

The art of medicine

Neuron overload and the juggling physician

Patients often complain that their doctors don't listen. Although there are probably a few doctors who truly are tone deaf, most are reasonably empathic human beings, and I wonder why even these doctors seem prey to this criticism. I often wonder whether it is sheer neuron overload on the doctor side that leads to this problem. Sometimes it feels as though my brain is juggling so many competing details, that one stray request from a patient—even one that is quite relevant—might send the delicately balanced three-ring circus tumbling down.

One day, I tried to work out how many details a doctor needs to keep spinning in her head in order to do a satisfactory job, by calculating how many thoughts I have to juggle in a typical office visit. Mrs Osorio is a 56-year-old woman in my practice. She is somewhat overweight. She has reasonably well-controlled diabetes and hypertension. Her cholesterol is on the high side but she doesn't take any medications for this. She doesn't exercise as much as she should, and her last DEXA scan showed some thinning of her bones. She describes her life as stressful, although she's been good about keeping her appointments and getting her blood tests. She's generally healthy, someone who'd probably be described as an average patient in a medical practice, not excessively complicated.

Here are the thoughts that run through my head as I proceed through our 20-min consultation.

Good thing she did her blood tests. Glucose is a little better. Cholesterol isn't great. May need to think about starting a statin. Are her liver enzymes normal?

Her weight is a little up. I need to give her my talk about five fruits and vegetables and 30 min of walking each day.

Diabetes: how do her morning sugars compare to her evening sugars? Has she spoken with the nutritionist lately? Has she been to the eye doctor? The podiatrist?

Her blood pressure is good but not great. Should I add another BP med? Will more pills be confusing? Does the benefit of possible better blood pressure control outweigh the risk of her possibly not taking all of her meds?

Her bones are a little thin on the DEXA. Should I start a bisphosphonate that might prevent osteoporosis? But now I'm piling yet another pill onto her, and one that requires detailed instructions. Maybe leave this until next time?

How are things at home? Is she experiencing just the usual stress of life, or might there be depression or anxiety disorder lurking? Is there time for the depression questionnaire?

Health maintenance: when was her last mammogram? PAP smear? Has she had a colonoscopy since she turned 50? Has she had a tetanus booster in the past 10 years? Does she qualify for a pneumonia vaccine?

Ms Osorio interrupts my train of thought to tell me that her back has been aching for the past few months. From her perspective, this is probably the most important item in our visit, but the fact is that she's caught one of my neurons in mid-fire (the one that's thinking about her blood sugar, which is segueing into the neuron that's preparing the diet-and-exercise discussion, which is intersecting with the one that's debating about initiating a statin). My instinct is to put one hand up and keep all interruptions at bay. It's not that I don't want to hear what she has to say, but the sensation that I'm juggling so many thoughts, and need to resolve them all before the clock runs down, that keeps me in moderate state of panic. What if I drop one—what if one of my thoughts evaporates while I address another concern? I'm trying to type as fast as I can, for the very sake of not letting any thoughts escape, but every time I turn to the computer to write, I'm not making eye contact with Mrs Osorio. I don't want my patient to think that the computer is more important than she is, but I have to keep looking toward the screen to get her lab results, check her mammogram report, document the progress of her illnesses, order the tests, refill her prescriptions.

Then she pulls a form out her of bag: her insurance company needs this form for some reason or another. An innocent—and completely justified—request, but I feel that this could be the straw that breaks the camel's back, that the precarious balance of all that I'm keeping in the air will be simply unhinged. I nod, but indicate that we need to do her physical examination first. I barrel through the basics, then quickly check for any red-flag signs that might suggest that her back pain is anything more than routine muscle strain. I return to the computer to input all the information, mentally running through my checklist, anxious that nothing important slips from my brain's holding bay.

I want to do everything properly and cover all our bases, but the more effort I place into accurate and thorough documentation, the less time I have to actually interact with my patient. A glance at the clock tells me that we've gone well beyond our allotted time. I stand up and hand Mrs Osorio her prescriptions. "What about my insurance form," she asks. "It needs to be in by Friday, otherwise I might lose my coverage." I clap my hand against my forehead; I've completely forgotten about the form she'd asked about just a few minutes ago.

