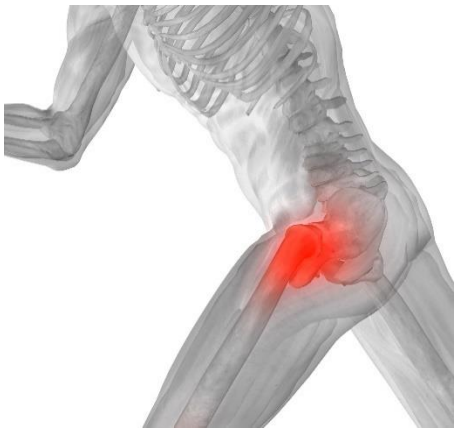
Private Practice Doctors
Preserving Personalized Care

Private Practice Doctors Newsletter

Consider this futuristic and not so futuristic scenario

Step 1: Symptom check: You have been having hip pain for a while, but it just does not seem to be getting any better despite over-the-counter medication and some rest. You go to the symptom application on your smartphone, perhaps from the National Institute of Health or your current insurance company. You quickly



zoom in on hip pain and answer the extensive questionnaire. The symptom app, with programmed learning based on over 100,000 cases of hip pain, statistically determines treatment options for your hip pain. The symptom app augments its learning with data from several other databases including: a) your pharmacy records for purchases for Advil, b) the length of time you have been reviewing articles related to hip pain on the internet, c) medical forums for any data you may have entered and d) data on your health from a national database of physician visits. Collating the data, the program has decided you need an MRI.

Step 2: Diagnosis: You accept the recommendation that you need an MRI and, upon acceptance, you continue with an electronic scheduler associated with the symptom app. Knowing your insurance plan and your location, the electronic scheduler gives you a list of MRI facilities in your area complete with reviews, the

charge at each facility and how much you will owe after your insurance coverage; your MRI has already been pre-approved. You select a facility based on your choices and a schedule populates the web page. You select a time and a place and then answer whether you would like to have an Uber/Lyft type driver bring you to and from the appointment. You answer yes. Now your initial task is complete.

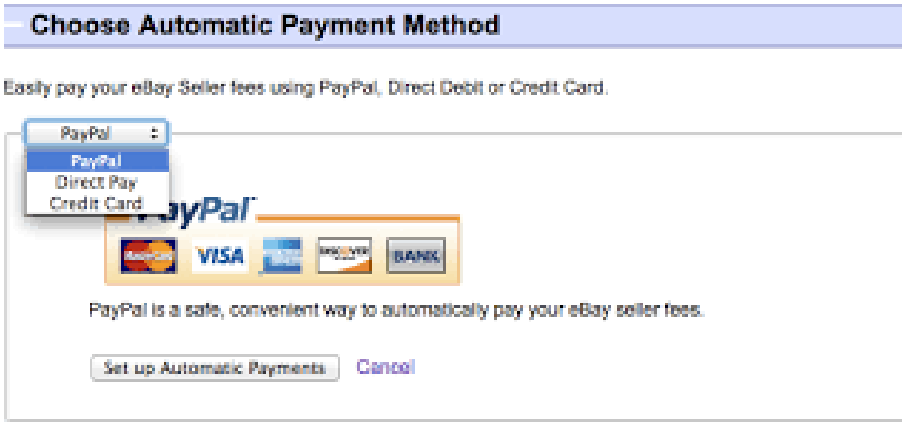
Step 3: The MRI procedure: Your scheduled medical Uber car picks you up and takes you to the facility for your MRI. You present your barcode information on your smartphone at the front desk kiosk and you are automatically checked in. Your technician comes out and greets you and you are placed on the scanner. There is no paperwork to complete because your information has all been preloaded into the computer. Once your test is complete you change back to your regular clothes. By the time you are dressed, a computer has read your scan and the recommended course of action is awaiting you on your phone: a hip replacement.

