One.

The first of April has a small share of notable birthdays for physicians, scientists, and others who impacted the human condition. A name that rings a bell is William Harvey (1578) shown above. This English physician
produced the first accurate description of the function of the heart and circulation of the blood in his book, *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus* [Painting attributed to Daniel Mytens, 1627. National Portrait Gallery London] Predecessors back to the time of Galen had gotten the physiology wrong, but Harvey was forgiving in his discovery, telling students: “Not to praise or dispraise other anatomists, for all did well, and there was some excuse even for those who are in error.” French mathematician Marie-Sophie Germain (April 1, 1776) produced pioneering work in elasticity theory and Fermat’s Last Theorem. Bismarck (1815) and Rachmaninoff (1873) came along as April firsters in the 19th century. Joseph Murray (April 1, 1919 - November 26, 2012) was a plastic surgeon and close friend of my old professor at UCLA, Willard Goodwin. When I was a resident I naively thought Joe was somewhat out of his league in his yearly travel group of old friends that included Goodwin and Robert McNamara, until Joe got the Nobel Prize for his work with renal transplantation.

[Above: Joe Murray visiting UM & young faculty member out of his league. Below: 2 legendary Michigan coaches – Steve Fisher & Bo Schembechler]
Bo Schembechler (April 1, 1929 - November 17, 2006) is, of course, legendary for us at the University of Michigan. More controversial is Abdul Qadeer Khan (April 1, 1936), a Pakistani physicist who disseminated nuclear weaponry to rogue nations of the world.

Unlisted so far in the Wikipedia tallies for April first birthdays is Paul Kalanithi (April 1, 1977 - March 9, 2015), author of a current best-seller *When Breath Becomes Air*. Finishing residency in neurosurgery at Stanford the author discovered he had metastatic lung cancer. The book has a simple structure: a prologue, Part One *In perfect health I began*, Part II *Cease not till death*, and then an epilogue by his wife Lucy.

We each quietly contemplate deeply personal questions related to what might be described as the meaning of life, but circumstances gave Kalanithi urgency to come to some resolution. He exposes his thoughts with literacy and without self-pity. The meaning of life he discovered for himself lay in what he called *human relationality*. The context of one’s life is what matters, he believed, and it is from relationships with others that we derive meaning. Physicians and other health care providers should have a head start in the personal search for meaning, if you accept Kalanithi’s view, although many don’t understand that advantage. A spiritual person at the end of life may derive comfort from a religious faith or from a faith in the order of the universe and, perhaps, a reassuring sense of the circle of life as the Lion King said. On the other hand a cynical person might claim that faith is only a hoax we play upon ourselves and that each of us should grab whatever we can before our individual turns at life are over. No one can genuinely tell anyone else what the truth actually might be, we each must figure it out for ourselves. That individual worldview is what makes each of us what we are, each of our presidential candidates what he or she is, what the pope is, what El Chapo is, and it made Paul Kalanithi what he was.

**Two.** Happy New Year.

For reasons lost in the deep recesses of history, the first of April has become a day for harmless pranks and hoaxes. April was the first full month of the new calendar year until only a few centuries ago. In Europe and during the Middle Ages March 25 was considered New Year’s Day. Possibly the natural human bent for trickery consolidated around that yearly transition. Japan begins its new year on the first of April and for this reason Dr. Takahiro Osawa and his family now return to Sapporo after 2 productive years with us in Michigan. We will miss him.
Taka tells me that April pranks are also a tradition in his country. April foolery has endured around the world since first alleged references in Chaucer's *Canterbury Tales* in 1392.

