweet spot in that flow state where they are most susceptible to change.

Now our first big study was on a game that we created called Neuroracer and we studied healthy older adults and what we were able to show that not only were they able to improve their ability to multitask on the game, but that other skills that were related through common brain networks but were not directly trained by the game itself. This is something we call transfer. So their ability to do a face memory task over short period of time, or a very boring sustained attention task, that they also improved significantly. So this is the very methodical rigorous approach that's necessary to take this concept that an interactive game can improve your cognitive abilities. Now we're stepping into clinical domains looking at populations such as ADHD, post-traumatic stress disorder, traumatic brain injury, anxiety disorder, multiple sclerosis, Alzheimer's disease, all of those studies have started mostly by our colleagues which then you know expressed interest in our games and we help guide them, and data is already now being yielded that we are really, really excited about. So you will hopefully be seeing many publications in 2017 across those

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conditions showing that we can make a positive and a meaningful and what we will show is a sustainable impact in improving the lives of those individuals.

Margaret Flinter: Well during the recent holiday shopping season it was just about impossible to avoid virtual reality products. You have said that the combination of virtual reality and artificial intelligence hold just incredible promise, then you've conducted so much research on how these technologies work together. What excites you about the potential for these interfaces?

Dr. Adam Gazzaley: This is the year of virtual reality. We have seen from the big platforms like the Oculus Rift and the Vive, the PlayStation VR, even Sony has one and then all really exploding into the consumer space this year, we will see more of that next year and then we will start seeing augmented reality devices that are going to be quite powerful where you overlay the digital world on top of the real world. I mean right now they are all really largely being targeted for entertainment purposes, but we see great potential for these to be powerful tools to help improve the human condition in many different ways. We think there will be focuses on education but also on medicine and mental health. We already have seen virtual reality advances for pain relief and for anxiety disorders. In our own group here at UCSF we are now taking our video game platforms that we have developed that focus on meditation type practices, physical fitness and now we're looking at how they might have an even greater impact if they are placed inside virtual reality domains, and the reason for that is that it is just a much more real world immersive setting to be in and we think that it will create more powerful experiences and thus have a more powerful influence on improving brain function.

Mark Masselli: We're speaking today with Dr Adam Gazzaley, Founding Director of Neuroscience Imaging Center at the University of California San Francisco and principal investigator of a cognitive neuroscience laboratory at UCSF. Dr. Gazzaley also co-founded Akili Interactive Labs, a digital medicine company. He's co-authored over a hundred scientific papers and has delivered over 500 presentations around the world on his research. I am wondering about the group that you partner with. Are there folks in the industry who are making video games engaged in your work?

Dr. Adam Gazzaley: I think scientists often assume that because they are deeply involved in understanding the brain they would be able to create video games on their own. We're not in that camp, we really respect the video game professionals, artists, musicians, storytellers, the programmers. We realize that there is great expertise and we want to help leverage that to accomplish this higher order goal of building these games as valuable tools, and so we teach them our understanding of the brain and closed-loop algorithms and then work with them on creating these environments and the reward structures. Akili Interactive which is the company that I cofounded based on our research here at UCSF is pretty much a 50-50 team of video game professionals and others from science and business and health care.

Some of the highest level people from the game industry that might be feeling you know as my colleague from LucasArts once told me he spent his entire career teaching teenagers how to kill aliens and now he is ready to advance to something else. And so we often find like the best people in the industry that have been doing it the longest, that have already made their names and they are on the other side of it and then they are like I want to take these skills and really reapply them. So it creates a new type of dynamic when you spend enough time with video game professionals and scientists and people from medicine that create products that people have never seen before, so we are really excited about that particular element of this whole journey.

Margaret Flinter: Well Dr. Gazzaley, you recently hosted a riveting presentation where you had a Wall Street Journal reporter on stage with you fitted with one of your lab's head caps and what was so remarkable about it is that one was able to watch a large 3D image of his brain on the screen as the neurons were firing away in real time while he interacted with a video game. How are these advanced imaging technologies enhancing our understanding of how the brain actually works?

Dr. Adam Gazzaley: So you are talking about a technology that we created with many other partners called the Glass Brain, and the goal is to create a real time visualization that is able to detect different brain rhythms and how brain areas are communicating with each other essentially in real time. So the Glass Brain is a combination of an MRI and a mobile EEG that operate upon that data very rapidly to create that visualization. And now we're proceeding along two pathways with this technology, the first is to see is there any value in real time brain information in this format as a diagnostic tool. So we also have a virtual reality version of this which is quite remarkable to put it on and fly inside your own brain. If you are a physician or a therapist let's say, flying inside someone else's brain, watching it evolve in real time and let's say you have a dashboard and you can increase the challenges in a game that they're playing and then look at how their brain responds, where we are spending most of our time is on the therapeutic aspects of this.

We have another game where your heart rate drives it so that's a physical fitness game where we want to maintain you at this perfectly challenging heart rate for you. With the Glass Brain what we can do is take neural information, actual brain data in real time while you're playing the game, feed that into the game engine and now the game is challenging you and giving you rewards not just based on your performance but based on what your brain is doing, and we think this is going to be a much more targeted way, almost like a surgical way of optimizing brain function, basically consumer friendly technology like mobile EEG caps and video games and VR and artificial intelligence and wearable physiological devices all coming together to create this closed-loop to improve your function.

Mark Masselli: You are a health care provider, you are a researcher and you are doing the bend science right now and you are trying to get FDA approval for several

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of your therapeutic games. I am wondering if you could talk a little bit about the approval process, what do you expect we will see.