Step 4: Treatment: To schedule your hip replacement, you click the accept button provided by the electronic app. A list of "approved" orthopedic surgeons in your area and on your health plan immediately populate the page. Once more, reviews, costs after insurance and affiliated hospitals are listed to aid your decision making.

A FAQ (frequently asked questions) page is available to provide you with answers to the most commonly asked questions. The ability to "chat" with a "personal

assistant" is also provided by the smartphone app. Should you be hesitant about having a hip replacement, alternate treatment options are posted along with the probability of success of each option.

Both your pre-operative visit and hip surgery are scheduled using the "app." In additions, your medication list is imported from a national pharmacy database. Costs are determined prior to surgery and you select from among several payment



options including direct payment from your bank, credit card or PayPal. You are "medical Ubered" to your hip surgery. You are greeted by the technician and ushered to a hospital bed which is robotically moved into the surgical suite. Your personal hip has been "printed" with a 3D printer using measurements from your MRI. Your robotic surgeon, assisted by a human "for safety" (similar to airline pilots), performs the procedure. You are monitored by computer during surgery and in the post-operative care area.

Step 5: Post-surgical care: The computer determines your after-care plan and time of discharge. As part of your recovery, you are entered into a local rehabilitation program. Your progress is documented as you go along. Once you finish the program, you are ready to resume all activities.

Some may find this scenario a little simplistic, others may find it unrealistic. But in actuality, much of this technology is either possible now or just on the horizon.

Happening Now

Analyzing Data: Mount Sinai School of Medicine has a project called Deep Patient that goes through reams of health care data from EMRs to predict disease risk. With Deep Patient 700,000 EHRs were fed into a computer, which combined the data to make variables to analyze risk.