Exactly 40 years ago (1 April 1976) during a BBC broadcast English Astronomer Patrick Moore predicted that a “Jovian-Plutonian gravitational effect” would cause a noticeable short-term reduction on Earth’s gravity. At 9:47 AM on that day (GMT), he announced, a momentary alignment of Pluto and Jupiter would decrease Earth’s gravity such that those who jumped into the air at that moment would experience a floating sensation. Soon thereafter, BBC received hundreds of calls from people who claimed to have had felt the effect. The story was revealed to be a hoax, but Moore was a believable prankster and 4 years later he co-authored a totally factual book on Pluto with Clyde Tombaugh, who had discovered the dwarf planet in 1930.
The idea of fluctuating gravitational fields was prominent in Kurt Vonnegut’s book *Slapstick* (published in 1976, the same year as Moore’s hoax) and if you notice cyclic patterns in human behavior you might find some validity in Vonnegut’s satirical hypothesis. A prediction 100 years ago along a similar line was made by Albert Einstein. Stemming from his theory of general relativity he predicted the idea of gravitational waves that could transport energy in the form of gravitational radiation. Hypothesis rather than hoax, it took a full century to prove this idea. On February 11, 2016 the LIGO and VIRGO Collaboratives announced discovery of a gravitational wave from a pair of black holes that spun into each other 1.3 billion light years away. The wave passed by the Earth this past September 14 when it was noticed initially by Marco Drago, a 33-year old Italian Physicist in his office at the Max Planck Institute in Hanover, Germany. [A. Cho. *Science*. 351:797, 2016] Teams and collaborations of thousands of people spent over 100 years seeking a gravitational wave, although Drago was the first to notice the anomalous signal, and even then his first thought was that it was a glitch or a trick.

Our ability to sort out truth from myth, stories, hypotheses, hoaxes, science fiction, propaganda, and blatant deceit is constantly being tested. April Fools’ Day offers a playful “reset button.”
Winter is officially over and while we did have some cold days, it wasn’t quite as cold or snowy as my memory tells me it used to be. Of course all things change and many of them cycle, whether sunspots, seasons, or climate. It is no hoax, though, that the Earth is in a warming spell and that anthropomorphic effects on the planet are driving that and other detrimental changes. Curiously, large swaths of the population, including many elected leaders in our nation, deny the fact of significant environmental change due to human influence.

Earth, with a volume of $2.6 \times 10^{11}$ cubic miles and a mass of $1.3 \times 10^{25}$ pounds, is the densest planet in the Solar System with a mean density of 0.2 pounds/cubic inch (5.5 grams per cubic centimeter). While the origin of planetary water is still unknown and it seems so vast, its $3.3 \times 10^9$ cubic miles represents only 0.0013% of the earth’s volume, merely a thin wet veneer over part of Earth’s surface. (1 cubic mile = 1.1 trillion gallons)
The image above comes from the USGS website (Water Science School). The big blue sphere represents all of earth’s water, the smaller sphere over Kentucky represents total fresh water, and the tiny bubble over Atlanta estimates the fresh surface water in lakes and rivers – this being what most of us 7 billion earthlings have available for drinking or washing. [Credit: Howard Perlman, USGS; globe illustration by Jack Cook, Woods Hole Oceanographic Institution © Adam Nieman.] Ice caps, glaciers, and permanent snow account for 5,773,000 cubic miles or a little less than 5.8 x 10^7 m³, or 17.6% of the earth’s total water.

During the last ice age, when Michigan was a mile deep below the Laurentide Ice Sheet, sea level was about 400 feet lower than it is today. At the other extreme, if all land and sea ice melted the ocean level would rise 70 meters or 230 feet. However you choose to describe it, the environment is changing rapidly and dangerously due to the heavy human footprint. This is no hoax or conspiracy.

