By Dr Tan Wu Meng, Editorial Board Member

Improving Knowledge, Improving Systems and Improving Patient Care
Thoughts from a Junior Doctor

INTRODUCTION

Medicine is first and foremost about healing the patient where we can, comforting those we cannot heal, and touching lives for the better always. In service to these goals, we make use of knowledge. Yet knowledge and understanding do not arise spontaneously – they come about through research efforts both serendipitously and systematically. In this article, I will share some ideas on how we can improve our knowledge of ourselves, the diseases we treat, and the patients we comfort. Apologies in advance for any ignorance!

LISTENING FOR DISCOVERIES, AMIDST THE VOLUME

Medical practice in Singapore is one of great volume. In some overseas centres, it would be a bad night call if more than 10 medical admissions were clerked between the house officer (HO) and medical officer (MO). In contrast, within our public hospitals, admissions can easily reach 30 or 40 per team of HO and MO, and this with multiple teams sharing the workload.

While the merits and demerits of volume-based service can be debated on both sides, this throughput represents an untapped resource. Although patient records number in the millions, most of the raw data is on paper and not easily collated. The segregation of services into two healthcare clusters, while promoting competition, has also created administrative barriers to data sharing. Online services such as *EMR Exchange* have improved the situation, but it is still a non-trivial task obtaining and correlating medical records across hospitals and clusters.

Registries and Data Mining. We should have more national-level registries for diseases and surgical procedures. But registries alone do not help patients – it is the analysis arising from their stored data. We should expand the staff resources for registries, employing statisticians to help with "data mining", while keeping a bioethicist on the staff to facilitate ethics compliance. These registries could be explored directly by the clinician, using a "search engine" paradigm. Alternatively, a consult-driven system would have the clinician submit a question to the registry staff, who would then digest the data and report back.

Why is this important? Patterns can be sought amidst the volumes of data, leading to testable hypotheses, and outcomes that influence patient management.

As an example of how "data mining" services might help, consider the following questions, which transcend a single discipline and would not easily be answered in totality without a ready repository of data:

- What is the incidence of prosthetic joint infections in Singapore?

- Are diabetic patients more likely to be afflicted? Is chronic glycemic control (for example, HbA1c) a predictor for this complication?

- And if so, is pre-operative optimisation of glycemic control a useful prophylactic intervention?

Having a "data mining" service would greatly assist clinicians in obtaining actionable answers to such questions.

EVERY MAN A THINKER, EVERY PERSON AN INVESTIGATOR

Through-track MBBS-PhD scholarships have received publicity in the news. They have utility as a talent-spotting and recruitment mechanism. But not all researchers find their calling early in life. Some discover their talent later, or find the passion for research after medical school.

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As a profession, we are all the poorer if we do not make provision for those who join us from paths less travelled. Similarly, we should not limit our catchment pool of potential research talent.

Here are some proposals on how we can increase our output of knowledge:

Creating a culture of intellectual inquiry. Although many departments are sufficiently enlightened to avoid the pitfall, there are still clinical units in Singapore where the MO and HO are not much more than a pair of hands, and where thinking is tacitly (if not explicitly) discouraged.

Where this culture remains, it must change – much public money has been spent on educating clinicians, so we should maximise use of their skills at all levels in the hierarchy. All of us should be prepared to ask beyond "What tests do I order to diagnose?", but also "Why is this test not helpful?" and "Can we invent a better test?" At the service level, we should try to see beyond the immediate workload and ask "What is the big picture for this patient?"

[* To avoid confusion, it should be noted that the phrase "every man a thinker" does not connote insubordination – thinking can co-exist alongside personal discipline and a respect for senior experience.]

Encourage ground-up "grassroots-level" research. Even a "small" or "low-profile" department can have registries of cases and procedures. These, in turn, can generate hypotheses which are testable, and outcomes which improve clinical practice. For small studies, the financial requirements are modest, so grant money should not be an issue.

Some might argue that small projects cannot create a big splash. While this claim may hold true, the strategic aim would not necessarily be high-impact publication, but to expose more doctors to research, thereby sparking further interest.

As part of such an initiative, there should be department-level grants existing in parallel with cluster-level grants. From the viewpoint of a cluster, it makes sense to support existing flagships, since they are already competitive and the start-up costs have already been worked through. Rather than putting cluster leadership in the unenviable position of having to choose between a successful flagship and an unproven newcomer, grant-awarding agencies should have separate fund allocation for this purpose.

Improving the doctor-patient ratio. Teaching, discussion and reflection are infeasible if dozens of patients must be seen on morning rounds (and their ensuing tasks attended to). Interesting ideas do not germinate without time to reflect. Furthermore, while some junior doctors will preserve their intellectual curiosity despite the grind of four to five years of HO / MO training, years of grind may pound the enthusiasm out of them.

One caveat: doctor-patient ratios at the national level may be too aggregated a statistic for meaningful analysis. As the majority of academic medicine and research activities will take place within our restructured hospitals, the key statistic would be the *public sector* doctor-patient ratio, both at hospital and department level.

Early and continued exposure to research. Although many specialties have structured research opportunities at the Registrar (Advanced Specialty Training) level, this may yet be a case of too little, too late. As an analogy, imagine the effect on recruitment into Surgery if students had little or no exposure in medical school, and only had their first structured opportunity to explore surgery at four or five years after graduation. Yet when it comes to research, this is the state of affairs for many junior doctors at present. Is it then surprising that there is a shortage of doctors involved in research?