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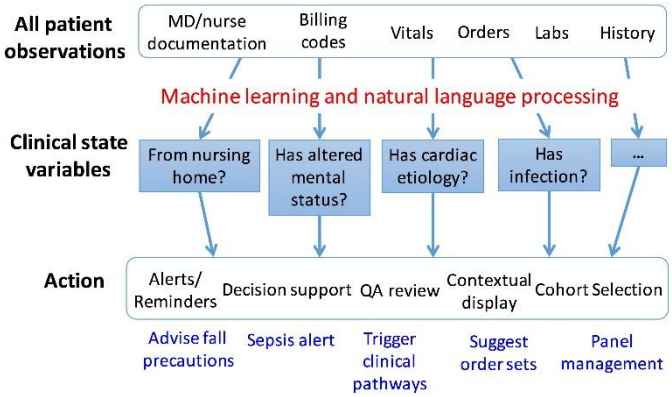
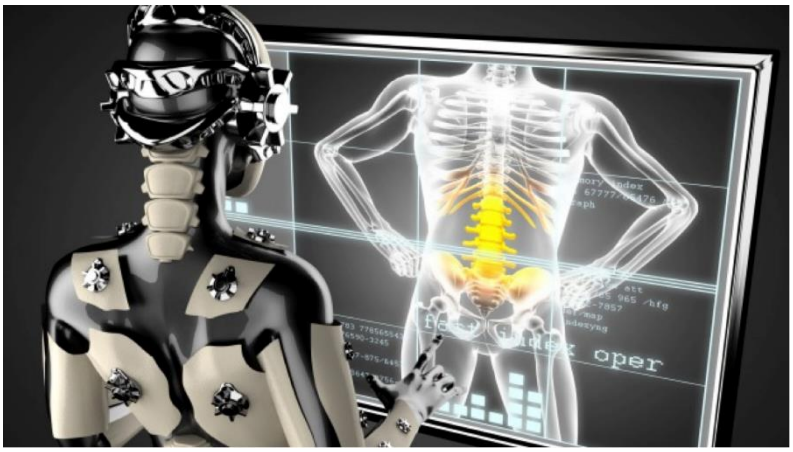
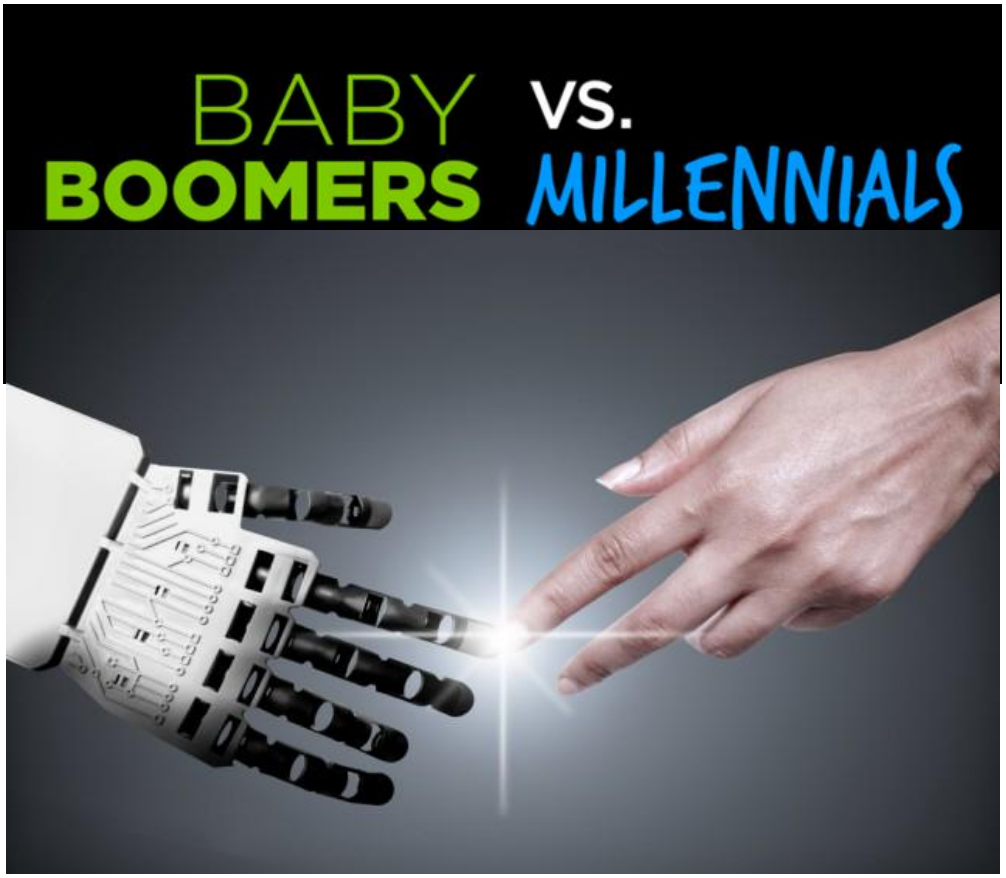


Computers and radiology: If you think that radiologists are indispensable for reading films, think again. In August 2017, researchers published data from a study that used more than 1000 x-rays to train a deep learning network to detect tuberculosis. The network became almost 100% proficient.

Therefore, if asked the appropriate questions, why couldn't an Apple or Android application determine the necessity of a hip MRI from a list of questions? Is it such a stretch to believe that computers, in the not-too-distant future, could read MRIs of the hip as well as they could a chest x-ray for tuberculosis? Once read, it would be simple for a computer to assess the latest literature and refer the patient for physical therapy, or an injection or surgery depending on the results.



AI vs. humans: Such all-knowing technology, in many cases, is not ready for tomorrow. We live in the early transition period where the expectations of baby-boomers reflect the old and the expectations of millennials reflect the new. The



younger the individual, the higher the expectation of computer interaction. We are at the turning point where AI (artificial intelligence) is just starting to be more accurate than physicians' judgements. It was not long ago that Deep Blue beat Garry Kasparov in chess (1997).