A fragment of a speech from John F. Kennedy has resonated with me throughout my adult life: "For in the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's futures. And we are all mortal." I recently asked my colleague and Kennedy scholar Kevin Loughlin for the origin of the quote and he immediately referenced Kennedy’s American University speech (titled A Strategy of Peace) on June 10, 1963. The president at the time had only a little more than 5 months to live. Flawed no more or less than most presidents or the rest of us, JFK did have inspiring intellect, clarity, and a way with words.
In April 1985 my family and I had been in Ann Arbor for less than a year. Having accepted the job here as an associate professor (without tenure) I was still getting over the sting of finding myself demoted to assistant professor by the Medical School Executive Committee after arrival, but that’s another story. The Section of Urology was a terrific environment, Ed McGuire was a great boss, pediatric urology at Michigan was going well, and I loved my colleagues here in the medical school. The community was an excellent fit for Martha and our children, and we quickly found great friends. I distinctly remember the hoopla about a local restaurant, the Pretzel Bell, closing that April. This picture below from the old Ann Arbor News (used recently in Michigan Today) shows people lined up for an auction of Pretzel Bell memorabilia, necessitated by the IRS because of fraud related to employee withholding taxes. The article in Michigan Today by James Tobin explains that the original proprietors, John and Ralph Neelands, hung an old bell, said to have dated back to Civil War times, in the tavern. The story went that Fielding Yost had come to own the bell and gave it to the Neelands, after ringing it at Ferry Field. Ann Arbor has a rich German history and German university beer gardens traditionally featured two signs of hospitality – a bell to call in neighbors and a basket of pretzels.

New ownership and management is resurrecting the Pretzel Bell and it should reopen soon to delight a new era of aficionados as well as old timers, for whom the name will ring a bell.
The University of Michigan has two bell towers (the original and the one on North Campus). The Bell Tower Hotel, across from the original, was the first place I stayed in Ann Arbor, when Ed McGuire invited me in 1983 to look at a pediatric urology job. A key predecessor of mine in the job had been Ed Tank, and his next-door neighbor back then, Dennis Dahlmann, now owns the hotel and has turned it into quite a gem. Ed Tank has retired in Portland, Oregon after a great career in our field. His excellent surgical results, the trainees he inspired, his academic productivity, and his organizational leadership constituted an extraordinary and admirable career. Ed’s successor in Portland, Steve Skoog, had been my resident at Walter Reed and is now a close friend and colleague. The coincidences in life are often beautiful.

[Above: Bloom & Tank. Below: Skoog and Dennis Peppas, former student of mine at USUHS, now pediatric urologist University of Texas, San Antonio]
A flawed general assumption in the business world is that an organization can be run, optimally, by cost-based accounting. If, in fact, all decisions could be based on numbers (metrics, as it is often said) then a good computer could replace all managers. Businesses, however, run based on people, relationships, and their stories at least as much as any numbers. Alon Weizer referred with irony to his excellent efforts at managing the Cancer Center ambulatory care unit (the largest in the UM Health System.): “it is easier to manage by metrics, rather than digging down into the stories behind them.” Of course we cannot ignore numbers and have to pay attention to them, they are a key part of our information intake, but they are hardly the only form of our intelligence. The idea of running a business from the central organizing principle of managerial cost-based accounting, rather than managing it according to mission, customer-based deliverables, and lean-centric employee engagement has been a damaging conceit of 20th century industry. Yet, paradoxically, just as managerial accounting is phasing out of forward-thinking businesses as the central operational paradigm, it has been colonizing the brains of health care system managers. At our Urology Department Retreat 2 days ago, we grappled a bit with the importance of financial margin and the need to defend and expand our markets on one hand, but with the central values of mission and essential deliverable (kind and excellent patient-centered care) on the other hand.
David Spahlinger got us started at noon with an overview of our health system reorganization and urgent strategies. Marschall Runge closed the program around 6:30 with a lively Q & A session. Our health system and medical school are fortunate to have great top leadership at this point in time.

Six. We need leadership but too often find odd characters coming forward offering their services to take charge of our governments and more immediate organizations. Having studied and experienced great and poor leadership I’ve become somewhat cynical of those who have a pressing need to lead me. The cautionary tale of the Bellman is fitting. He was the captain of a ship’s crew in Lewis Carroll’s *The Hunting of the Snark*. His map of ocean (a blank paper) and contradictory navigational orders did not inspire his crew, but his rule of three (“What I tell you three times is true.”) helped lead them into strange territory. Sometimes it feels like this for those of us taking care of patients in large health care systems.
Lewis Carroll, a mathematician, delighted in nonsense and intellectual pranks and he no doubt relished that irony. The beauty of math and science is their pursuit of verifiable truth. Bellmanism may work well in primitive societies, but it fails in free, just, and scientifically-educated societies. A modern bellman can say whatever he or she wants, as many times as they want, but for the rest of us to accept a claim, verification or proof is necessary. *Trust but verify,* is the adage we often hear. Scientists are rigorous about this way of thinking.