Studies have debunked the myth of multitasking in human beings. The concept of multitasking was developed in the computer field to explain the idea of a microprocessor doing two jobs at one time. It turns out that microprocessors are in fact linear, and actually perform only one task at a time. Our computers give the illusion of simultaneous action based on the microprocessor "scheduling" competing activities in

a complicated integrated algorithm. Like microprocessors, we humans can't actually concentrate on two thoughts at the same exact time. We merely zip back and forth between them, generally losing accuracy in the process. At best, we can juggle only a handful of thoughts in this manner.

The more thoughts we juggle, the less we are able to attune fully to any given thought. To me, this is a recipe for disaster. Today I only forgot an insurance company form. But what if I'd forgotten to order her mammogram, or what if I'd refilled only five of her six medicines? What if I'd forgotten to fully explain the side-effects of one of her medications? The list goes on, as does the anxiety.

At the end of the day, my mind spins as I try to remember if I've forgotten anything. Mrs Osorio had seven medical issues to consider, each of which required at least five separate thoughts: that's 35 thoughts. I saw ten patients that afternoon: that's 350. I'd supervised five residents that morning, each of whom saw four patients, each of whom generated at least ten thoughts. That's another 200 thoughts. It's not to say that we can't handle 550 thoughts in a working day, but each of these thoughts potentially carries great risk if improperly evaluated. If I do a good job juggling 98% of the time, that still leaves ten thoughts that might get lost in the process. Any one of those lost thoughts could translate into a disastrous outcome, not to mention a possible lawsuit. Most doctors are reasonably competent, caring individuals, but the overwhelming swirl of thoughts that we must keep track of leaves many of us in a perpetual panic that something serious might slip. This is what keeps us awake at night.

There are many proposed solutions—computer-generated reminders, case managers, ancillary services. To me, the simplest one would be time. If I had an hour for each patient, I'd be a spectacular doctor. If I could let my thoughts roll linearly and singularly, rather than simultaneously and haphazardly, I wouldn't fear losing anything. I suspect that it would actually be more efficient, as my patients probably wouldn't have to return as frequently. But realistically, no one is going to hand me a golden hour for each of my patients. My choices seem to boil down to entertaining fewer thoughts, accepting decreased accuracy for each thought, giving up on thorough documentation, or having a constant headache from neuronal overload.

These are the choices that practising physicians face every day, with every patient. Mostly we rely on our clinical judgment to prioritise, accepting the trade-off that is inevitable with any compromise. We attend to the medical issues that carry the greatest weight and then have to let some of the lesser ones slide, with the hope that none of these seemingly lesser ones masks something grave.

Some computers have indeed achieved the goal of true multitasking, by virtue of having more than one microprocessor. In practice, that is like possessing an additional brain that can function independently and thus truly simultaneously. Unless the transplant field advances

The printed journal includes an image merely for illustration

Graham Dean, *Small Echo* (2004)

drastically, there is little hope for that particular *deus ex machina*. In some cases, having a dedicated and competent clinical partner such as a one-on-one nurse can come close to simulating a second brain, but most medical budgets don't allow for such staffing indulgence.

As it stands, it seems that we will simply have to continue this impossible mental high-wire act, juggling dozens of clinical issues in our brains, panicking about dropping a critical one. The resultant neuronal overload will continue to present a distracted air to our patients that may be interpreted as us not listening, or perhaps not caring.

When my computer becomes overloaded, it simply crashes. Usually, I reboot in a fury, angry about all my lost work. Now, however, I view my computer with a tinge of envy. It has the luxury of being able to crash, and of a reassuring, omniscient hand to press the reboot button. Physicians are permitted no such extravagance. I pull out the bottle of paracetamol tablets from my desk drawer and set about disabling the childproof cap. It's about the only thing I truly have control over.

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Further reading

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Ofri D. *Medicine in translation: journeys with my patients*. Boston, MA: Beacon Press, 2010.

Ofri D. *Singular intimacies: becoming a doctor at Bellevue*. Boston, MA: Beacon Press, 2009.