Researchers at John Radcliffe Hospital in Oxford, England developed AI diagnostics that were more accurate than doctors at diagnosing heart disease. At Harvard, AI using a "smart microscope" detected potentially lethal blood infections and sorted them with 95% accuracy.

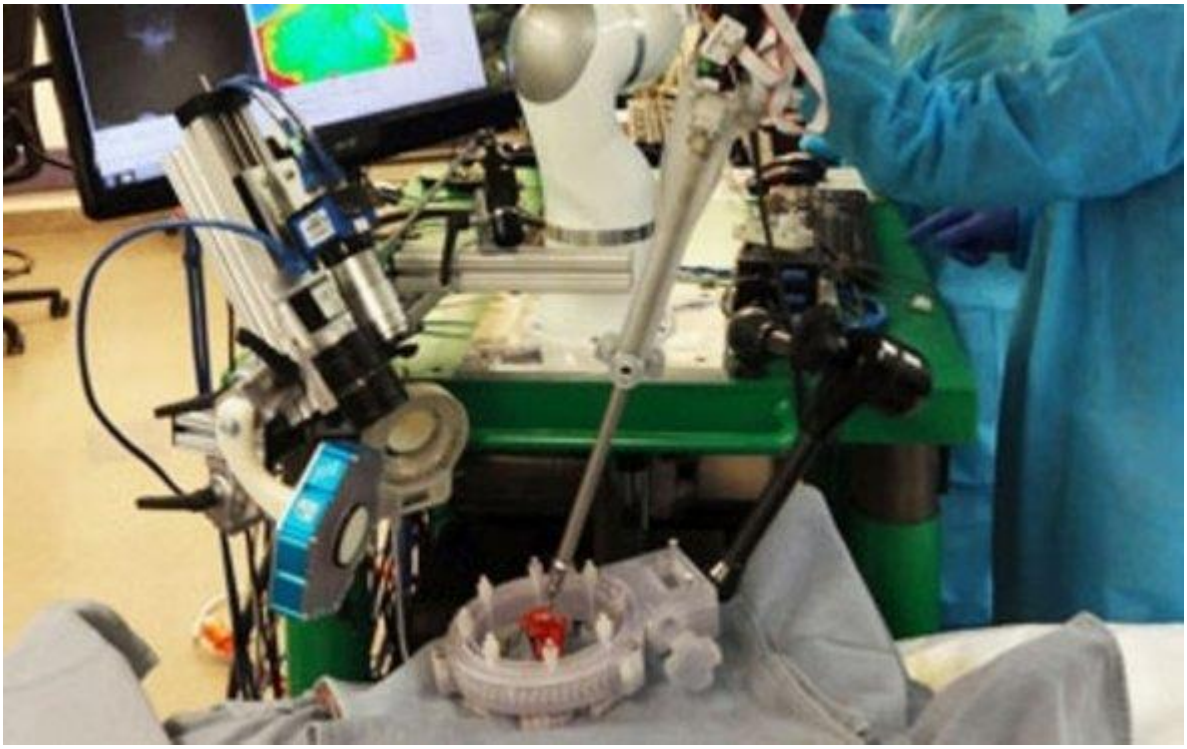
In Japan computer aided endoscopy revealed signs of potentially cancerous growths with 94% sensitivity. IBM's Watson was matched against human experts to obtain information from the genetic data of tumor cells. The humans took 160 hours to review and give recommendations for treatment. Watson took 10 minutes.

In this transition period, I believe you will hear such phrases as "the value of AI is to augment humans and not replace." This will be, in my opinion, to calm healthcare professionals and patients unaccustomed to an AI interface. As time goes by though, it is easy to see more and more functions being turned over to AI as computer accuracy improves.