Thinking about statements and proofs, a long time ago Pythagoras proved that $a^2 + b^2 = c^2$ for any right-angled triangle and most of us not only remember this is true, but we can actually prove it by a few examples or tests. A French lawyer and mathematician, Pierre de Fermat (1601-1655), asked himself: if $a^2 + b^2 = c^2$ then can this be true for higher integers; in other words does $a^3 + b^3 = c^3$ and is this equation generalizable for all powers? Fermat thought not and his conjecture was written in the margin note of a book in 1637, but his proof was apparently not recorded although he must have convinced himself that Pythagoras’s hypothesis only holds for
special cases (like the number 2). For more than 350 years other mathematicians, including Marie-Sophie Germain, tried to figure it out, but failed until Andrew Wiles successfully proved Fermat’s conjecture in 1994.

Medical practice aspires to evidence and logic over Bellmanism. Nevertheless, much of what we do has to find a balance within a Pythagorean triangle of decision choices. On one side we rely upon our personal training and individual experiences. Another side (with far fewer options) offers evidence-proven therapeutic choices. The third side entices us with cutting-edge innovations. In the fast action of clinical practice we will usually default to the hypotenuse of our training and experience. The reality of clinical practice today falls short of the math; that is present-day clinical evidence plus cutting edge innovative technology does not equate to individual training, experience, and reason. Yet while this larger side may be our first resort, we need to condition ourselves and our students to remain self-critical and vigilant for old faulty dogma and new ideas that are better.

[\(a\) = cutting edge innovation, \(b\) = verifiable high level evidence, \(c\) = training & experience]

**Seven.** What are the big questions in health care? As health care in this country undergoes significant changes, dictated by a variety of forces, it may be useful for us to consider health care *not* in the context of metrics (e.g. RVUs, length of stay, and cost per case), but rather in terms of our basic expectations and values. If most citizens and practitioners can understand and agree upon the larger questions of health care, the answers and the structures to provide them may come to us more readily. I don’t think it should be up to any one subset of “the experts” to tell us the
questions, for after all, that’s a sort of Bellmanism. The key questions should be derived more broadly, they do not belong solely to universities, medical schools, or schools of public health. They do not belong to state or governmental legislative or regulatory agencies. They do not belong to the AMA, the ACS, the AUA. They belong to the public – to citizens, patients, health care providers. My first loyalty lies within the last broad categories as a citizen, patient, and physician – memberships that convey measures of authority in offering, just now, a set of basic questions for our collective consideration. Whether these are the right questions is a matter for you to consider. What among them is right, what is wrong, and what is missing?

- What is health care?
- How should it be provided?
- How is it improved and how does innovation occur?
- How is it taught?
- How is it funded and how are escalating costs managed?

**Eight.** While there may be no simple solutions for these questions, and whereas the “devil is in the details” clarity can be found in their deliberate articulation and informed public discussion. The first question is deceptively simple, but what of "health care" is a public good and in the public interest? Certainly vaccination for dangerous diseases, TB surveillance and therapy, mosquito control, and Ebola management should be public goods. When is health care screening – screening for TB, hypertension, or malignancies (which malignancies) – in the public interest? What basic commodities of health care must be assured to the public (to assure the public health) and what are the discretionary choices that should be paid for by the responsible recipients of those services? And what about recipients who are incapable of such responsibility? Is not antenatal, obstetric, and well-child care in the public interest? Who should make these decisions?

The time-worn bogeyman of “socialized medicine” has seen its day; socialized medical care has a heavy footprint in today’s USA and its called Medicare, Medicaid, Tricare, and the Veterans Administration. Pressing questions are related to funding, equity, and scope of each of these systems. The present binary argument between a single payer system or an insurance-based model, in my opinion, is wrong.

