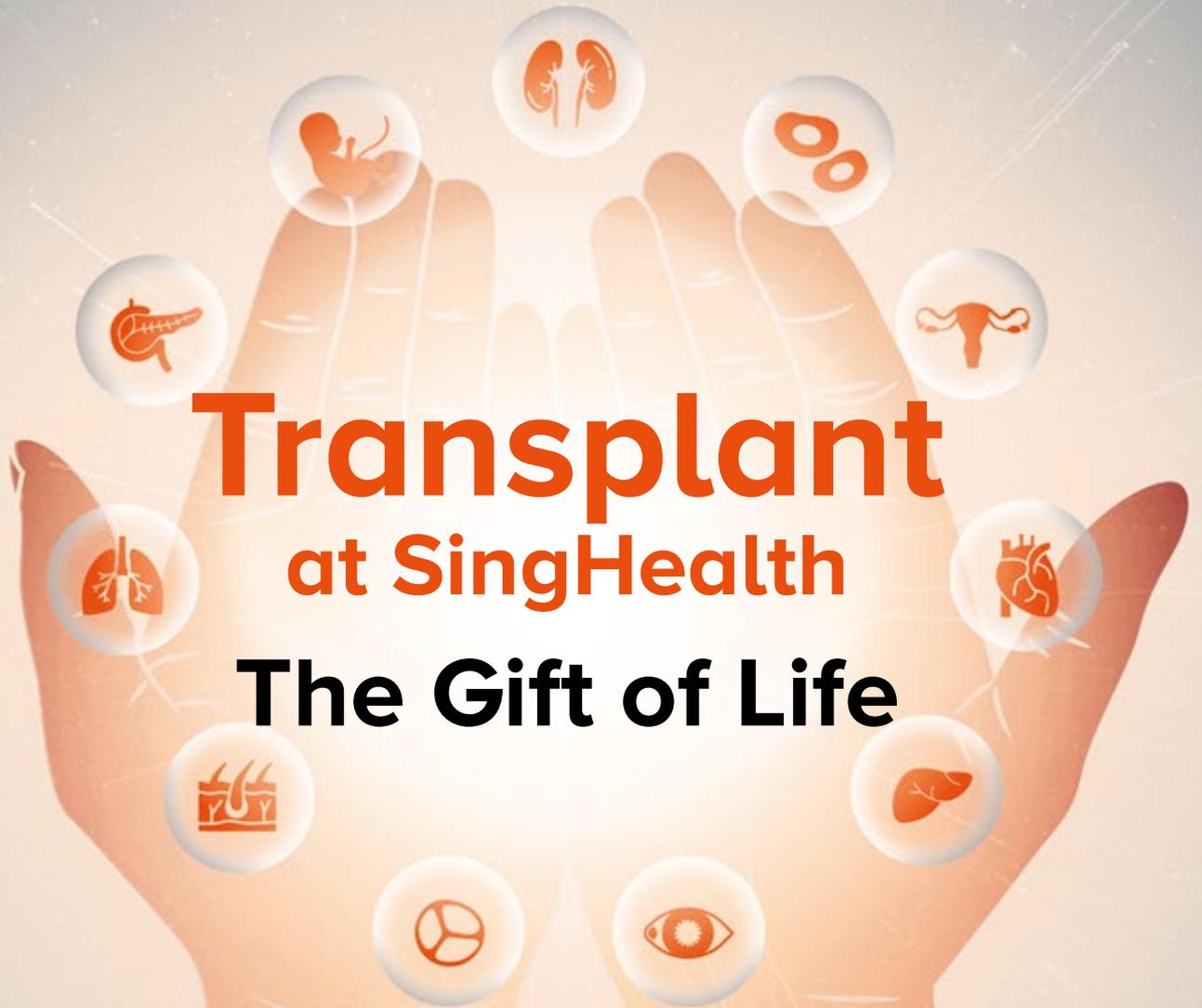




DEFINING MED

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Transplant at SingHealth The Gift of Life

Minimising COVID-19 Risk in Kidney Transplantation

Laparoscopic Living Donor Hepatectomy

Options for Female Fertility Preservation

Outpatient and Home-Based Autologous Haematopoietic Stem Cell Transplant

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PATIENTS. AT THE HEART OF ALL WE DO.®

Minimising the Risk of COVID-19 in Kidney Transplant Recipients

Assoc Prof Terence Kee

*Programme & Medical Director, Renal Transplant Programme & Senior Consultant,
SingHealth Duke-NUS Transplant Centre;
Senior Consultant, Department of Renal Medicine,
Singapore General Hospital*

As dialysis carries a higher risk of infection and COVID-19-related mortality, kidney transplant programmes such as at the SingHealth Duke-NUS Transplant Centre have implemented measures to ensure that transplants are done safely. However, as kidney transplant recipients who are stable tend to see their general practitioners (GPs) for treatment of respiratory ailments, GPs are best-placed and valued partners in keeping these vulnerable patients safe with the approaches outlined below.

INTRODUCTION

Kidney transplant recipients make up the largest proportion of solid organ transplant recipients in Singapore. Furthermore, many of them, after passing their first year of transplantation, would be stable on chronic immunosuppression and may only be seen at the transplant centre two to three times a year.

As a result, it is not uncommon for a kidney transplant recipient to first consult a general practitioner (GP) for common medical conditions like respiratory tract infections.

Unfortunately, amidst the current COVID-19 pandemic, there is an increased likelihood of COVID-19 being the cause of respiratory tract symptoms for kidney transplant recipients. Hence, there is a need to update GPs on the characteristics and outcomes of COVID-19 in this group of patients.

THE IMPACT OF COVID-19 ON KIDNEY TRANSPLANTATION

The COVID-19 pandemic has had an adverse impact on organ donation and transplantation in Singapore. In 2020, the number of kidney transplants fell by over 50%, with only 46 kidney transplants performed compared to 89 in 2019. This would mean that a greater proportion of patients with end-stage kidney failure had to undergo dialysis instead.

Risks of kidney dialysis over kidney transplantation

Apart from dialysis-related morbidity, **patients on dialysis also face higher risks of contracting a COVID-19 infection** during the pandemic. This is due to their more frequent contact with healthcare facilities and the community.

In a systematic review, the incidence of COVID-19 was higher in patients receiving dialysis (105 per 10,000 person weeks) than patients with kidney transplants (23 per 10,000 person weeks).¹

Furthermore, **COVID-19 related mortality was higher among dialysis patients** with the unadjusted 28-day mortality risk being 33% higher than kidney transplant recipients.² This may be related to a higher comorbidity burden as they spend more time on dialysis.

ENSURING SAFETY IN TRANSPLANT CENTRES AMIDST THE PANDEMIC

Since dialysis is associated with higher incidence and mortality of COVID-19, it is reasonable for kidney transplant programmes to continue providing access to transplantation for patients with end-stage renal failure. As a result, transplant centres in Singapore have implemented a number of measures to ensure transplantation can be performed safely in pandemic conditions.

Adjusting transplantation activity levels

For example, the **SingHealth Duke-NUS Transplant Centre** has published guidelines on adjusting the level of transplantation activity based on:^{3,4}

- National disease outbreak alert levels
- Prevailing COVID-19 transmission risk profiles
- Availability of resources
- Urgency for transplantation

Organ donor and transplant recipient screening protocols

Organ donor and transplant recipient screening protocols were also developed using polymerase chain reaction (PCR) testing, imaging and questionnaire checklists to minimise the risks of early post-transplant COVID-19 infections.⁵

Protected pathways to minimise exposure

Transplant programmes also developed telemedicine, medication delivery systems and protected pathways to ensure that outpatient care could be delivered safely without exposure to COVID-19.^{6,7}

Approaches to Reducing COVID-19 Risk for Transplant Recipients

Despite these measures, kidney transplant recipients remain vulnerable and experience high morbidity and mortality if they are infected with COVID-19.

In a meta-analysis and systematic review of 23 studies done at the SingHealth Duke-NUS Transplant Centre, it was reported that the pooled rate of mortality for kidney transplant recipients was 21.1%, which was higher than the 4.3% mortality rate observed in the general population.^{8,9}

COVID-19 infection in kidney transplant recipients also increased the risk of allograft loss as acute kidney injury and dialysis occurred in 38.9% and 12.4%, respectively.⁸

Therefore, it is imperative that everything possible should be done to reduce the risks of COVID-19 infections in kidney transplant recipients.

Approaches to accomplish this include:

1 COVID-19 vaccination

2 Early recognition and treatment

3 Lifestyle precautions

1 COVID-19 VACCINATION

COVID-19 vaccination is recommended for kidney transplant recipients, and most evidence about its safety and efficacy is based on experience using COVID-19 mRNA vaccines. Not surprisingly, immune responses to COVID-19 mRNA vaccines are poor in kidney transplant recipients who are on systemic immunosuppression.

In one study, the seroconversion rates after two doses of a COVID-19 mRNA vaccine were low at 27.2%, though seroconversion rates were even lower with the Sinovac vaccine at 18.8%.^{10,11}

Nevertheless, two doses of a COVID-19 mRNA vaccination still offer some protection, as one study of 904 vaccinated kidney transplant recipients reported that the breakthrough infection rate was only 0.8%.¹² More importantly, others have demonstrated that the mortality rate was reduced to 7.7% (compared to 12.6% among unvaccinated kidney transplant recipients).¹³

Given the low immunogenicity of two doses of a COVID-19 mRNA vaccine, a third vaccine dose is recommended and has been shown to further improve seroconversion rates to 60%.¹⁴

As for now, the primary COVID-19 vaccination schedule for kidney transplant recipients is three doses, with a booster dose to be given five months after the third dose.

2 EARLY RECOGNITION AND TREATMENT

There has been significant progress in the development of effective COVID-19 therapeutics since the pandemic started. In the United States, mortality among COVID-19-infected transplant recipients has declined over time, which has been attributed to improvement in care and changes in COVID-19-specific treatments.¹⁵

As a result, kidney transplant recipients infected with COVID-19 should be admitted back to their transplant centre hospital as soon as possible to receive treatment.

Therapies such as neutralising monoclonal antibodies (e.g., casirivimab/imedevimab or Regeneron), if administered during the early phase of COVID-19 infection, have been reported to be safe and effective in preventing progression of COVID-19.¹⁶⁻²⁰ This in turn would reduce the risks of death from COVID-19.

Remdesivir and immunomodulatory drugs such as tocilizumab have also been shown to reduce hospital stay and mortality among organ transplant recipients with more severe COVID-19 infections.²¹

Apart from receiving COVID-19 therapeutics, kidney transplant recipients would also need to have their immunosuppression adjusted, which can only be done safely in an inpatient setting. Transplant programmes have therefore disseminated advisories to their patients, instructing them to contact their transplant coordinators so that arrangements can be made for hospital admission in the event of being infected with COVID-19.

3 LIFESTYLE PRECAUTIONS

Regardless of the advances made in COVID-19 vaccination and therapeutics, **kidney transplant recipients must also play their part by adhering to safe management measures.** These include the proper wearing of masks, social distancing and accepting telemedicine consults whenever they are offered.

Kidney transplant recipients must also **learn how to correctly perform antigen rapid testing** whenever there is exposure or symptoms related to COVID-19.

It is even more important for the household contacts of kidney transplant recipients to adopt the same measures, as a common source of COVID-19 exposure in kidney transplant recipients is actually their household contacts.