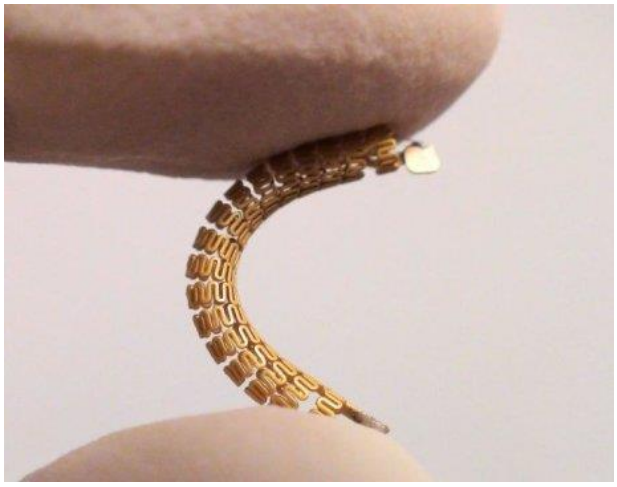
Surgery and AI: Even actual procedures may come under an AI care. Currently, surgical robots function as an extension of the human operator, with the human at the controls of a console. In 2015, MIT did a retrospective analysis of a decade of robotic surgery. There were 144 deaths and 1391 injuries from technical difficulties and device malfunctions with robotic surgery. The vast majority of the cases were successful. With time these numbers will surely improve. As technology advances there should be no reason that robotic assistance should not move to robot independence. In a robotic surgery breakthrough in 2016, a bot stitched up a pig's small intestine using its own vision, tools and intelligence. Even more important, the performance was better than the human performance. In this experiment, researchers placed markers, which fluoresced under infrared light,

in the intestinal tissue. The computer imaging system tracked their positions down to the millimeter during surgery. The robot then developed and adapted its suturing approach which was a combination of knots and running stitches. The programmers had placed in the computer the ideal suturing practices including spacing and tension.

Therefore, in the not too distant future, the concept of augmenting a surgeon or radiologist will easily transition to supplanting a surgeon or radiologist. If you are skeptical, be so at your own risk.



Coming to a hospital near you: Let me hit you on another development that is probably out of your field. University of British Columbia electrical and computer engineers have developed a type of "smart stent" that monitors subtle changes in the blood flow through an artery, detecting the narrowing in its earliest stages. In plain English, say you have coronary artery disease, one of the most common diseases there is. You have a narrowing and a coronary artery stent is placed. Soon you will be able to have a stent that monitors blood flow to look for problems such as restenosis, before there is a problem.



You want another example, asthma is a very common disease that affects 25 million Americans. Most people don't realize they are having a significant attack until their flow measurements are significantly decreased. ADAMM is a wearable technology to identify attacks before the wearer notices symptoms. The device is a patch with cough counting, respiration, wheeze and heart rate monitor and provides notifications and inhaler detection. Oh, it's already available.

Ethics 101: If you think some of this technology is not already seeping into mainstream care, think again. Dr. David Feinberg is president and CEO of Geisinger, a health service organization for 3 million people in Pennsylvania and New Jersey. He announced that DNA sequencing will be offered to every

Geisinger patient, at no cost to the patient. This will allow recognition of many heritable diseases. But it should also raise privacy issues. Who will be in charge of your DNA sequences and who will have access to data? What will be the ramifications if a problem is found that has a certain probability of occurring? Let's say you are 70 and have a 90% chance of developing Alzheimer's by genetic testing, would an insurance company still cover a coronary bypass if you need it? Would you be considered "cost effective" for the latest breast cancer treatment?

The more we talk about the future, the more we are hopeful that all these new technologies will improve our lives. But what about the downsides? As we are able to do more and more genetic manipulation, we are going to have large ethical issues to deal with.

Primate Cloning: Should human beings be cloned? Recently, Chinese scientists cloned two female Macaques. It was the first time primates have been cloned using somatic cell nuclear transfer.