EVIDENCE-BASED MANAGEMENT, EVIDENCE-BASED ADMINISTRATION

While much research has been done on therapeutics and treatment decisions, there is also a role for studies into how clinical teams are managed, and how administrative decision-making can be improved.

Just as we make therapeutic decisions based on evidence, we should also promote the implementation of evidence-based administration. Where the evidence supports existing wisdom, no harm is done – but where the research evidence runs counter to perceived realities, it may highlight an area where further reflection is needed.

Consider the following examples:

- **Night Calls, Duty Hours and Safety.** Many junior doctors in Singapore, when rostered for in-house duty, will work a full day, then work the night shift, then work the next day (for a half day or full day, depending on department workloads). Yet there is evidence that 20 to 25

hours of wakefulness produce performance decrements equivalent to that observed at a blood alcohol concentration of 0.10%, which in many jurisdictions would be over the legal limit for driving, flying a plane or operating machinery.[1] There is also epidemiological evidence that extended work shifts of 24 hours or more are associated with an increased risk of motor vehicle crashes.[2]

Given the research evidence, we should look further into establishing the extent of performance impairment after prolonged duty hours in the local context – and improving the system should the evidence call for it. It might be too late by the time a medical negligence lawyer is asking questions such as "Does your institution permit staff to treat patients while impaired by alcohol or an equivalent influence?"

- **Streamlining Paperwork.** Despite widespread availability of information technology (IT), many tasks are still performed on paper. In some hospitals, an imaging investigation is

ordered on a paper form – this is then digitised by the fax machine, printed again onto paper at the radiology unit, and then manually typed into digital form by a clerk. One might think that the progress of the order could be checked on computer, since the booking system is computerised. The reality is that in many hospitals, checking the order requires a telephone call, so the data entry clerk can log into the system and retrieve the information.

Some might ask, do systems improvements matter at all? They matter because every hour spent on red tape is one less hour available for clinical care, patient communication, continuing medical education and research. Many organisations like DHL, Federal Express and Amazon have fully digitised their order tracking and fulfilment systems, so that clients can track orders in real-time and escalate urgent orders if need be – perhaps this is one area where we can learn from others.

What these two examples have in common is that they represent areas where research into policy decisions can impact on patient care. In the first example, of night calls, we could perform a study into the risk of motor vehicle accidents or clinical near-misses by post-call personnel in Singapore. In the second instance, a quantitative analysis of time spent on tasks by local medical staff might prove revealing – for example, it might suggest that in addition to recruiting more doctors, we should also find ways to deploy existing doctors more meaningfully.

PROMOTING COLLABORATION, PREVENTING DIVIDES

In some overseas centres, there is the stereotype of basic scientists regarding clinicians as "half-baked researchers". Conversely, another stereotype exists whereby clinicians might see basic scientists as "chasing publications and out of touch with patient needs". When this happens, it is because both sides have misunderstood the other's role and competencies.

Such a divide is unhelpful, as the two are synergistic. Without basic research, the biology of disease cannot be understood. Likewise, clinical perspectives can help researchers choose which problem or aspect of a disease to pursue.

Here are three suggestions on how to promote collaboration:

- **Themed symposia on diseases, from bedside to bench to bedside.** Many conferences concentrate on basic science or clinical perspectives, but not both. This exacerbates the lack of contact between scientists and clinicians: if a conference is purely on laboratory science, few clinicians will attend and vice versa. Joint conferences can help ameliorate this problem. For example, in the case of hepatitis B, we can bring together gastroenterologists, oncologists, liver surgeons, molecular biologists and virologists.

    The official purpose for such joint gatherings would be knowledge sharing, but the unofficial agenda would include building familiarity, trust and networking.

- **Co-location of institutes.** In some academic medical centres overseas, the flagship research institutes are located on the hospital campus, within walking distance of clinical units. This promotes an intangible but valuable scientific buzz, and facilitates collaboration and discussion between groups.

- **Matchmaking services.** No single person can be an expert in every field. A national-level matchmaking service can help link researchers, thereby generating new projects. Inter-disciplinary projects can create research niches not previously explored, thereby generating

publications, intellectual property and most importantly, benefit to patients.

For example, a clinician with an interesting observational phenomenon might be interested in mapping the gene – a matchmaking service could put him/her in touch with an expert in genomics.

Likewise, a molecular biologist with a novel potential oncogene might wish to team up with a clinical group, to study a cohort of patients at risk.

Preventing Divides. Even as academic medicine and research are promoted, the Powers That Be must be mindful to avoid creating new divides. For the near and middle-term future, the majority of clinicians will have bedside practice as their bread and butter – and any policy incentives must recognise this fact. Similarly, non-research clinicians must never be made to feel second-class – while the researcher works to change the lives of tomorrow's patients, the in-service clinician touches the lives of patients in the here and now.

CONCLUDING THOUGHTS

Inter-Ministry Integration. Many of the great challenges of governance in the 21st century will transcend a single ministry. Creating a renaissance of academic medicine and research in Singapore will be a similarly transcendent undertaking. For example, the Ministry of Health will have to be brought on board, if medical staffing numbers are to be improved. The Ministry of Education must be engaged as well, so that changes are made in medical school curricula, and a culture of critical thinking disseminated through our nation's schools.

Research is knowledge. We owe it to our patients to make the best possible decisions: both at the level of individual patient care, and in designing the systems by which individual care is provided. One contribution to this goal would be research in the broadest sense, a quest for knowledge fuelled by a spirit of inquiry. ∎

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