CONCLUSION

Though the COVID-19 pandemic continues to challenge the healthcare system in Singapore, it has been resilient and effective against a common invisible enemy. Those at the frontline, such as GPs, are valued partners in protecting vulnerable transplant recipients from COVID-19. On behalf of the SingHealth Duke-NUS Transplant Centre, we express our gratitude to our GPs for being our vanguards.

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Associate Professor Terence Kee is a Senior Consultant renal physician with an interest in renal transplantation. He obtained his MBBS at the Flinders University of South Australia in 1994, and by 2000 he completed the Singapore General Hospital (SGH) basic and advanced physician training programmes in general and renal medicine. He subsequently received a Singapore Government Health Manpower Development Plan award in 2004 to undergo a one-year fellowship in advanced renal transplantation under Professor Jeremy Chapman at the Westmead Hospital in Australia. He returned to SGH in 2005 and has since been an active member of the renal transplant team.



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Laparoscopic Living Donor Hepatectomy: Transforming the Liver Transplantation Landscape

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With the increasing rate of living donor transplantation to meet the growing demand for liver transplantation, minimally invasive procurement of the liver graft – with its benefits of faster recovery, less pain and far superior cosmesis – has changed the public perspective of donation.

INTRODUCTION

Surgery in liver transplantation has undergone an evolution since it was first introduced more than 20 years ago. This evolution was the result of its success and the increasing complexity of diseases that needed to be treated.

As a result, it was not only the diseased liver that needed to be replaced. The post-transplant recovery could be complicated by the physiological sequelae that the aetiological diseases caused in the patient, such as portal hypertension, portal venous thrombosis and bleeding tendencies, to name a few.

Living Donor Liver Transplantation

In tandem with this and to address the increasing number of referrals that have resulted in demand outstripping the supply of diseased donor organs, living donor liver transplantation emerged as an important therapy for many patients.

ADDRESSING COMPLEX UNDERLYING PHYSIOLOGIES

The idea of transplanting a partial liver (either right or left lobe) from a living donor multiplied the complexity of liver transplantation when done in the presence of complex physiology. In addition, donor safety and morbidity had to be addressed as well.

Where a whole organ would have been implanted, now a partial graft would be required to take on the metabolic functions of a whole graft and address the complexities of the underlying physiology.

Here, innovation in the form of portal inflow modulation, precise calculation of graft weight suitability by

using sophisticated radiological imaging, hepatic venous reconstruction with cryopreserved grafts and microscopic arterial reconstruction have worked successfully.

CHANGING THE LANDSCAPE OF LIVER DONATION WITH MINIMALLY INVASIVE HEPATECTOMY

Perhaps the most important advancement in liver transplantation is the recent innovation of laparoscopic procurement of the liver graft. This is a surgical tour de force of the modern surgical era. The advent of minimally invasive procurement of the liver has changed the perspective of donation for many people.

LAPAROSCOPIC LIVING DONOR HEPATECTOMY AT THE SINGHEALTH DUKE-NUS TRANSPLANT CENTRE

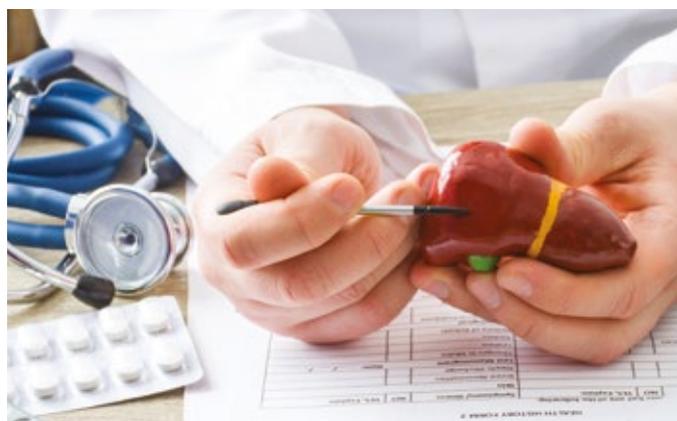
With an established living donor liver transplant programme and expertise in laparoscopic liver resection, we performed our first laparoscopic living donor hepatectomy in March 2019.

Since then, all our living donor hepatectomies for adult-to-adult liver transplant have been performed laparoscopically. Starting from the first case, we have built on our experience, and the cases undertaken were of increasing technical complexity.

A laparoscopic donor hepatectomy offers the benefits of faster recovery, less pain and far superior cosmesis. Our donors stay three to four days after the surgery.

The march of progress in surgery will move on, and changes for the better of patients will be introduced.

The high-stakes nature of living liver donation, and performed in a laparoscopic manner, has established our programme amongst the few top centres in the world performing this surgery. We envision that we will be able to offer this surgery to the majority of our liver donors in future.



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General Hospital
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Associate Professor Chan Chung Yip is a Senior Consultant surgeon and is the current Head of the Department of Hepato-pancreato-biliary and Transplant Surgery, Singapore General Hospital (SGH). He graduated from the Faculty of Medicine at the National University of Singapore in 1997. He completed his training in General Surgery in 2006 and received further training in liver surgery and transplantation in Kaohsiung, Taiwan as well as in laparoscopic hepatobiliary and pancreatic surgery in Seoul, Korea.

He is a pioneer in laparoscopic surgery of the liver, pancreas and bile duct in Singapore, and is a leader in its adoption amongst other surgeons in the country and region. He is a Ministry of Health-gazetted liver transplant surgeon, and is a lead surgeon of the living donor liver transplant programme in SGH.



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Female Fertility Preservation: Options and Considerations

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Fertility preservation is often not foremost in the minds of women who have been diagnosed with cancer, or even after treatment. However, as cancer survival rates for children and young adults improve, the demand for fertility preservation services will increase. General practitioners who see such patients can play an important role in sharing with them the options available.

INTRODUCTION

Women have a finite reproductive lifespan. A baby girl is born with all the follicle-containing oocytes she will have in her lifetime – a finite supply which is depleted with time as the follicles undergo atresia, and is completely exhausted at menopause.

In addition, there is also a known decline in oocyte quality in terms of aneuploidy, related to age-related instability of the oocyte meiotic spindle. This results in ovarian ageing and its clinical consequences of infertility, miscarriage and pregnancy with a Down syndrome foetus.

WHEN SHOULD MEDICAL FERTILITY PRESERVATION BE CONSIDERED?

Chemotherapy, pelvic irradiation and ovarian surgery are iatrogenic factors that are known to accelerate the natural decline in ovarian reserve. The devastation to the ovarian reserve and resulting risk of premature

menopause depends on the type of treatment and its ovarian toxicity, the age of the woman and her baseline ovarian reserve.

Hence, timely referral to a gynaecologist who specialises in reproductive medicine is crucial when a reproductive-aged woman requires chemotherapy or pelvic irradiation, or has undergone ovarian surgery.

Patient criteria

Women who are suitable candidates for medical fertility preservation have the following characteristics:

- Age ≤ 40 years
- Premenopausal
- Has a realistic chance of surviving for five years
- Not pregnant
- Desires to have a child in the future



What Are the Options for Female Fertility Preservation?

1 Egg / embryo freezing

Ovarian stimulation followed by the freezing of mature eggs or embryos is the most established method of fertility preservation.

Process

The patient self-administers subcutaneous gonadotropins for about 10-14 days to stimulate multi-follicular development in her ovaries, following which she undergoes an egg retrieval procedure under sedation. The patient would be fit to start chemotherapy as early as two days after egg collection.

If there is no male partner, the eggs are supercooled and stored in tanks containing liquid nitrogen.

If the woman is married, the eggs can be fertilised and the resultant embryo cryopreserved. The process is essentially similar to in-vitro fertilisation (IVF), the main difference being that the embryos are frozen rather than transferred in utero.

Potential risks and complications

The risk of complications is low and includes the following:

- Ovarian hyperstimulation syndrome
- Venous thromboembolism
- Procedural risks associated with egg collection
 - bleeding, infection, ovarian torsion

Oestrogen-sensitive tumours and breast cancer recurrence

In patients with oestrogen-sensitive tumours such as breast cancer, aromatase inhibitors are given concurrently to alleviate the supraphysiological estradiol levels during ovarian stimulation. Women who were given letrozole during ovarian stimulation had the same risk of breast cancer recurrence as for those who did not undergo ovarian stimulation, without compromise in stimulation results.¹



Obstetric and perinatal risks

No increased obstetric and perinatal risks were found in pregnancies achieved with frozen eggs or embryos, compared with IVF pregnancies conceived with fresh eggs or embryos. However, the long-term health of babies born as a result of egg freezing is not known.

Although the risk of miscarriage and chromosomal abnormality is related to the age at which the eggs were retrieved and frozen, egg/embryo freezing does not prevent the other obstetric complications (e.g., eclampsia, gestational diabetes, growth restriction, caesarean section) associated with advanced maternal age.

For example, a 45-year-old woman attempting to conceive with eggs that were frozen when she was at age 30 would have the same risk of maternal and perinatal complications as women in her current age group. However, her risk of miscarriage and chromosomal abnormality would be similar to that of a 30-year-old.

Efficacy

The success of female fertility preservation is highly dependent on the woman's egg quality and ovarian reserve, which are in turn significantly influenced by age.

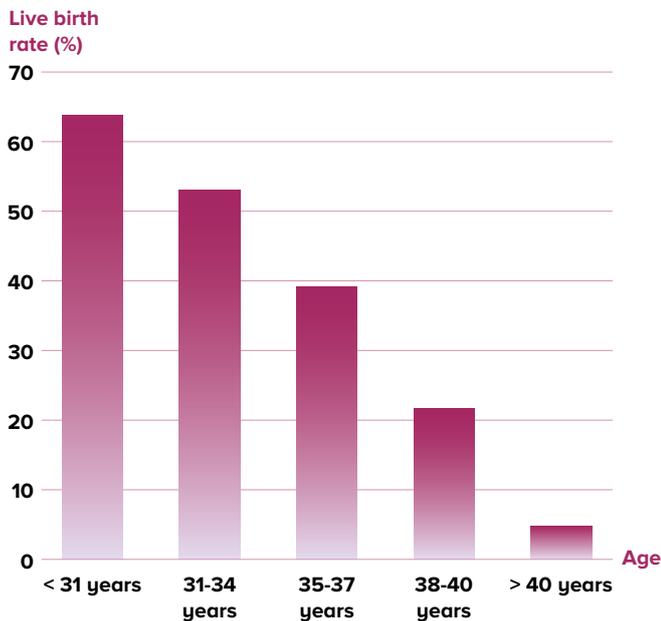


Figure 1 Live birth rate stratified by age after one complete cycle of embryo freezing in 20,687 Chinese women²

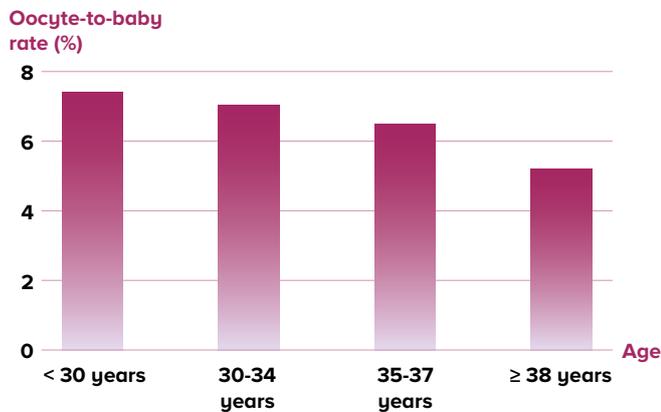


Figure 2 Oocyte-to-baby rate stratified by age³

A large study² reported the live birth rate after one cycle of embryo freezing in 20,687 Chinese infertile women of various ages (**Figure 1**), while another study³ reported the oocyte-to-baby rate for different ages of women (**Figure 2**).

