HOSPITAL EMR

TRANSFORMING CLINICAL PRACTICE ONE BYTE AT A TIME

Text by Dr Eric Wong

Madam Loh is no stranger to Tan Tock Seng Hospital (TTSH). She first visited around ten years ago when she was still Miss Loh.

She can still vividly recall the first time she approached the sandstone-coloured building in an ambulance. Her left knee had swelled to the size of a melon after an accident, and the pain pulsated with every heartbeat. As she laid on the stretcher, she tried to distance herself from the incumbent handling by strangers, tightness of the blood pressure cuff and pungent smell of sanitisers. All of these were highly unpleasant, but lying there with little to do, this little mental exercise of hers was both distracting and pacifying.

Since the pain had become more tolerable, her attention was diverted to more pressing matters – matters of life and death. She started rehearsing in her mind: "Yes, doctor, I am allergic to ibuprofen."; "No, I had my heart surgery five years ago, and I am currently on blood thinner."; "No, doctor, I can't remember the exact name of the medication I'm on, but I am taking it every morning."; "Sorry, doctor, I can't really remember the exact name of my condition, but I was told that it has something to do with my heart valves."; "I had it done in National University Hospital, and no, I can't remember the name of my doctor. Yes, I am still on follow-up." As she enumerated the list of questions with her imaginary doctor, she suddenly felt a sense of despair rising from her chest. In a flash, memories of previous admissions, as vivid as if it happened just the day before, invaded her mind. She remembered the junior doctors' insouciance when she couldn't recite what they wanted. She recalled the nauseating dread of waiting for her x-ray reports in the clinics and her medications at the pharmacy. Her throat started to ache as her memory of excessive blathers turned to muscle memory. The ambulance had slowed down, but she hardly noticed.

Just as the hatch of the ambulance was about to open, her laryngeal discomfort turned into a stricture. Her misery when the doctors missed her drug allergy the last time struck her like a lightning bolt. She could almost feel her eyes and lips starting to swell again. Her trepidation turned to near panic and the pain in her left knee soared. In the darkest corner of her heart, she started cursing the bicycle that she fell from and everything that was about to happen to her as the paramedics wheeled her into the emergency department.

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The time before technology

Certainly, times have changed. It was not too long ago when seeking healthcare was a double-dread: a challenge to one's memory in the middle of physical hardship. All too often, our patients were made to regurgitate as much as they could remember while being tormented by their own physical ailments. Consolation was frequently delayed by the seemingly never-ending cycle of questions and clarifications. Yet on the

other end, doctors were not feeling any better. Faced with dubious histories and patchy claims, we were constantly lost in the maze of information uncertainties. Clinical decisions were difficult when we couldn't fully trust our sources, especially when our sources were in no mood or condition for chit chats. Exhausted, we had difficulty trusting ourselves to fully comprehend what our patient was telling us, let alone completing the task of ordering, interpreting, reading and prescribing before having to turn our attention to the next patient. Amid this mental calamity, we yearned for the thick brown folders from the Medical Record Office to corroborate, but we detested the burden of summarising old notes. Information was scarce and hard to come by, and history-taking and results-tracking were onerous chores.

Yet we have long known the limitation of our capricious human mind for storing information, and the inefficiency of pen and paper for communication. We did go through medical schools after all. Our junior days were laden with horror stories of how our peers and seniors had failed our patients. Incorrect dosages of medication, overlooked allergies, belated diagnoses and missed critical results were our hottest water-cooler gossips. We learnt from those mistakes, but often not fast enough. Our collective self-blaming was just not the right pedagogy for the betterment of our clinical skills, and especially not if it was at the expense of our patients.

Entrance of healthcare technology

Then, like the other industries in Singapore, healthcare had its glimpse of information revolution. The National Healthcare Group started adopting clinical information technology (IT) in the form of electronic discharge summaries in the late 90's. The beginning was difficult. There was immense resistance from doctors, nurses and even patients. Typing was clerical work, a task deemed too prosaic and mundane for the noble MBBS graduates. Electronic laboratory ordering was tedious; reading electronic vital signs were irksome and arduous; and accessing the physician portal was vexing and uncongenial. Worst of all, the computer screen was a barrier, alienating doctors and patients, and depriving us of the close personal relationship we enjoyed with our patients. Resistance turned to rebellion when the electronic inpatient medical record was implemented in 2009. Infuriated by the poor usability, as well as the lack of computer hardware, it took months of dialogue and retraining for us to feel courageous enough to pick up the mouse again. Lesson learnt: *It is not the computer you should spend time with when you are designing a system – it is the humans.*

But soon, abhorrence became attachment. Like smartphones, clinical IT has a much more profound effect on our work than initially imagined. When I asked a group of junior doctors informally last year to identify the most important tool for a doctor, over 70% of them ranked their computers as the number one tool for them to get their job done. This should not have been surprising. After all, as doctors who spent five years of medical school learning history-taking and physical examination, aren't we the very essence of medical information collection skills? Aren't we, doctors who were taught the magical art of formulating differential diagnosis, the ethos of hypothesis testing and validations? Little did we know that medicine, in its very core, is driven by information. And these pieces of information needed to exist in a meaningful and accessible way for us to truly utilise them. When information existed on paper, it was often inaccessible and forbidding. Old notes took ages to reach our clinics and wards, and laboratory results and x-ray films were often lost in transit, buried within piles and piles of processed dead trees. The computer and accompanying technologies, such as electronic records, ordering and prescription, have fundamentally changed how medical care is delivered.