Dr. Adam Gazzaley: So the stage that we are at with Akili in terms of taking video games to that true clinical level which requires regulatory approval, we've pre-submitted to the FDA who have approved not the game for clinical use yet but a full multi-site clinical trial which is as far as we know the first time that we've seen this type of trial being conducted. The first trial that's underway now is as a therapeutic device to treat attention disorders in children with ADHD. Then we could be looking at the first non-drug treatment for ADHD and as far as we know the first video game as a prescribable. That's a big one and we will see the results of that study in 2017 as we will start many other clinical trials, but there are other things that have to change. It has to be essential almost like a paradigm shift in terms of physicians thinking about medicine not just as pills but as interactive video games. There has to be a shift in how payer will help support this field as prescribable therapies. But my hope is that we will see psychiatrists, neurologists reach into their pockets, pull out a prescription pad and not just write down a drug but write down like two months of iPad and a whole new type of medicine will be born, that's what I hope.

Margaret Flinter: We have been speaking today with Dr. Adam Gazzaley, Founding Director of the Neuroscience Imaging Center, Neuroscape Lab and the Gazzaley Lab at UC San Francisco. You can learn more about his groundbreaking work by going to [gazzaleylab.ucsf.edu](http://gazzaleylab.ucsf.edu) or follow him on Twitter at [@adamgazz](https://twitter.com/adamgazz). Dr. Gazzaley, thank you so much for joining us on Conversations on Health Care today.

Dr. Adam Gazzaley: My pleasure, it was lot of fun.

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Mark Masselli: At Conversations on Health Care we want our audience to be truly in the know when it comes to the facts about health care reform and policy. Lori Robertson is an award-winning journalist and managing editor of FactCheck.org, a non-partisan, non-profit consumer advocate for voters that aim to reduce the level of deception in U.S. politics. Lori, what have you got for us this week?

Lori Robertson: We looked back at the most noteworthy false claims about science in 2016 and several concerned health issues. For instance, during a Congressional battle over funding to combat the Zika epidemic Senate Minority Leader Harry Reid falsely claimed that Zika "affects everyone," because recent research found that it "causes people to go blind." Temporary vision impairment is a symptom of Zika but no adult has gone blind because of the virus. Democratic Presidential Candidate Hillary Clinton said that you can't do any research about marijuana because it's a Schedule 1 drug. That's false. Schedule 1 classification makes it difficult to conduct research on a substance but not impossible. Senator Jim Inhofe falsely claimed in November that a new report confirms that fracking has not impacted drinking water

in Wyoming. The industry funded report couldn't reach a firm conclusion due to a lack of water quality data before oil and gas exploration. Louisiana representative Ralph Abraham claimed in June that thousands of studies refute the US Environmental Protection Agency's conclusion that ground level ozone exacerbates asthma attacks. That's false too. A link between ground level ozone and asthma exacerbation is well-documented in the scientific literature which both the American Lung Association and the World Health Organization acknowledge. And that's my fact check for this week. I am Lori Robertson, Managing Editor of FactCheck.org.

Margaret Flinter: FactCheck.org is committed to factual accuracy from the country's major political players, and is a project of the Annenberg Public Policy Center at the University of Pennsylvania. If you have a fact that you would like checked, email us at [www.chcradio.com](http://www.chcradio.com). We will have FactCheck.org's Lori Robertson check it out for you here on Conversations on Health Care.

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Margaret Flinter: Each week, Conversations highlights a bright idea about how to make wellness a part of our communities and everyday lives. When long time IBM executive Sharon Linder left the corporate world she thought she would ease into semi-retirement, but then breast cancer diagnoses for her mother and two sisters shifted her focus. She watched as all three of them went through multiple surgeries and treatments wearing the ubiquitous Johnny, the hospital gowns that tie in the back and leave patients often feeling vulnerable and exposed.

Sharon Linder: The hospital gown was never meant to close in the back, it was meant to make it easy for you to go to the john. So when you put it in the front it really doesn't close. You know I think that the traditional hospital gown takes away your identity and comfort, two things that are really important when you are advocating for yourself.

Margaret Flinter: The former corporate executive decided that the one in eight women going through breast cancer treatment needed a power suit of their own to navigate this challenging experience and she launched her own research project into which fabrics and which designs might provide a better alternative to the standard hospital gown.

Sharon Linder: We came up with a fabric that you know you would throw in the washer and drier for like two weeks nonstop and it came out beautifully. So the fabric we came up with isn't a [inaudible 23:27] fabric but it's a knit so the feel of it is very much like a cotton cashmere that is just so soft you just don't want to take it off.

Margaret Flinter: She called her invention Janes as opposed to Johnny, creating a gown that thousands of users have called comfortable, stylish and a vast improvement from their predecessors.



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Sharon Linder: And they fit people in a comforting way. You are totally covered. It's a little V-neck crossover at the very top and it goes all around your body.

Margaret Flinter: And she developed a gown in time for her own cancer diagnosis and was able to see her invention put to her own good use.

Sharon Linder: Janes did give me really a leg up. I think that I felt better about all of my treatments just feeling like I looked better. When you think you look better you feel better.

Margaret Flinter: Dozens of hospital systems across the country are adopting her gown design, which you can also order online for women who have received a recent diagnosis of breast cancer, and even nursing mothers are using her product. Janes, a hospital gown designed for enhancing the female patient experience, providing comfort, dignity, easier access during challenging procedures, or just providing an easier experience for newly breastfeeding mothers, now that's a bright idea.

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Margaret Flinter: This is Conversations on Health Care. I am Margaret Flinter.

Mark Masselli: And I am Mark Masselli, peace and health.

Conversations on Health Care, broadcast from the campus of WESU at Wesleyan University, streaming live at [www.wesufm.org](http://www.wesufm.org) and brought to you by the Community Health Center.