Besides egg quality, other factors such as smoking, history of polycystic ovarian reserve and previous ovarian surgery are also important.

A common misconception is that fertility preservation is an insurance against future infertility; it is not. The reality is that live birth is not a guarantee,

and it is more realistic to consider fertility preservation as offering an extra opportunity to conceive with younger and better-quality gametes.

2 Ovarian tissue freezing

Ovarian tissue freezing offers a different approach to fertility preservation, other than the freezing of mature eggs or embryos.

A typical cycle of egg freezing allows the retrieval of a small number of eggs (usually less than 30), whereas the freezing of ovarian tissue with whole follicles, each containing a single oocyte surrounded by steroid hormone-producing cells, allows thousands of oocytes to be frozen in one instance.

Premature ovarian failure is a known adverse effect of highly gonadotoxic chemotherapy as well as pelvic radiotherapy. As ovarian tissue freezing also preserves the steroid hormone-producing cells of the follicular unit, it can restore fertility as well as the hormonal function of the ovary.

Process

The ovarian tissue is retrieved by surgery, which can usually be performed laparoscopically. As most of the follicles in the ovarian tissue are in the primordial stage, the ovarian tissue needs to be reimplanted back into the body via a second operation to regain its functionality.

Typical graft sites are the remaining ovary and pelvic sidewall (orthotopic) and anterior abdominal wall (heterotopic). Currently, the only way to use frozen-thawed ovarian tissue is in vivo; in-vitro methods to retrieve mature oocytes from primordial follicles are still being researched on.

Unlike in conventional organ transplants, patients do not need to take any long-term immunosuppressive medications after ovarian tissue transplant surgery. This is because the ovarian tissue that is harvested and reimplanted back into the body is the patient's own, thus there is no risk of organ rejection.

Timing considerations

The lifespan of the graft is very variable, and depends on the amount of tissue transplanted and the age of the woman when the ovarian tissue

was first removed. Graft survival ranging from a few months to up to ten years has been reported.⁴ Given the limited lifespan of ovarian tissue grafts, transplantation should be postponed until the patient is ready to conceive or experiences symptoms of ovarian hormone deficiency.

Efficacy

Ovarian function was restored in more than 95% of cases, within four to nine months after transplantation. Among women who were trying to conceive after ovarian tissue transplant, a live birth rate of about 30% has been reported, of which half were spontaneous conceptions.⁵

Ovarian tissue freezing is a relatively new procedure, and its experimental label was removed by the American Society of Reproductive Medicine only as recently as 2019.

Overall, data on the efficacy, safety and reproductive outcomes after ovarian tissue freezing is still limited. It is currently considered an ‘established medical procedure with limited effectiveness’ that should be offered to carefully selected patients.⁶

Indications

Ovarian tissue freezing is currently the only option for prepubertal girls.

It can also be offered to patients undergoing moderate- or high-risk gonadotoxic treatment (e.g., stem cell transplant, pelvic radiotherapy) or where egg/embryo freezing is not feasible. For example, patients who need to start cytotoxic treatment urgently would not have time to undergo the ovarian stimulation required for egg/embryo freezing.

Potential risks and complications

In addition to the surgical complications of freezing and grafting the ovarian tissue, there are concerns regarding the presence of occult metastases in the frozen ovarian tissue and retransplanting the original malignancy. The risk is theoretical with careful patient selection, and depends on the type and stage of cancer.⁷

Egg / embryo freezing	Ovarian tissue freezing
Requires hormonal stimulation – delay in cytotoxic treatment needed	Does not require hormonal stimulation – no delay in cytotoxic treatment
Does not require surgery; procedure (usually transvaginal) done under sedation to retrieve eggs	Requires surgery (partial or total oophorectomy) performed under general anaesthesia; a second operation is needed to reimplant the ovarian tissue when fertility is desired
Smaller numbers of oocytes/embryos frozen (usually less than 30)	Allows the freezing of thousands of oocytes at one time
Mature oocytes or fertilised oocytes (i.e., embryos) are frozen	Immature (primary) oocytes are frozen
Requires assisted reproductive technology	Allows opportunity to conceive spontaneously
Does not preserve ovarian hormonal function	Allows restoration of fertility and ovarian hormonal function
Risks related to ovarian stimulation and egg collection	Surgical risks
More established method of fertility preservation	Less established method of fertility preservation

Figure 3 Key differences between egg / embryo freezing and ovarian tissue freezing

3 Gonadotropin-releasing hormone (GnRH) agonists

Although GnRH agonists are commonly used during chemotherapy to reduce the chance of premature ovarian insufficiency, the mechanisms which underlie this effect are uncertain.

Efficacy

In addition, studies have shown conflicting results regarding the risk reduction for premature ovarian insufficiency, with better results seen in breast cancer patients compared to those with haematological malignancies.

Finally, a reduction in premature ovarian insufficiency may not result in higher fertility rates.⁸ Very few studies on the use of GnRH agonists for reduction of chemotherapy-induced gonadotoxicity included pregnancy rates as an end-point, thus evidence for the fertility-preserving potential of GnRH agonists is scarce.

As such, international guidelines are unanimous in stating that because of the limited evidence, GnRH agonists should not be considered an equivalent or alternative option for fertility preservation and should not be used in place of proven fertility preservation methods.⁸

CASE STUDY

Patient background

A 24-year-old lady with early-stage Hodgkin's lymphoma was referred for fertility preservation. She was single and virgo intacta with a good ovarian reserve. She had regular periods with no known gynaecological issues.

The patient was planned to start urgent chemotherapy with doxorubicin, bleomycin, vinblastine and dacarbazine (ABVD).

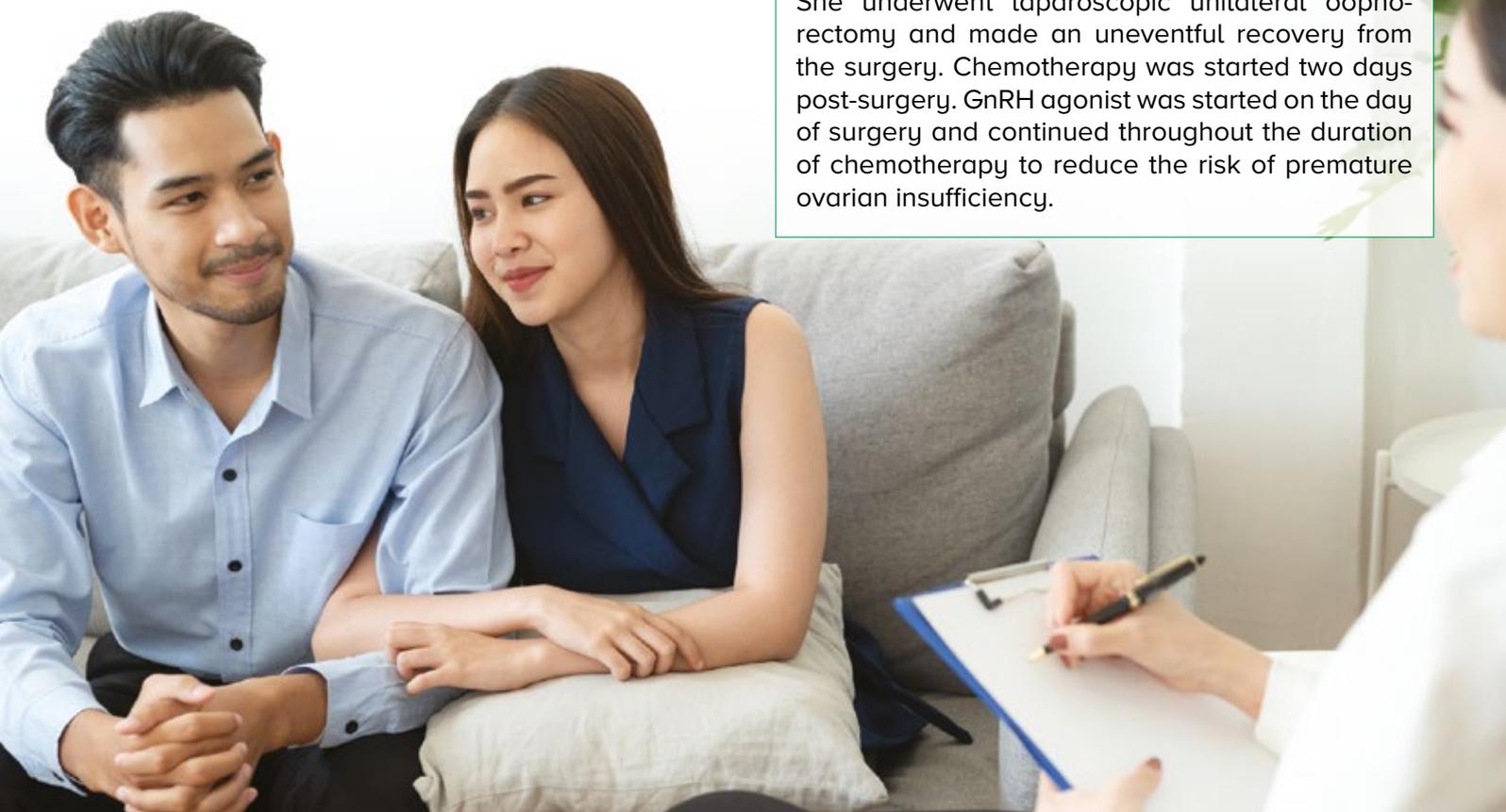
Assessment and counselling

The patient was offered ovarian tissue freezing as there was insufficient time for the ovarian stimulation needed for egg freezing.

She was reviewed by the anaesthetist prior to surgery and was assessed to be low-risk for general anaesthesia. In addition to the operative risks, the patient was also counselled about the risk of ovarian metastasis and reimplantation of the original malignancy with ovarian tissue grafting, although the risk is small with Hodgkin's lymphoma.

Fertility preservation and chemotherapy

She underwent laparoscopic unilateral oophorectomy and made an uneventful recovery from the surgery. Chemotherapy was started two days post-surgery. GnRH agonist was started on the day of surgery and continued throughout the duration of chemotherapy to reduce the risk of premature ovarian insufficiency.



TAKE-HOME MESSAGES FOR GPs

As cancer survival rates for children and young adults improve and patients are looking to enhance their quality of life after cancer survival, the demand for fertility preservation services will increase. General practitioners may occasionally see young women who have been cured from cancer in their practice.

It is important to be aware that these patients are likely to have a reduced fertility potential compared to their counterparts in the same age group. Many of these patients may not have had the opportunity to receive fertility counselling before starting cancer treatment. Some of these patients may have been offered fertility preservation at the point of diagnosis,

but may have been too overwhelmed to pursue any definitive fertility preservation procedures.

For cancer patients who are keen to start a family, the fertility discussion does not stop with cancer treatment. It is equally important to continue this conversation after treatment has been completed, given the limited reproductive lifespan of many of these women.

As long as premature ovarian insufficiency has not occurred, there is still a role for fertility preservation after cancer treatment, although pregnancy outcomes would be expected to be inferior to that before starting cancer treatment.

