

November 2022 | Part 1

Peer Reviewed

LKC Medical Society Research Newsletter



James Ding

Research Spotlight

Hello everyone, I am James Ding and am currently a PGY2 doctor in the Emergency Department at Sengkang General Hospital! I am an LKC alumni and was from the WLT house, huge shoutout to Sister Ramani!

What research do you do?

I am focused on Ophthalmology research, with special interest in the areas of Clinical Practice, Biomedical Science, and Medical Education. My current project is on Medical Education, which looks at how we can better teach and engage medical students. On average, I spend about 2 days per week on research.

You're a co-investigator in the award-winning IMAGINE study. Can you tell us what IMAGINE is about?

In brief, IMAGINE investigates the applicability of mental rehearsal (MR) in medical training. MR is the process of mentally visualizing the steps of a physical task, almost like how a medical student would rehearse in his or her head how to take a history before going for his or her OSCE. This process of visualization has been proven to activate similar neurocircuits as doing physical movements.

As such, our group applies MR in teaching various ophthalmic physical examination skills and compares its efficacy against other learning strategies such as peer-learning and physical practice. We aim to promote MR as a free and efficacious learning strategy for practicing psychomotor skills.

Fun fact! / Favourite protein or cell?

Fun fact: I like cats!

My favourite cell is the retinal ganglion cell, and my favourite protein is red meat.

How do you want to bring IMAGINE forward in your future work?

We hope to apply MR in ophthalmic microsurgery training and eventually expand out to other surgical disciplines, such as general surgery! An example would be laparoscopy. Imagine a learning technique which you can do anywhere, free-of-charge, during your surgical posting or residency. Wouldn't that be great!

What are the best and worst things about research?

The best feeling is when you publish a well written paper with significant findings. This makes all our hard work in the 'lab' worthwhile.

The worst part has got to be the recruitment process for test subjects 😞

Do you think research is important for medical students?

Certainly, as we are moving towards evidence-based medicine, one needs to learn how to perform research, as well as to read and assess the available evidences. To perform research, is to produce evidence for others to follow.

I believe research is a very fulfilling process as you watch your efforts come to fruition. Needless to say, research can also be a good opportunity to learn even more about your subspecialty of interest.

How did you start, and what prompted you to become a clinician-researcher?

In my opinion, I am far from a clinician-researcher. Having just started out on research, I am even more junior as a researcher than a doctor. I guess a more appropriate 'title' will be 'junior doctor and a research student'.

As to how I started gaining an interest in research, you know how a lot of junior medical students follow this Instagram account by the New England Journal of Medicine (NEJM). Well, I was one of those students! Back in my pre-clinical years, I was entranced by the many rare cases or 'fun-facts' that such pages shared every now and then, from a novel chest X-ray to a very gross abscess. At the same time, as I trawled through research papers while studying various aspects of medicine and writing practical reports, the thought of seeing my name in a journal slowly took root in me. I've always dreamt of seeing a "Ding et al." cited by other researchers, yet the fear of not being able to balance research with schoolwork would put that dream on hold.

My interest in a research niche developed after finishing my NENTE block. Reading up about the different types of color blindness, visual field defects, glaucoma (the list goes on!) really showed me the depth and breadth of visual sciences, more than what I had a small taste of back in M2.

Ophthalmology is known for its strong research culture. Almost every senior doctor is involved in a research project and plenty of opportunities were available for medical students, some of which are less intensive commitment-wise. As such, I dropped A/Prof Johnson Tan, who was LKC's Ophthalmology faculty lead at the time, that I was interested to pursue research under his guidance and I had never looked back since.

What makes a good research project / a good researcher?

The recipe for a good project would be

1. A wise principal investigator,
2. A solid team,
3. Sound theoretical framework and hypothesis,
4. Good design, and last but not least,
5. Proper execution of the study with proper administrative planning

As for what makes a good researcher, there are just too many essential characteristics! But if I were to list out a few, then one ought to be-

1. A keen learner,
2. Meticulous,
3. A team player, and
4. Resilient

Another point, no matter how good a study design is, it is meaningless if you fail to recruit subjects or fail to properly execute the study interventions. The background administrative work by researchers is often overlooked in the process of conducting a study. It may be exciting to publish a paper, but behind it is an endless slew of emails, filing and other dull tasks, that are nonetheless crucial to the success of a project.



I don't really have many nice photos of myself, so here's a photo as a dedication to the people who are most important to me.

Any advice for students looking to get started?

I can boil it down to these three tenets:

1. Find the discipline you are interested in,
2. Email the relevant people, and
3. Do not be afraid to ask seniors for advice.

In an ideal world with unlimited funds and time, what would you like to study?

To be honest, I am not really sure. My knowledge in research, especially clinical research, is still extremely limited. However, if I were to just imagine wildly, perhaps finding a way to regenerate the optic nerve or retina? Good vision is extremely important for a good quality of life, imagine how distressing and inconvenient being blind must be. Yet, this is a reality that many people around us face. The optic nerve and retina are literally extensions from your brain and any damage is almost irreversible. It will be wonderful if we can find a way to not only prevent, but to reverse blindness.

What's your fondest memory in LKC?

Oh, too many! Two that stuck out for me was drinking in hall and eating beehoon from Extension with my friends back in M1, and having a meal together with Sister Ramani at her house! Some moments I cherish as well would be studying for MBBS together with my team in M5, when we would end up just chit-chatting the whole evening.

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Learning By Imagining: The IMAGINE Study

Written by Tan Yong Yi (Class of 2027)

Physical examinations may be the most daunting elephant in the room for some medical students, from having to memorize and execute a choreography of tests, to evaluating and differentiating between different diagnoses along the course of an examination. Yet, it is not as if one has a simulated patient just waiting to be examined at one's own time and convenience to practise such clinical skills.