We are far more efficient now. With just a few clicks, clinical notes nicely laid out in legible Arial font type will appear in chronological order on the monitor in front of us. A few more clicks and all 64 cuts of the head CT scan images would wondrously materialise in pixels, with double windows for you to compare with old films side by side. Handphones would beep when our patients' results are critical. Ward rounds are more organised, and the tug-of-war on inpatient medication records and vital sign charts between nurses and doctors become things of the past. Scheduling lunch appointments becomes easier when we have full visibility of our afternoon clinic workload. We are safer too. Adverse events with missed drug allergies and overdosing have almost become extinct, thanks to the introduction of electronic prescription and allergy checks. The clinical decision support system allows us to offload some of the cognitive burden of remembering maximum dosages

and drug-drug interactions. Surgical implants are easily tracked for quality assurance. Neighbourhoods are also better cared for – a recent tuberculosis cluster identified in Ang Mo Kio exemplified what can be achieved when one coalesce clinical acumen with information as simple as diagnosis and address.

We, to a certain extent, have become better doctors practising more safely – which is what we have always aspired to be.

Benefits for the community

Clinical IT does not benefit just clinicians alone. When I spoke to Madam Loh last year, her experience then was very different from her first visit years ago. She had had a few follow-ups throughout the years, and one of the key differences she felt was that the consultations had become more meaningful. She used to spend large portions of her allocated clinic time explaining her most recent visits to other speciality clinics or hospitals, the medications that had been adjusted, and the other appointments she had scheduled. Without the need to hunt and gather for such information, her doctors have managed to spend more time with her to address her most important need – her health. Certainly there were times when doctors seem to be staring at the computer screen, but the time they spent entering and searching for information was much lesser than the time she had to spend waiting for her doctors to flip through pages after pages of her hard copy reports previously. All her clinical notes are now in one place and she no longer has to worry about losing her referral letters when she visits polyclinics. Her results from private hospitals were also diligently scanned into the computer and made available for her doctors in TTSH to check on at any time. Even the results from other hospitals are available in the National Electronic Health Record, saving her the need to bring around her CT scan films. In the past, she had to carry a heavy folder with all her results and reports inside whenever she came to the hospital. Now, all she carries are her handbag and handphone.

As our conversation consummated, I asked her what she thought was the most impactful improvement in healthcare over the past years. Without any hesitation, she praised the ease of coordinating all her different medical appointments and the text reminders she receives for them. Madam Loh was not the only one having issues. During a recent patient engagement group, a group of patients and caregivers unanimously voted "disorganised appointments" as the top grievance when seeking healthcare, trumping long waiting times and poor value for money. Before she left the consultation room, she causally mentioned that after the unfortunate overlooked drug allergy incident many years ago, doctors and nurses had stopped asking her what medication she was allergic to. Instead, they would read from her records and prompt for her confirmation. It made her feel much more reassured when we demonstrated that we knew. She was glad that she had not suffered another incidence of allergic reaction since. Her doctors had stopped hurting her.

I thought hard after I led her out of the consultation room. Sitting in the white-walled space, I couldn't help but remark how few pieces of paper I have on my table, and that it was the computer that took the centre stage. This little black box has allowed my prescription to travel through multiple systems to reach the pharmacy. Robots would have started busily packing Madam Loh's medication as she waited for the elevator. On her next visit, a nurse, a physiotherapist, or whoever tending to her, will be able to read my notes, and other colleagues', off the screen, and collaborate virtually without the hassle of picking up the phone or trying to locate each other.

The future of healthcare

This little black box will be playing an even more important role as we evolve from episodic consultations to long-term team-based patient care. Long gone are the days when doctors could expect ourselves to fulfill all the healthcare needs of our patients. Neither do we have the luxury of time to appease those who expect otherwise during busy clinic visits. Typically, a patient will have two to three encounters with other healthcare workers in between outpatient specialist visits. In polyclinics, the numbers can often be larger as we relegate more traditional doctors' tasks – eg, wound assessment – to our colleagues. In the case of Madam Loh, she has appointments with three specialists, her family doctor, physiotherapists, nurses, podiatrists and pharmacists, spreading across different institutions. To work together, we need the ability to share information and communicate effectively, and our electronic medical record has been the linchpin in this rotating wheel of collaborations. As our population ages and the burden of chronic diseases increases, the need to share will continue to surge. Increasing partnerships between community and hospital will require workflow to cut across clinics and institutions effectively. Patients will expect us to know and share.

It was right at this moment that my phone buzzed. It was a video message from my friend showing me his wound, asking for advice. I wondered how much time we have before our patients tell us that what we do on computers is not good enough anymore. Mobile devices, social networks, instant messages, analytics and artificial intelligences are just a few examples of technologies that have transformed how we socialise and communicate over the past years, and soon they will impact how we interact with our patients too. I pushed that thought aside as the resuscitation room nurses summoned me for a new standby case. I ran out, confident that my medical officers would have started tracing the patient's medical history, and may have even started ordering some basic laboratory tests before the patient arrives. For the digital natives, caring for patients with IT is in their blood. For those of us who started our career with pen and paper, it is good to remember that there are always lives to save and people to comfort, but always we must do no harm. And not knowing and not working together with the right tools is doing harm. ◆