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Dr Serene Lim is a Consultant at Singapore General Hospital. She received her specialist accreditation in obstetrics and gynaecology in 2015. In 2018, she was awarded the Health Manpower Development Plan Scholarship by the Singapore Ministry of Health to pursue a one-year fellowship in reproductive medicine and fertility preservation with Professor Kate Stern at the Royal Women's Hospital, Melbourne. Dr Lim sees both general obstetrics and gynaecology patients and has clinical interests in reproductive medicine, infertility, fertility preservation, in-vitro fertilisation, pregnancy and labour care.



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A Growing Shift Towards Outpatient and Home-Based Autologous Haematopoietic Stem Cell Transplantation

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With the growing shift from inpatient to outpatient and home-based autologous haematopoietic stem cell transplantation, patients benefit from shorter inpatient stays, lower rates of nosocomial infections, and earlier return to independent functioning. The SingHealth Duke-NUS Transplant Centre shares how a shared-care model with general practitioners is envisaged in post-transplant monitoring and care in the near future.



INTRODUCTION

Haematological malignancies are on the rise worldwide, and Singapore is no exception. These increased incidence rates have been attributed to our ageing population, improvement in diagnosis and reporting and even environmental factors. In the 2018 Singapore Cancer Registry Report, lymphoid malignancies were ranked as the fifth most common cancer in males, and the sixth most common cancer in females.

AUTOLOGOUS HAEMATPOIETIC STEM CELL TRANSPLANTATION

Autologous haematopoietic stem cell transplantation (auto-HSCT) is the cornerstone for treatment in relapsed B-cell lymphomas, and is also used as consolidative therapy in first-line treatment for T-cell lymphomas and multiple myeloma.

The increased incidence of haematological malignancies has also led to a steady increase in the number of auto-HSCTs performed at Singapore General Hospital (SGH) over the years (**Figure 1**).

Autologous Cell Therapies Performed at SGH (2012-2021)

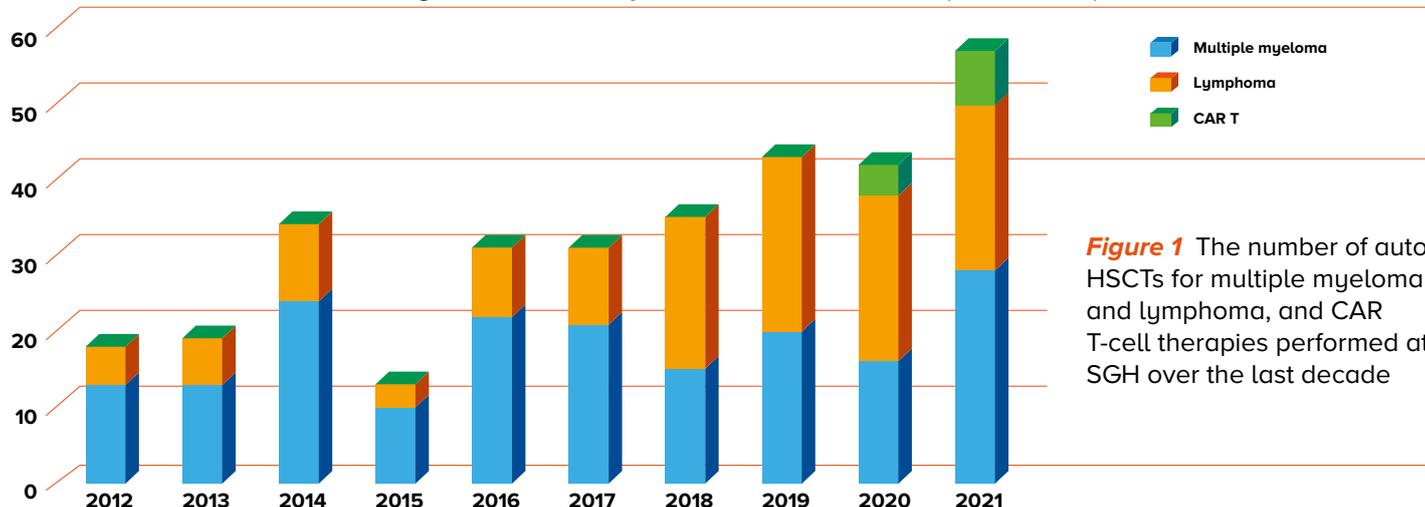


Figure 1 The number of auto-HSCTs for multiple myeloma and lymphoma, and CAR T-cell therapies performed at SGH over the last decade

A SHIFT FROM INPATIENT TO OUTPATIENT AND HOME-BASED AUTO-HSCT

An auto-HSCT comprises conditioning therapy for disease-directed cytotoxicity followed by infusion of stem cells previously collected from patients as a form of stem cell rescue.

Conditioning and stem cell infusion have traditionally been given in an inpatient setting, followed by a prolonged course of post-transplant monitoring, with a total stay of approximately three to four weeks. This is costly and also creates a significant strain on inpatient resources.

In a move to conserve inpatient resources, there has been a move towards outpatient and home-based auto-HSCTs.

Through forward planning and provision for access to outpatient and home-based medical and nursing support, conditioning regimens and post-transplant monitoring for stem cell transplants can be performed in the outpatient and home-based setting in a safe and effective manner.

THE INPATIENT AUTO-HSCT PATIENT JOURNEY

Auto-HSCTs are typically used in patients requiring high doses of chemotherapy, which are likely to damage the bone marrow. Healthy stem cells that were previously harvested from the patient are infused after the delivery of high-dose chemotherapy, to replace the damaged bone marrow.

The auto-HSCT journey typically involves three phases:

- **Pre-transplant**
- **Peri-transplant**
- **Post-transplant**

Pre-transplant

In the pre-transplant phase, patients will be admitted into the hospital. A central venous catheter will be inserted and patients will receive pre-transplant hyperhydration and conditioning chemotherapy. Their previously collected frozen stem cells will be reinfused back to them. The day of stem cell infusion is routinely called Day 0.

Peri-transplant

Patients will stay in an isolation room in the hospital throughout the peri-transplant phase, where their blood counts will nadir before blood count engraftment.

Neutropaenic phase

The main treatment-related morbidity and mortalities occur during the period of neutropaenia where patients are at risk of infective complications. The neutropaenic phase usually sets in from Day +3 to Day +5, and patients may remain neutropaenic for another seven to ten days before their stem cells engraft.

During this period, patients may develop neutropaenic fever, experience mucositis and/or develop significant gastrointestinal symptoms of nausea and vomiting, and abdominal cramps with severe diarrhoea.

The patients may require broad-spectrum intravenous antibiotics, intensive electrolyte repletion, transfusion of blood products and administration of opioids for oral pain control as well as other symptom-relieving medications.

Monitoring, support and recovery

The entire peri-transplant period typically ranges between 12-15 days. Whilst admitted, patients' vital signs will be monitored closely, and strict intake and output charted accurately to guide intravenous fluid and electrolyte repletion.

In certain patients, parenteral nutrition may be necessary during this peri-transplant period. Some patients may experience temporary fragility and will require assistance in performing and completing some of their activities of daily living, such as toileting and ambulation.

In general, almost all patients recover well and can be discharged after two to four weeks of hospital stay.

Seemingly complex, the blood count nadir and engraftment periods for this form of auto-HSCT are fairly predictable. This predictability enables clinicians to schedule for the procedure in the outpatient or home environment.

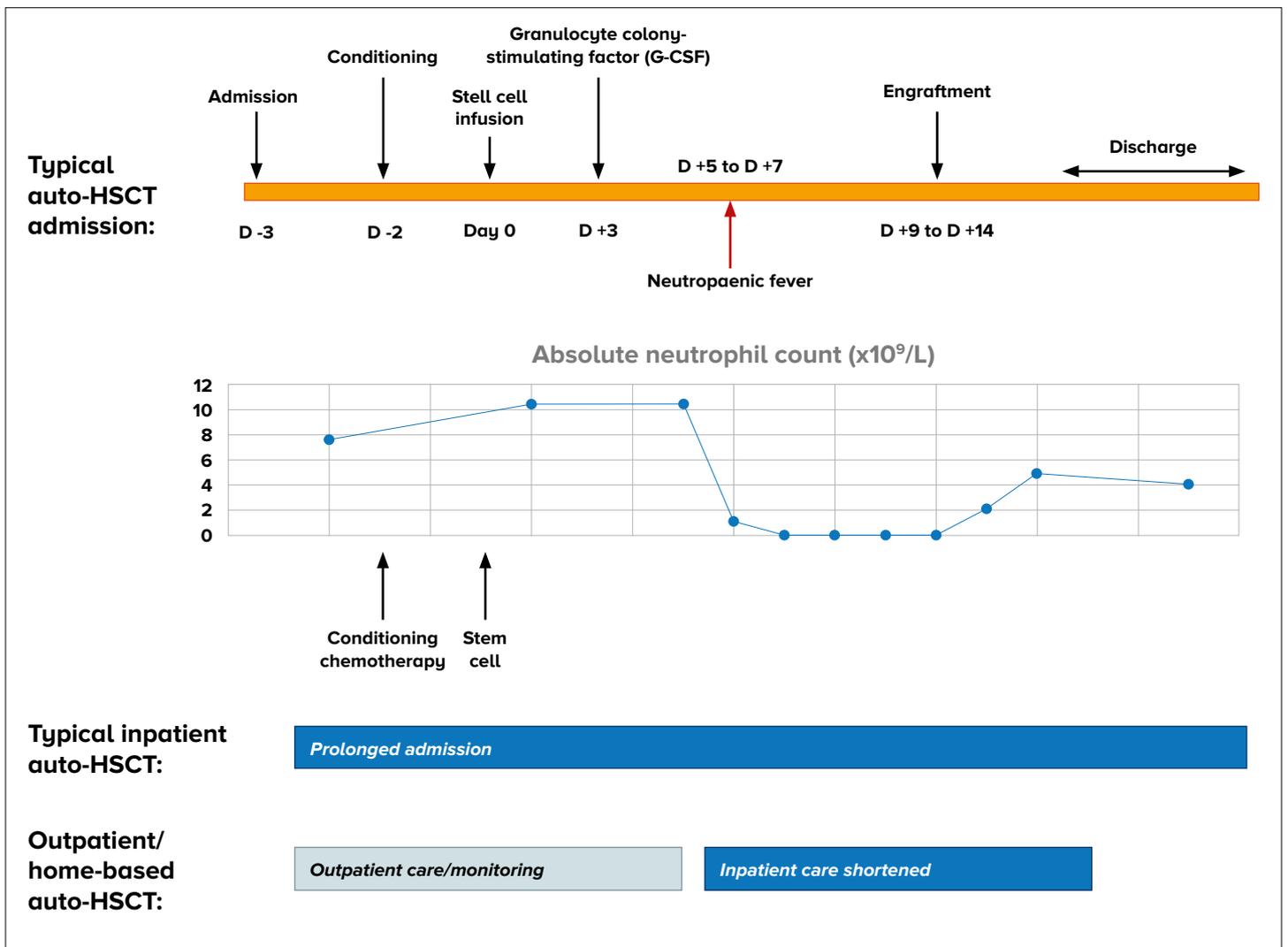


Figure 2 The typical patient journey for an inpatient and outpatient/home-based auto-HSCT

The Outpatient / Home-Based Auto-HSCT Patient Journey

As shown in *Figure 2*, some patients can be selected to undergo outpatient or home-based auto-HSCTs.