For somatic cell nuclear transfer, scientists implant the nucleus from a cell of the animal being cloned into a donor egg. That egg is then exposed to an electric current, which causes it to develop into an embryo that can eventually be carried by a surrogate.

Under previous techniques, a maximum of four clones were possible, this technique allows unlimited number. Scientists "claim" to not want to claim

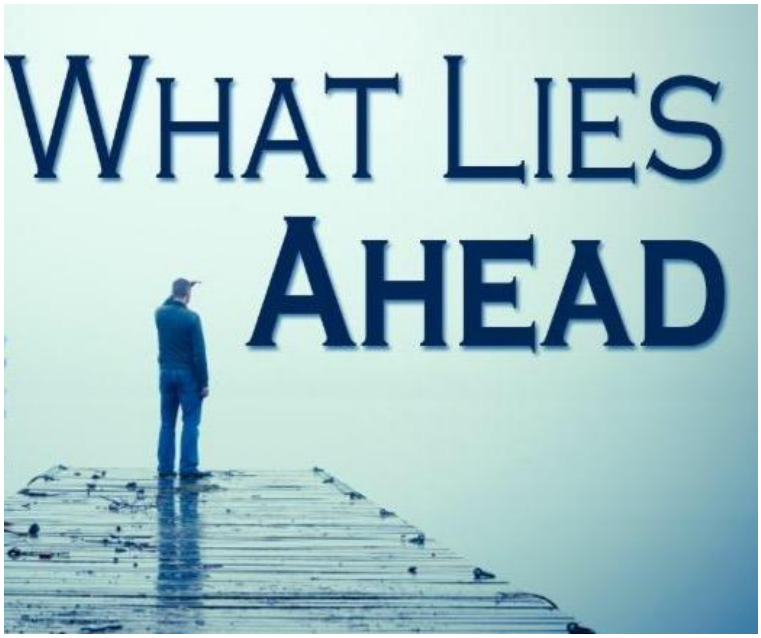
humans, but all the obstacles appear to have been removed. Look, none of us should be so naïve to believe that when a profit or life-saving motive is introduced, someone will not take advantage. Think about the prospect of creating a "shell body" to harvest organs. In this scenario, a wealthy or powerful individual keeps a cloned body, or shell, available so that organs can be harvested as they become necessary. The US can legislate all it wants in this regard, but overseas avenues of abuse become ripe for the pickings.

Chimeras: Animal human hybrids are beginning to occur under the guise of needing human organs for transplant. In early 2017, a pig embryo was injected with human cells early in its development to test the feasibility of this process.

Recently, researchers have proven that sheep embryos could be created with human cells. The embryos were not allowed to develop past 28 days in this instance. Evidently, there was some ethical consideration established 28 days as the cut-off. But why is 28 days more ethical than 29 or 129 days? Where is the cutoff? What is the status of these part human creatures?

These part animal-part human embryos are known as chimeras. Researchers isolate the stem cells of one animal which can develop into any cell type in the body. They then inject those stem cells into a different species. If the embryo's DNA is "hacked" so that a particular organ does not grow, the other animal's cells will be used to make that organ. So, for example a human liver could grow in living pig. The US National Institutes of Health currently forbid public funding of

human-animal hybrids. That did not seem to stop the race to perform this experiment. While laws can be written, given sufficient profit, these same laws can be easily ignored. We are having a terrible time controlling nuclear technology which is not public.



The future, as is always the case, is filled with some amazing possibilities and many potential disastrous pitfalls. How we handle them can surely affect the future of healthcare and humanity.

We hope you enjoy our newsletters. We try to explore new ground with each issue. Whether it is an analysis of current healthcare laws, ways to make your practice grow or exploring the future, Private Practice Doctors is a source of information and savings. We encourage you to go to our website or call us to investigate all opportunities.

If you have any comments on the newsletter write me at reed.wilson@privatepracticedoctors.com

If you have any interest in our services just write Sarah at sarah.wilson@privatepracticedoctors.com