However, what if, just imagine, having such a simulated patient appear as and when you wish, like a genie from a lamp! And better still, like a genie, this "simulated patient" appears out of thin air! That is what Adj. A/Prof Yip Chee Chew, and an LKC alumni, Dr. James Ding, sought out to create, an educational genie to assist student learning anytime, anywhere! As such, we interviewed Prof. Yip and Dr. Ding to find out.

Clinical education holds a special place in Prof. Yip's heart, as he finds novel ways to bring clinical knowledge and cases to life. In fact, Prof Yip's Master's thesis in Health Professional Education (HPE) was on mental rehearsal, where learners imagined themselves doing a task instead of doing the task in reality. Prof. Yip then reapplied this novel learning tool in various aspects of medical education, which culminated to the "Investigating Mental-Rehearsal's Applicability in Guiding Independent E-learning" study, or IMAGINE. Here, medical students were taught an ophthalmic examination and guided to mentally rehearse the examination online. Then, they were assessed by clinicians and compared to another group who were taught the examination traditionally.

During the course of his clinical educator career and Master's education in HPE, Prof. Yip realised the power and practicality of mental rehearsal. When he conducted classes at NUS, Prof. Yip would get his students to close their eyes and visualize immediately after teaching a skill. As he quipped in his interview, "You can do it on the MRT, just close eyes do also can, instead of listening to music!"

During the COVID-19 pandemic, Prof. Yip saw how clinical education was greatly hampered by online teaching. Students lacked in-person teaching and feedback, as well as opportunities to practise on simulated and real patients.



Hence, he experimented with Distance Augmented Real-time Teaching (DART) over Zoom with his students. Yet, noticing the critical gaps in simulating convincing and realistic clinical scenarios, Prof. Yip decided to introduce mental rehearsal into his classes, which eventually formalized into the IMAGINE study to properly investigate the efficacy of mental rehearsal.

As simple as getting a few medical students to sit down and imagine themselves staring straight down at a patient's eyeball may sound, yet the IMAGINE study was not without its challenges. Prof. Yip shared that this was his first time conducting such a study, and that the recruitment process was arduous. From publicizing the trials, selecting participants and matching the disparate schedules of both clinician-assessors and student-participants, the reams of administrative work rivaled that of conducting the trials themselves. Furthermore, Prof. Yip shared that he himself was unsure of how well the different study groups will learn and had a difficult time removing as many confounding factors as possible. In addition, it was a challenge to assess the students' performance in doing physical examinations on standardised patients during the COVID-19 pandemic. The team had to take active infection control measures such as N95 masking and instrument sanitisation to protect the students, research coordinators and the standardised patients.

Despite the difficulties and setbacks, the study was a success! They found that students who learn with mental rehearsal did as well as those who learnt via physical practice, showing the success of mental rehearsal. Furthermore, the students themselves had thoroughly enjoyed themselves. Some walked away happily with a suturing kit, while others felt that the teaching itself was engaging with real simulated patients to practise on! Even for an accomplished clinician and educator like Prof. Yip, he himself shared that conducting the study, especially during the volatile COVID-19 period, was immensely fruitful.

So what are some benefits to mental rehearsal? Apart from being able to perform this anywhere, Prof. Yip shared that under a stress-free environment, one has more mental space to think about what to do next and to perform the examination accurately and smoothly.

Looking beyond the horizon, Prof. Yip and his team were heartened by the positive outcomes of the study and hopes to apply this learning technique to more complex and clinically important examinations, and eventually to surgical procedures. The sky is the limit for Prof. Yip and his team; one can only imagine.

Project Title: Investigating Mental-Rehearsal's Applicability in Guiding Independent E-learning (IMAGINE) Study for Eye Examination Skills - II

Background

Guided Mental Rehearsal (GMR), underpinned by the Theory of Motor Simulation, can be a resource-independent adjunct for learning psychomotor skills. We hypothesize

- 1) GMR is non-inferior to Guided Physical Practice (GPP) in learning Pupillary Examination (PE).
- 2) Mental Imagery (MI) ability improves with GMR practices.

Methods

This is an assessor-blinded, randomized controlled trial with its sample size calculated using pilot data (n=46, power=0.81, alpha=0.05).

On day 1, baseline MI ability was assessed and PE was taught. Practices (GMR or GPP) were scheduled for 1 and 3 weeks. At 1 and 2 months, PE performances and MI abilities were assessed with checklist-scoresheet and Movement-Imagery-Questionnaire-3 respectively.

Results

Fifty-three pre-clinical year students were included (GMR n=26, GPP n=27).

Data are presented as median with inter-quartile range. Mann-Whitney-U test shown no significant difference between GMR-group and GPP-group's PE performances at 1 month (35.00 [14.00] vs 33.25 [12.00], p=0.91) and 2 months (40.00 [10.50] vs 36.42 [12.00], p=0.50).

For GMR-group, PE score increased between 1 and 2 months (Wilcoxon-Signed-Rank. 35.00 [14.00] vs 40.00 [10.50], p=0.02). Friedman test followed by post-hoc Wilcoxon-Signed Rank test with Bonferroni adjustment demonstrated improved MI across baseline, 1 and 2 months (Kinesthetic Visualization Score 22.00 [8.00] vs 23.00 [7.00] vs 24.00 [6.00], p<0.01; External Visualization Score 24.00 [5.00] vs 25.00 [6.00] vs 26.00 [4.00], p=0.36). These were not observed in the GPP-group.

Discussion & Conclusion

Repeated GMR is non-inferior to GPP in e-learning PE, and MI ability improved with deliberate GMR practices. GMR can be a cost-free, resource-independent adjunct in acquiring clinical examination skills.