Benefits to patients

In such situations, the conditioning chemotherapy and stem cell infusion are initiated in the outpatient setting. Patients are then monitored closely in the outpatient or home setting and may be admitted during the period of neutropaenia, or should the patient develop transplant-related complications. This **shortens the inpatient stay period significantly**.

As compared to an inpatient auto-HSCT, outpatient and/or home-based auto-HSCTs may also **reduce rates of nosocomial infections, which facilitates earlier return to independent functioning with improved reintegration** into family and professional lives.

Pre-transplant

Initial pre-transplant interventions

Patients undergoing the outpatient/home-based auto-HSCT may choose to receive their pre-transplant phase interventions either as an outpatient day admission at the SGH Haematology Centre, or as an inpatient hospital admission.

- Patients who opt to receive treatment as an outpatient will go to the SGH Haematology Centre as scheduled to receive their pre-transplant conditioning chemotherapy, as well as the reinfusion of their stem cells.
- Patients who choose to be admitted to the hospital to receive their pre-transplant treatment will be discharged from hospital after they receive their stem cell infusion.

Both groups of patients will be prescribed with prophylaxis medications to be taken strictly, as well as common symptom-preventive medications that can be consumed if required.

Follow-up review and instructions

Patients will be scheduled to return to the SGH Haematology Centre at least two to three times a week for blood tests. There will also be scheduled physical or virtual reviews with either the transplant physician or transplant advanced practice nurse.

Patients are given clear instructions to return promptly to either the hospital emergency room after hours or the SGH Haematology Centre during office hours, if they develop a fever or feel unwell. Patients will also receive a memo with clear instructions to provide to the healthcare personnel who will be attending to them.

Peri-transplant

During the peri-transplant period at home, patients or their live-in caregivers are required to check their temperatures and blood pressures at least four times a day, or more frequently if required.

They will be given clear instructions on a no-visitor policy, adherence to strict neutropaenic food precautions, maintenance of good personal hygiene, as well as the accurate charting of intake and output records.

During this peri-engraftment period, patients commonly get readmitted to hospital for neutropaenic fever, severe diarrhoea or mucositis that affects their ability to consume fluids orally.

Some patients may be discharged home from the hospital if well after three to five days of stay, while other patients may be discharged after blood count engraftment and resolution of symptoms.

PATIENT SELECTION CRITERIA FOR OUTPATIENT / HOME-BASED AUTO-HSCT

When undergoing outpatient or home-based auto-HSCT, part of the care responsibilities will be on the patient and their caregiver(s). Hence, proper patient selection is important in ensuring a safe treatment journey.

To qualify, the patient must:

1. Be committed in taking all prescribed medications, adhering to medical and care advice, and returning to hospital according to the visit schedule and promptly if unwell
2. Have a dedicated 24-hour caregiver who will be with the patient, and is well and committed to accompanying the patient back to the hospital according to schedule, and promptly if the patient is unwell
3. Have a functional thermometer and blood pressure monitoring machine



THE GP'S ROLE: A VISION OF SHARED CARE

General practitioners (GPs) may progressively be involved in providing community or home-based care for such patients.

In the current model, patients return relatively frequently to the outpatient haematology clinic for symptom review, monitoring of blood counts and to receive electrolyte infusions or transfusions where necessary. Patients and caregivers often find travelling back to the hospital time-consuming, and it may also affect the patient's rest in the acute post-transplant period.

We envision a shared-care model in the future, where GPs can partner with hospitalists to provide post-transplant monitoring.

In the shared-care model, GPs can accord patients with community-based or home-based care, such as reviewing a patient's clinical symptoms and sending for laboratory investigations.

As part of the outpatient and home-based transplant team, they will be able to contact the transplant physician easily such that the patient can be seamlessly transferred back to the hospital to receive outpatient therapies or inpatient care, should the need arise.

FUTURE DEVELOPMENTS

There are also ongoing efforts looking into wearable vital monitoring devices that can be reflected in the hospital clinical charts, with appropriate thresholds set for the transplant physician or nurse to be notified. Such early warning systems can enable the team to reach out to the patients and advise early return to the hospital in a timely manner.

CONCLUSION

With a projected increase in the number of stem cell transplants and cellular therapies being performed for patients with haematological malignancies, there is now an accompanied increased need to pursue outpatient and home-based auto-HSCT.

Through close communication and monitoring of patients by a core group of transplant physicians, nurses, coordinators and community-based healthcare professionals, outpatient and home-based auto-HSCT enables patients to benefit by having their hospitalisations shortened, and having their post-transplant care take place in an environment they are most comfortable with.



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She works with a dedicated team of physicians and allied health professionals in the Haematopoietic Stem Cell Transplant Programme to deliver CAR T cells to patients as well as to develop outpatient transplant services.



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To find out more about our transplant programmes, GPs can contact the **SingHealth Duke-NUS Transplant Centre** or scan the QR code to visit the website.

Tel: **6312 2720**

Email: sd.transplant.centre@singhealth.com.sg



Common Shoulder Conditions and Their Management

Dr Benjamin Ang

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General practitioners are commonly presented with shoulder pain in their practice, where they are well-positioned to detect and administer first-line treatment for the underlying conditions. Read on for a review of common shoulder conditions and their management in primary care.

INTRODUCTION

Shoulder pain is a common presenting complaint seen in the primary care setting. Its causes may include:

- Frozen shoulder / adhesive capsulitis
- Rotator cuff tendinopathy
- Rotator cuff tear
- Subacromial impingement / bursitis
- Biceps tendinopathy
- Biceps tear
- Acromioclavicular joint (ACJ) osteoarthritis
- Glenohumeral joint osteoarthritis
- Cuff tear arthropathy

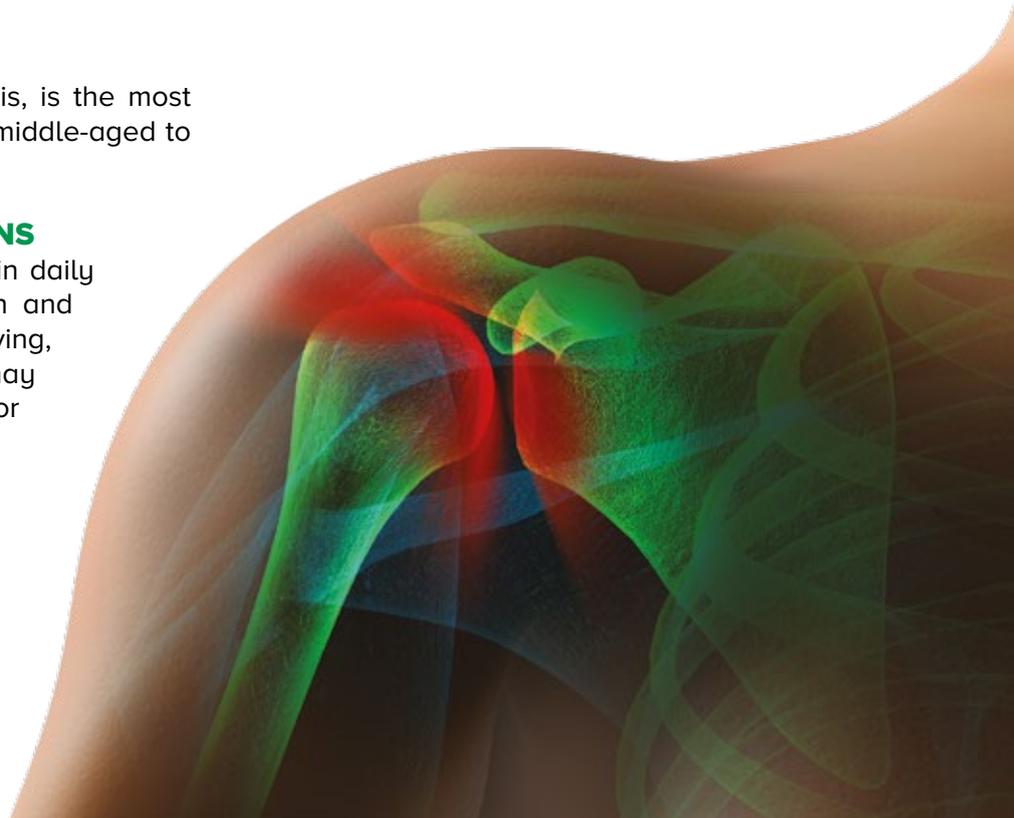
Frozen shoulder, or adhesive capsulitis, is the most common shoulder condition affecting middle-aged to elderly patients.

COMMON SHOULDER CONDITIONS

The upper limbs are frequently used in daily life, and any impairment due to pain and stiffness can limit activities of daily living, such as dressing or self-care, and may also result in difficulties with sleep or lying on the affected side.

The common presenting complaints, signs and symptoms during physical examination, and treatment options for the various common conditions are summarised in **Table 1**. Very often, a patient may have several co-existing conditions and thus present with a mixture of complaints, signs and symptoms.

It is important to exclude a cervicogenic source of pain by taking a history of neck pain, radiating pain down the forearm and numbness in the upper limb. It is also important to rule out non-orthopaedic differentials of shoulder pain, such as cardiac or gallbladder disease.



COMMON SHOULDER CONDITIONS

Condition	Presenting complaint	Signs and symptoms	Injections	Surgical intervention
Frozen shoulder / adhesive capsulitis	Shoulder pain and/or stiffness	Limited active and passive range of motion	Glenohumeral joint H&L and hydrodilatation	Arthroscopic capsular release and manipulation under anaesthesia
Rotator cuff tendinopathy, rotator cuff tear	Shoulder pain and/or weakness	Weakness, painful arc, drop arm sign positive	Not recommended for rotator cuff tear	Arthroscopic rotator cuff debridement/repair/augmentation
Subacromial impingement / bursitis	Shoulder pain in certain positions	Hawkins-Kennedy test positive, Neer's test positive	Subacromial H&L	Arthroscopic subacromial decompression, bursectomy, acromioplasty
Biceps tendinopathy, biceps tear	Shoulder pain over bicipital groove	Bicipital groove tenderness, Speed's test positive, Yergason's test positive, Popeye sign if complete tear	Bicipital groove H&L	Arthroscopic biceps tenotomy or tenodesis
Acromioclavicular joint (ACJ) osteoarthritis	Shoulder pain over ACJ	ACJ tenderness, cross-body adduction test positive	Acromioclavicular joint H&L	Arthroscopic excision of distal clavicle
Glenohumeral joint osteoarthritis	Shoulder pain and/or stiffness	Limited active and passive range of motion	-	Total shoulder arthroplasty
Cuff tear arthropathy	Shoulder pain and/or weakness	Weakness, painful arc, drop arm sign positive	-	Reverse shoulder arthroplasty

Table 1 Common shoulder conditions and their presenting complaints, signs and symptoms and treatment options
 H&L: Hydrocortisone and lignocaine

INVESTIGATIONS FOR COMMON SHOULDER INJURIES

X-rays, ultrasounds and magnetic resonance imaging (MRI) scans are the commonly performed investigations for shoulder pain work-up.

X-rays

In the context of trauma, basic X-rays are required to rule out fractures and dislocations. X-rays are recommended to rule out glenohumeral joint arthritis when diagnosing frozen shoulder. It can also serve as a baseline investigation and pick up acromioclavicular joint arthritis and subacromial spurs.

Ultrasounds

An ultrasound of the shoulder is useful to look for other concomitant conditions such as rotator cuff tears, subacromial bursitis and biceps tendinopathy. However, it is unable to pick up intra-articular lesions such as labral tears.