A single payer system, while convenient from the point of funding and health policy, is fraught with many problems, among them being loss of
personal choice, dependence on politically-set budgets, restriction of innovation, and lack of competition. On the other hand, the idea of building an entire national health-care system on an insurance-based paradigm is faulty since basic health care (this first question, after all) is a complex life-long responsibility extending from antenatal months to the last days of life. Insurance for rare and unexpected catastrophes like liver transplantation, motor vehicle accidents, ALS, renal failure, and serious malignancy makes sense, but not “insurance” for expected life events such as childbirth, vaccinations, dental care, routine checkups, and screening for certain diseases. The bipolar choice could be compared to asking us to choose between the Post Office or Federal Express as the single national mail delivery service. Neither one alone would be a good provider. The competition between them and other delivery services makes each one leaner, more innovative, and more customer-centric. Health care of our population needs many avenues to be universal, fair, excellent, efficient, and innovative.

Nine. The epilogue to Kalanithi’s book, written by his wife Lucy, included one phrase that struck me: “Although Paul accepted his limited life expectancy, neurologic decline was a new devastation, the prospect of losing meaning and agency devastating.” [p.203] Ultimately, for most of us, those two things are what life boils down to – the meaning we find in life and our agency to do things that are meaningful to us and to others. Meaning is our ability to make sense of things. Sense-making may be a matter of simple practicality, knowing for example that 1+1=2, or it may be the more existential making-sense of our lives. Kalanithi made fine sense of his shortened existence. Lucy Kalanithi ends her epilogue in the book powerfully enough to make your eyes well up: “Paul’s decision to look death in the eye was a testament not just to who he was but who he had always been. For much of his life, Paul wondered about death – and whether he could face it with integrity. In the end, the answer was yes. I was his wife and a witness.” [p.225]

The content, style, and literacy of Kalanithi’s book makes it compelling and readable. Coincidentally, the book is visually accessible because of its typeface, which is called Bell, after John Bell (1745-1831) who produced the original design, described as: “a delicate and refined rendering of Scotch Roman” at the book’s conclusion (above quotation is bold Bell MT font on my computer, although via email or the WordPress blog site, deformation is expected).
Cancer, sectarian violence, motor vehicle trauma, and heart disease remain high on the list of the Grim Reaper’s tools. Nearly 400 years ago last month (March 31, 1631) the cleric and poet John Donne died, from stomach cancer it is believed. Born in 1572, 6 years before Harvey, Donne grew up and lived his 59 years through difficult times amidst terrible sectarian conflict that makes our recent western paradigm of separation of church and state so praiseworthy. During the reign of Elizabeth I (1558 - 1603) the Recusancy Acts, beginning in 1593, imposed punishment on those who didn’t participate in Anglican religious activity, extending to imprisonment and capital punishment. (These laws were ultimately repealed in 1650, although restrictions against Roman Catholics lasted in England and Wales until full Catholic Emancipation in 1829.) Donne’s parents were Roman Catholics, but the father died when he was four and John’s mother married a wealthy widower, Dr. John Syminges. Donne studied in Oxford and Cambridge but never graduated with a degree as he was unwilling to take the Anglican Oath of Supremacy. He then studied law in London. Donne’s brother Henry, a university student, was arrested in 1593 for harboring Catholic priest William Harrington. Under torture Henry betrayed Harrington who was tortured, hanged, and disemboweled in 1594. Henry Donne died in Newgate Prison of bubonic plague.
John Donne became an Anglican minister, Dean of St. Paul’s, and a poet. (His interesting later years were chronicled by Izaak Walton, author of the first book on fly fishing.) What’s relevant from Donne is Meditation XVII in *Devotions upon Emergent Occasions* that included this familiar phrase that is linked to Kalanithi’s idea of human relationality: “No man is an island, entire of itself; every man is a piece of the continent, a part of the main. If a clod be washed away by the sea, Europe is the less, as well as if a promontory were, as well as if a manor of thy friend's or of thine own were: any man's death diminishes me, because I am involved in mankind, and therefore never send to know for whom the bell tolls; it tolls for thee.”

Thank you for reading *What’s New* and *Matula Thoughts* for this April 1, 2016.

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