MRI

MRI is the most advanced imaging technique and also the most expensive. It allows for assessment of all the above conditions, and is the preferred mode of imaging for preoperative planning.

Managing Common Shoulder Injuries

Diabetes screening

For patients with frozen shoulder, screening for diabetes mellitus is recommended in view of the high correlation between the two conditions.

Oral analgesia and lifestyle modifications

In the primary care setting, oral analgesia such as paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) should be prescribed for pain relief. Topical NSAIDs may also be prescribed for more targeted local effect.

Inflammation from bursitis and arthritis may be improved from the use of NSAIDs. Advice for lifestyle modification may also be beneficial.

Physiotherapy

For most shoulder conditions, a trial of physiotherapy for at least a few months is recommended. Physiotherapy exercises can help improve shoulder range of motion and muscle strength, to help patients improve their abilities to perform daily activities.

Surgery

If the symptoms are severe and debilitating, and after failure of conservative management, different

surgical options as detailed in *Table 1* may be considered. Surgery is usually performed arthroscopically using a few keyhole incisions, except for arthroplasty (joint replacement) which requires an open approach.

The choice of procedures required will be individualised to the patient's signs, symptoms and underlying condition(s), with the appropriate procedures performed to address each individual pathology.

Surgery is also the only way to repair a torn rotator cuff. The other treatments mentioned above will not 'cure' it, but may help alleviate the patient's symptoms. For young patients with an acute, traumatic rotator cuff tear, early surgery is recommended. Otherwise, a trial of physiotherapy is preferred.

However, in certain cases of unrepaired rotator cuff tear, there is a risk of progression of the size of rotator cuff tear, and subsequently to end-stage cuff tear arthropathy.

SHOULDER DISLOCATION

In the younger population, shoulder dislocation is the most common shoulder complaint. Traumatic shoulder injuries may occur at any age, and are commonly associated with labral tears in young patients and rotator cuff tears in older patients.

Anterior dislocation is the most common direction of shoulder dislocation. It is usually a result of trauma, although recurrent dislocation may also be atraumatic. Posterior dislocation may be the result of electrocution or seizures.

Diagnosis

Clinically, painful range of motion and squaring of the shoulders is suspicious for dislocation.

X-rays, particularly axial or Velpeau views, are useful to diagnose dislocation, and to confirm enlocation after manipulation and reduction.

After reduction, **MRI** is the investigation of choice as it can pick up labral tears, Hill-Sachs lesions, and other intra-articular pathologies. For an elderly patient who suffers a dislocation, a rotator cuff tear is not uncommon and can be picked up on MRI as well.

With recurrent dislocations, there may be anterior glenoid bone loss or a large Hill-Sachs lesion. Occasionally, a **computed tomography (CT) scan** may be required for better assessment of the bony defect for surgical planning.

Management

Acute management of a dislocated shoulder involves **manipulation and reduction under sedation**. This is commonly done in the emergency department. After reduction, an arm sling may be used for support and to immobilise temporarily until the pain resolves.

The recommended treatment for recurrent shoulder dislocation is **surgery**. This may include labral repair, capsular plication, remplissage and/or bone block procedures. At the time of surgery, other concomitant pathologies may also be addressed.

Physiotherapy for strengthening of the rotator cuff muscles is also a crucial adjunct to prevent recurrence.

CONCLUSION

Analgesia, lifestyle modifications and physiotherapy are the first-line treatment for most shoulder conditions. Injections may be a useful adjunct in certain conditions. Surgical intervention should be considered after failure of conservative management. Surgery is the recommended initial treatment in certain cases, such as for young patients with an acute traumatic rotator cuff tear and for patients with recurrent shoulder dislocations.

THE DEPARTMENT OF ORTHOPAEDIC SURGERY AT SINGAPORE GENERAL HOSPITAL

Singapore General Hospital's Department of Orthopaedic Surgery performs an average of over 400 shoulder surgeries per year. The department's Sports Service does a large majority of these surgeries, including arthroscopic surgeries and open surgeries for arthroplasty – addressing all the above-mentioned conditions and others such as fractures.



Dr Benjamin Ang

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Dr Benjamin Ang is an Orthopaedic Surgeon with the Department of Orthopaedic Surgery in Singapore General Hospital. He is an avid sportsman and has previously represented Singapore at international competitions in track & field and floorball. With first-hand experience and a personal understanding of an athlete's psyche, he sub-specialises in sports orthopaedics. His interests lie in managing shoulder, hip and knee conditions. He was awarded the Ministry of Health HMDP (Health Manpower Development Plan) award for further fellowship training in hip surgery in Switzerland.

GPs who would like more information about these conditions and procedures may contact Dr Ang at benjamin.ang.f.h@singhealth.com.sg.



GP Appointment Hotline: **6326 6060**

GPs can scan the QR code for more information about the department.



Limb Salvage in Complex Diabetic Foot Wounds – A Multidisciplinary Approach

Dr Lew Pei Shi

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Major amputation of the lower limb is one of the most devastating complications of diabetes, and many cases begin as a foot ulcer. General practitioners play an important role through patient education, foot screening and the identification of ‘foot at risk’ patients for a timely referral to a tertiary centre, to reduce the risk of amputation.

INTRODUCTION

Diabetes mellitus is one of the most significant causes of ill health and disease in Singapore. The lifetime risk of developing diabetes is one in three among Singaporeans, and the number of those with diabetes is projected to surpass one million by 2050.¹ This is associated with a projected increased expenditure in the care of these Singaporeans, which is estimated to rise to SGD 2.5 billion by 2050.²

DIABETES AND LOWER LIMB AMPUTATION

Major amputation of the lower limb is one of the most devastating complications of diabetes. Disability is common after amputation, and removing the individual from the workforce will cause further economic burden.

Foot ulceration due to neuropathy and repetitive trauma, complicated by infection and ischaemia, is the underlying pathway to amputation. The lifetime incidence of developing a foot ulcer may be as high as 25% in persons with diabetes³, and 84% of non-traumatic limb amputations are preceded by foot ulcers⁴.

Patients with diabetes have a tenfold higher risk of amputation compared to the general population.⁵ The prognosis after lower limb amputation is poor, with one-year mortality of up to 30% in Singapore.⁶

DIABETIC FOOT WOUND MANAGEMENT

The key to management of diabetic foot wounds is **prevention**, through education, foot screening and advice on appropriate foot care and footwear.

However, if a wound develops, it should be promptly referred to a tertiary centre for management by a multidisciplinary limb salvage team.

In 2009, Fitzgerald introduced the ‘toe and flow’ concept of the diabetic foot team.⁷ The ‘irreducible minimum’ of the team consists of a vascular surgeon and podiatrist, with frequent inclusion of additional specialists as available and necessary.

A systematic review by Musuuza et al. in 2020 reported a reduction in major amputation for diabetic foot wounds in 94% of the studies, and up to 51% absolute or 89% relative reduction in major amputation associated with management by multidisciplinary teams.⁸

The team compositions varied between studies, and included surgeons, physicians and allied health professionals. Four key clinical tasks commonly addressed were glycaemic control, local wound management, vascular disease and infection. The teams functioned in both inpatient and outpatient settings.

Multidisciplinary Care for Diabetic Foot Wounds at Changi General Hospital

The **Changi General Hospital (CGH) Vascular and Endovascular Surgery Service** has been involved in the care of diabetic foot wounds for many years. We have a specialised multidisciplinary team caring for these patients.

In the inpatient setting, the multidisciplinary team conducts ward rounds together every day to ensure optimal medical and wound care. For the past nine years, our service has had a consistent **limb salvage rate of more than 90%** at six months post-intervention.

THE CGH WOUND HEALING CENTRE

The CGH Wound Healing Centre provides a **one-stop outpatient multidisciplinary service for the evaluation and management of chronic wounds**, including diabetic foot wounds. The centre is helmed by board-accredited specialists from Vascular Surgery, Orthopaedic Surgery and Plastic Surgery.

Specialised wound care nurses conduct consultations, perform therapy for complex wounds and leverage a variety of technologies for wound management. Podiatrists perform gait analysis, biomechanical intervention and pressure offloading, and advise on proper foot care and footwear.

OUR FACILITIES AND CARE TEAM

There are facilities for bedside wound debridement (**Figure 1**) and advanced wound care such as the application of negative pressure wound therapy, ultrasound and electrical stimulation, and ultrasonic wound debridement (**Figure 2**). Diagnostic facilities such as ultrasonography for arterial disease and transcutaneous oxygen measurements are also available at our centre.

Our care team is certified by the American Board of Wound Management (ABWM) as Certified Wound Specialist Physicians (doctors) and Certified Wound Specialists (nurses and podiatrists).



Figure 1 The wound examination and dressing room has seven beds and ample space to allow for wheelchair access

OUR SERVICES

- Wound assessment
- Ultrasonography for arterial/venous pathology
- Transcutaneous oxygen measurement
- Conservative sharp wound debridement
- Simple/complex wound dressing
- Compression therapy for venous ulcers
- Negative pressure wound therapy
- Ultrasound and electrical stimulation for wound healing
- Ultrasonic-assisted wound debridement
- Podiatry for diabetic foot care



Figure 2 Advanced Practice Nurse Cheng Shuhua performing bedside ultrasonic wound debridement on a patient

CASE STUDY

Background and presentation

Mr A is a 63-year-old Indian male with a history of diabetes mellitus, hypertension and ischaemic heart disease. He is independent in his activities of daily living and is community ambulant with no aids.

He presented to us with a poor-healing wound on his right heel associated with increasing swelling and pain (*Figure 3*).



Figure 3 Infected right heel wound before and after initial debridement

He was previously seen by a general practitioner (GP) and private vascular surgeon who advised him to go to a public institution for further management, as primary management with antibiotics and wound dressing did not improve the situation. He was not compliant with his diabetes medications.

Evaluation

On evaluation, Mr A was found to have right lower limb chronic limb-threatening ischaemia with an infected right heel wound and underlying calcaneal osteomyelitis. He also had poorly-controlled diabetes with a random fasting glucose of 17.2 mmol/L and HBA1c of 10.3%.

Multidisciplinary management

Mr A was reviewed by the endocrinologist for control of his diabetes and titration of his diabetes medications. He was also seen by the dietitian and diabetes nurse educator to reinforce his knowledge on diabetes control.



Figure 4 A clean wound was achieved after another two surgical debridements with partial calcaneectomy performed

He underwent right lower limb angioplasty and debridement of the right heel wound. The infection was very extensive, involving the plantar fat pad and plantar fascia. He required another two surgical debridements and partial calcaneectomy to achieve a clean wound, but the resultant wound was a large defect in the right heel (*Figure 4*).

He was reviewed by the Plastic and Reconstructive Surgery team, and was offered the options of free flap reconstruction versus fish skin dermal substitute and negative pressure wound therapy. Mr A opted for the latter (*Figure 5*).



Figure 5 Application of fish skin dermal substitute to right heel wound

Mr A's care was mainly led by the vascular surgeon, with contributions from the plastic surgeon, endocrinologist, infectious disease physician and allied health professionals including wound care nurses, podiatrists, physiotherapists and a diabetes nurse educator.

Patient outcomes

After several surgical procedures for wound debridement and application of fish skin dermal substitute, Mr A's wound healed at seven months after his first operation (*Figure 6*). He maintains functional status and the ability to walk.



Figure 6 From left to right: three, six and seven months after first surgery

THE ROLE OF GPs IN DIABETIC FOOT CARE

GPs play an important role in the prevention of diabetic foot ulcers through patient and caregiver education, foot screening, advice on foot care and footwear, and the identification of 'foot at risk' patients for referral to a tertiary centre for further evaluation.

Determining the risk of foot ulcers

The key risk factors for development of foot ulcerations are:

- Loss of protective sensation (LOPS) / peripheral neuropathy
- One or both distal pulses not being palpable / peripheral arterial disease (PAD)
- Presence of foot deformity or callosity

The International Working Group of the Diabetic Foot (IWGDF) risk stratification system uses these three factors to advise on foot screening and examination frequency (**Table 1**).

Patient and caregiver education

Patient and caregiver education includes the following advice:⁹

- Do not walk barefoot, in socks without shoes, or in thin-soled slippers, whether indoors or outdoors
- Inspect daily the entire surface of both feet, and the insides of the shoes that will be worn
- Wash feet daily with careful drying, especially in between toes
- Use emollients to lubricate dry skin
- Cut toenails straight across
- Avoid using chemical agents, plasters or any other technique to remove calluses or corns
- Self-monitor foot skin temperature to identify early signs of inflammation
- Wear appropriate footwear that accommodates the shape of the feet and fits properly, to reduce plantar pressure and help prevent a foot ulcer

Category	Ulcer risk	Characteristics	Frequency
0	Very low	No LOPS and no PAD	Once a year
1	Low	LOPS or PAD	Once every 6-12 months
2	Moderate	LOPS + PAD, or LOPS + foot deformity, or PAD + foot deformity	Once every 3-6 months
3	High	LOPS or PAD, and one or more of the following: <ul style="list-style-type: none"> • History of a foot ulcer • A lower-extremity amputation (minor or major) • End-stage renal disease 	Once every 1-3 months

Table 1 The IWGDF risk stratification system⁹

CONCLUSION

The key to decreasing the incidence of diabetic foot ulceration is prevention. If a foot ulcer develops, the patient should be referred to a tertiary centre for multidisciplinary management to reduce the risk of major amputation.

The CGH Wound Healing Centre is a multidisciplinary outpatient facility focusing on early intervention and the fast-track treatment of such patients. Together, we work towards one goal to improve limb salvage rates in diabetic patients, and to maintain their functional status and integrity.

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To view all references, please refer to the online version of *Defining Med* by scanning the QR code on the cover page.



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GPs can call the **SingHealth Duke-NUS Vascular Centre** for appointments at the following hotlines, or scan the QR code for more information:

**Singapore
General
Hospital**
6326 6060

**Changi
General
Hospital**
6788 3003

**Sengkang
General
Hospital**
6930 6000

**KK Women's
and Children's
Hospital**
6692 2984

**National
Heart Centre
Singapore**
6704 2222



Delivering the Gift of Life and Gift of Hope

The SingHealth Duke-NUS Transplant Centre

The SingHealth Duke-NUS Transplant Centre was established in 2010, comprising all the transplant programmes within the SingHealth cluster under one roof.

The Transplant Centre consists of transplant physicians, psychologists, medical social workers, transplant coordinators, administrators, pharmacists and nutritionists coming together as healthcare professionals dedicated to the art and science of transplantation. This is a centre where the entry requirements are a passion and love for the practice of transplantation to benefit our patients.

ABOUT THE TRANSPLANT CENTRE

As part of the SingHealth Duke-NUS Academic Medical Centre, the Transplant Centre is now home to clinical research and expertise in transplant, with research and education capabilities to develop novel and educational activities for our programmes. In addition, it is also a strong advocate for organ donation.

The 'under one roof' philosophy has allowed us to relentlessly pursue the improvement of the quality of our programmes, as well as the survival rate and long-

term outcomes. More importantly, it has allowed us to learn from each other and respond to the changing needs in transplantation.

United under the umbrella of the Transplant Centre, our transplant programmes were able to respond to the COVID-19 pandemic in a timely and robust manner, allowing us to continue organ donation and transplantation safely for our patients.

Our Transplant Programmes



**Cardiovascular
Homograft**



Cord Blood



Cornea



Heart



Kidney



Liver



Lung



Ovarian Tissue



Pancreas - Kidney



Skin



**Haematopoietic Stem Cell
(Adult and Paediatric)**

To find out more about our transplant programmes, please contact the
SingHealth Duke-NUS Transplant Centre:

Email: sd.transplant.centre@singhealth.com.sg

Tel: 6312 2720

Website: www.singhealth.com.sg/transplant-centre

ENHANCING CLINICAL SERVICES, QUALITY AND SAFETY

Since its inception, 12,884 transplants have been performed, giving new life and new hope to patients and families. In 2020, 445 transplants were performed and 15 deceased donor organ transplants were made possible by the gifts from eight donors.

Transplant care management is highly complex, involving clinical practitioners from multiple disciplines and diverse patient profiles. Leveraging the rapid development of data infrastructure, machine-learning modelling and the rich patient-

level data repository in electronic medical records, we have launched a patient-centric transplant quality improvement initiative.

Data quality metric surveillance is applied to ensure accuracy in the patient journey by data mapping. This has been a result of the adoption of advanced data analytics to extract insights into potential interventions for improvement from our complex transplantation data.

RESEARCH AND INNOVATION

The SingHealth Duke-NUS Transplant Centre has launched numerous research projects to enhance and expand our transplant services, research and talent pool. These research projects have provided answers to the unknown – filling gaps in knowledge and changing the way healthcare professionals work.

Examples of our efforts to push the frontiers of transplantation in Singapore include strategies for developing immune tolerance and a novel multivisceral research project.

EDUCATION AND ENGAGEMENT

Education and engagement involves transplant healthcare workers, patients and the public.

The Transplant Centre actively engages healthcare professionals and communities through educational activities including symposiums and educational seminars/workshops, both locally and regionally, to increase knowledge and awareness about transplant donation and advances in organ transplantation.

Informational videos and social media are some platforms used to reach out to our stakeholders. We

also provide learning opportunities and educational resources to transplant healthcare professionals for training, as well as for those seeking continuing education.

Transplant outreach is a critical element to us. We strive to improve patient access for transplant information through community education, individualised information about treatment options and building strong relationships with community medical providers.

Specialist Promotions & Appointments

NEW APPOINTMENTS



Assoc Prof Low Lian Leng
Consultant, Family Medicine & Continuing Care;
Chief Medical Informatics Officer, SingHealth Office of Regional Health;
Head, Department of Post-Acute & Continuing Care, SCH @ OCH;
Director, SingHealth Office of Regional Health, SGH Campus;
Director, PHICO;
Co-Director, Centre for Population Health Research and Implementation



Assoc Prof Goh Boon Bee George
Senior Consultant, Gastroenterology & Hepatology;
Director, Clinical Trials and Research Centre (CTRC)



Dr Geoffrey Sithamparapillai Samuel
Head & Senior Consultant,
Rehabilitation Medicine

APPOINTMENTS – CONSULTANTS



Dr Goh Hui Fen Jacqueline
Consultant
Dept
Anaesthesiology



Dr Michael Kynoch
Consultant
Dept
Anaesthesiology

APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Chai Jia Xin
Associate Consultant
Dept
Anaesthesiology



Dr Deborah Khoo Wen Shi
Associate Consultant
Dept
Anaesthesiology



Dr Lim Yan Yin Denise
Associate Consultant
Dept
Anaesthesiology



Dr Sim Xiu Ling, Jacqueline
Associate Consultant
Dept
Anaesthesiology



Dr Zhang Qianpian
Associate Consultant
Dept
Anaesthesiology



Dr Cheo Fan Foon
Associate Consultant
Dept
Anatomical Pathology



Dr Chow Chun Yuen
Associate Consultant
Dept
Anatomical Pathology



Dr Chen Hui, Lionel Raphael
Associate Consultant
Dept
Colorectal Surgery



Dr Koo Chee Hoe
Associate Consultant
Dept
Colorectal Surgery

Specialist Promotions & Appointments

APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Hui Li Yao, Laura
Associate Consultant
Dept
Dermatology



Dr Choong Chu Ming, Mindy
Associate Consultant
Dept
Diagnostic Radiology



Dr Hou Wenlu
Associate Consultant
Dept
Diagnostic Radiology



Dr Sivashankar Subramaniam
Associate Consultant
Dept
Diagnostic Radiology



Dr Tan Jin Rong
Associate Consultant
Dept
Diagnostic Radiology



Dr Tran Nguyen Tuan Anh
Associate Consultant
Dept
Diagnostic Radiology



Dr Wong Chen Pong
Associate Consultant
Dept
Diagnostic Radiology



Dr Wong Hui Lin
Associate Consultant
Dept
Diagnostic Radiology



Dr Ho Fu Wah Andrew
Associate Consultant
Dept
Emergency Medicine



Dr Marcus Lee Aik Beng
Associate Consultant
Dept
Emergency Medicine



Dr Lim Kim Wei
Associate Consultant
Dept
Gastroenterology and Hepatology



Dr Tay Shu Wen
Associate Consultant
Dept
Gastroenterology and Hepatology



Dr Teh Kim Jun, Kevin
Associate Consultant
Dept
Gastroenterology and Hepatology



Dr Wu Chun Ho, Clement
Associate Consultant
Dept
Gastroenterology and Hepatology



Dr Ling Xiao Shuang
Associate Consultant
Dept
General Surgery



Dr Benjamin Poh Ruimin
Associate Consultant
Dept
General Surgery



Dr Eliza Sin I-Lin
Associate Consultant
Dept
General Surgery



Dr Arifin Trina
Associate Consultant
Dept
Geriatric Medicine



Dr Fong Sheng
Associate Consultant
Dept
Geriatric Medicine



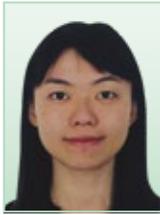
Dr Joyce Tie Lin
Associate Consultant
Dept
Hand & Reconstructive Microsurgery



Dr Tan Hwee Leong
Associate Consultant
Dept
Hepato-pancreato-biliary & Transplant Surgery



APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Dorothy Ng Hui Lin
Associate Consultant
Dept
Infectious Diseases



Dr Wee Liang En, Ian
Associate Consultant
Dept
Infectious Diseases



Dr Zhou Yi
Associate Consultant
Dept
Internal Medicine



Dr Lai Chooi Mun, Deborah
Associate Consultant
Dept
Molecular Pathology



Dr Chua Ser Kenon
Associate Consultant
Dept
Orthopaedic Surgery



Dr Kiang Lei
Associate Consultant
Dept
Orthopaedic Surgery



Dr Liu Xuan
Associate Consultant
Dept
Orthopaedic Surgery



Dr Bryon Teo Jun Xiong
Associate Consultant
Dept
Orthopaedic Surgery



Dr Leong Zhou Hao
Associate Consultant
Dept
Otorhinolaryngology -
Head & Neck Surgery



Dr Png Lu Hui
Associate Consultant
Dept
Otorhinolaryngology -
Head & Neck Surgery



Dr Henry Chua Wenjie
Associate Consultant
Dept
Pain Medicine



Dr Tan Sein Jieh, Elizabeth
Associate Consultant
Dept
Pain Medicine



Dr Tan Pei Ling
Associate Consultant
Dept
Rehabilitation Medicine



Dr Liew Zhong Hong
Associate Consultant
Dept
Renal Medicine



Dr Tan Chee Wooi
Associate Consultant
Dept
Renal Medicine



Dr Koh Siew Hui, Michelle
Associate Consultant
Dept
Respiratory & Critical
Care Medicine



Dr Cheng Ming Hua
Associate Consultant
Dept
Surgical Intensive Care



Dr Yong Jin
Associate Consultant
Dept
Urology



Dr Tan Zehao
Associate Consultant
Dept
Vascular &
Interventional
Radiology

Specialist Promotions & Appointments

NEW APPOINTMENTS



Dr Mah Chou Liang
*Chief &
Senior Consultant*
Dept
Anaesthesia & Surgical
Intensive Care



Dr Tan Ki Wei
*Chief &
Senior Consultant*
Dept
Dermatology



**Dr Kwek Boon Eu
Andrew**
*Chief &
Senior Consultant*
Dept
Gastroenterology &
Hepatology



Dr Goh Kiat Sern
*Chief &
Senior Consultant*
Dept
Geriatric Medicine



**Dr Chien Mei Fong
Jaime**
*Chief &
Senior Consultant*
Dept
Infectious Diseases



**Adj Assoc Prof Chionh
Chang Yin**
*Chief &
Senior Consultant*
Dept
Medicine



Dr Sreekanth Koduri
*Chief &
Senior Consultant*
Dept
Renal Medicine



Dr Lim Ivy
*Chief &
Senior Consultant*
Dept
Sport & Exercise
Medicine

APPOINTMENTS – SENIOR CONSULTANTS



**Dr Low Chin Howe
Robin**
Senior Consultant
Dept
Chairman, Medical
Board's Office
(Occupational Medicine)



Dr Biju John
Senior Consultant
Dept
Renal Medicine

APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Lee Man Xin
Associate Consultant
Dept
Accident & Emergency



Dr Chan Wan Fen
Associate Consultant
Dept
Anaesthesia and
Surgical Intensive Care



Dr Ling Xi Wern
Associate Consultant
Dept
Anaesthesia and
Surgical Intensive
Care



APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Jessica Eleanor Malanjum
Associate Consultant
Dept
Anaesthesia and Surgical Intensive Care



Dr Tan Chun Lei
Associate Consultant
Dept
Anaesthesia and Surgical Intensive Care



Dr Zhang Xinyan
Associate Consultant
Dept
Anaesthesia and Surgical Intensive Care



Dr Seet Yert Li Melissa
Associate Consultant
Division of Breast Surgery



Dr Zhang Han
Associate Consultant
Dept
Diagnostic Radiology



Dr Zeng Wanling
Associate Consultant
Dept
Endocrinology



Dr Lin Weicong Kenneth
Associate Consultant
Dept
Gastroenterology & Hepatology



Dr Sng Chong Yu Edwin
Associate Consultant
Dept
Infectious Diseases



Dr Foong Wei Sheng
Associate Consultant
Dept
Orthopaedic Surgery



Dr Moo Ing How
Associate Consultant
Dept
Orthopaedic Surgery



Dr Loh Ming Ren John
Associate Consultant
Dept
Otorhinolaryngology - Head & Neck Surgery



Dr Pang Cui-Ying Maria Judith
Associate Consultant
Dept
Otorhinolaryngology - Head & Neck Surgery



Dr Li Yiding
Associate Consultant
Dept
Rehabilitation Medicine



Dr Sieow Yu-Fang Nicole
Associate Consultant
Dept
Respiratory & Critical Care Medicine



Dr Khor Yu Keat Andrew
Associate Consultant
Division of Rheumatology



Dr Tan Aik Khien Victor
Associate Consultant
Dept
Sport & Exercise Medicine

Specialist Promotions & Appointments

NEW APPOINTMENTS



Assoc Prof Melvin Chua Peng Wei
Chairman & Senior Consultant
Division of Medicine and Inpatient Care



Assoc Prof Derrick Aw Chen Wee
*Education Director, SKH Campus;
Senior Consultant*
Dept
General Medicine



Dr Angela Koh Fang Yung
Head & Senior Consultant
Dept
General Medicine



Dr Daniel Chong Thuan Tee
Head & Senior Consultant
Dept
Cardiology,
NHCS @ SKH



Dr Jean Lee Mui Hua
*Director,
Transitional Care and
Community Medicine;
Senior Consultant*
Dept
Emergency Medicine

APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Lee Mei Yi Lynette
*Associate Consultant,
Endocrinology*
Dept
General Medicine



Dr Tan Yan Chin
*Associate Consultant,
Haematology*
Dept
General Medicine



Dr Koh Chien Hsiang Cedric
*Associate Consultant,
Internal Medicine*
Dept
General Medicine



Dr Lim Shao Jiao Dorcas
*Associate Consultant,
Internal Medicine*
Dept
General Medicine



Dr Tay Sok Boon
*Associate Consultant,
Respiratory Medicine*
Dept
General Medicine



Dr Cher Wei Liang Eric
Associate Consultant
Dept
Orthopaedic Surgery



Dr Png Wenxian
Associate Consultant
Dept
Orthopaedic Surgery



Dr Low Wei Xiang Alvin
Associate Consultant
Dept
Urology



Dr Neo Shu Hui
Associate Consultant
Dept
Urology

NEW APPOINTMENTS



Dr Toh Han Wei Luke Michael
Head & Senior Consultant
Dept
Diagnostic and
Interventional Imaging



Dr Lee Yien Sien
*Deputy Head (Clinical
Operations and
Women's Imaging) &
Senior Consultant*
Dept
Diagnostic and
Interventional Imaging



Dr Tang Phua Hwee
*Deputy Head (Research
and Education and
Paediatric Imaging) &
Senior Consultant*
Dept
Diagnostic and
Interventional Imaging



PROMOTIONS – SENIOR CONSULTANTS



Dr Sandra Sylvia Mascarenhas
Senior Consultant
Dept
Child Development



Dr Zaw Lwin
Senior Consultant
Dept
Emergency Medicine



Dr Chow Chu-Tian, Cristelle
Senior Consultant
General Paediatrics Service



Dr Tewani Komal Girish
Senior Consultant
Dept
Gynaecological Oncology



Dr Amudha Jayanthi Anand
Senior Consultant
Dept
Neonatology



Dr Nirmal Kavalloor Visruthan
Senior Consultant
Dept
Neonatology



Dr Yip Wai Yan
Senior Consultant
Dept
Neonatology



Dr Rajeswari Kathirvel
Senior Consultant
Dept
Obstetrics and Gynaecology



Dr Koh Huiting, Lynn
Senior Consultant
Dept
Otolaryngology



Dr Low Mei-Yi
Senior Consultant
Dept
Otolaryngology



Dr Wong Pek Choo Adele
Senior Consultant
Dept
Pathology and Laboratory Medicine



Dr Kong Tze Yeun
Senior Consultant
Dept
Plastic, Reconstructive and Aesthetic Surgery



Dr Liu Shuling
Senior Consultant
Dept
Reproductive Medicine



Dr Tan Tse Yeun
Senior Consultant
Dept
Reproductive Medicine

PROMOTIONS – CONSULTANTS



Dr Lee May Ping
Consultant
Allergy Service



Dr Goh Suk-Hui Lynette
Consultant
Gastroenterology, Hepatology and Nutrition Service



Dr Chia Shi Yun
Consultant
General Paediatrics Service

Specialist Promotions & Appointments

PROMOTIONS – CONSULTANTS



Dr Lim Hwee Ying
Consultant

General Paediatrics
Service



Dr Ong Li Ming
Consultant

General Paediatrics
Service



**Dr Guadalupe Cara
Viegelmann**
Consultant

General Paediatrics
Service



Dr Koh Ai Ling
Consultant

Genetics Service



Dr Kam Kai-Qian
Consultant

Infectious Disease
Service



**Dr Karen Donceras
Nadua**
Consultant

Infectious Disease
Service



**Dr Lee Wai Kheong
Ryan
(Li Weiqiang Ryan)**
Consultant

Dept
Maternal Fetal Medicine



**Dr Ng Yang Huang
Grace (Huang Yanfang)**
Consultant

Dept
Maternal Fetal Medicine



Dr Ho Xin Yi
Consultant

Dept
Obstetrics and
Gynaecology



Dr Koh Meiling, Serena
Consultant

Dept
Obstetrics and
Gynaecology



Dr Ng Xinhui, Ada
Consultant

Dept
Obstetrics and
Gynaecology



Dr Geetha Visvalingam
Consultant

Dept
Obstetrics and
Gynaecology



**Dr Yong Su-Ern Jenica
(Yang Su'en)**
Consultant

Dept
Otolaryngology



Dr Teh Kai Liang
Consultant

Rheumatology and
Immunology Service



Dr Lim Ming Jian
Consultant

Dept
Women's Anaesthesia

APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Lin Bin, Cheryl
Associate Consultant

Children's Intensive
Care Unit



Dr Koo Chieh Shen
Associate Consultant

Dental Service



Dr Teo Jean Nee
Associate Consultant

Dept
Emergency Medicine



Dr Goh Siak Ming
Associate Consultant

Minimally Invasive
Surgery Unit



Dr Smita Jindal
Associate Consultant

Minimally Invasive
Surgery Unit



Dr Wan Kai Jing
Associate Consultant

Dept
Obstetrics and
Gynaecology



APPOINTMENT – CONSULTANT



**Dr Murugam
Vengadasalam**
Consultant

Division of Supportive
& Palliative Care

APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Tan Wei Chong
Associate Consultant

Dept
Breast and
Gynaecology,
Division of Medical
Oncology



Dr Zhang Zewen
Associate Consultant

Dept
Breast and
Gynaecology,
Division of Medical
Oncology



NEW APPOINTMENTS



Assoc Prof Jack Tan
Head & Senior Consultant

Dept
Cardiology
Sub-specialty
Interventional Cardiology



Assoc Prof Ewe See Hooi
Deputy Head & Senior Consultant

Dept
Cardiology
Sub-specialty
Echocardiography



Assoc Prof David Sim
Deputy Head & Senior Consultant

Dept
Cardiology
Sub-specialty
Heart Failure



Assoc Prof Chin Chee Tang
*Director, Coronary Intervention Service;
Senior Consultant*

Dept
Cardiology
Sub-specialty
Interventional Cardiology



Dr Koh Choong Hou
*Director, SAF Cardiac Fitness Centre;
Consultant*

Dept
Cardiology
Sub-specialties
Echocardiography, Cardiovascular
Rehabilitation & Preventive Cardiology,
Sports Cardiology



Assoc Prof Aaron Wong
*Deputy Chief Executive Officer
(Cardiac Care Network);
Senior Consultant*

Dept
Cardiology
Sub-specialty
Interventional Cardiology

Specialist Promotions & Appointments

NEW APPOINTMENTS



Assoc Prof Yeo Khung Keong
Deputy Chief Executive Officer (Data Science & Innovation); Senior Consultant
Dept
Cardiology
Sub-specialty
Interventional Cardiology



Asst Prof Ong Boon Hean
Deputy Head (Thoracic) & Senior Consultant
Dept
Cardiothoracic Surgery
Sub-specialties
Cardiac Surgery (Adult), Thoracic Surgery, Lung Transplantation

PROMOTIONS – SENIOR CONSULTANTS



Asst Prof Chin Chee Yang
Senior Consultant
Dept
Cardiology
Sub-specialty
Interventional Cardiology



Asst Prof Jeffrey Lau
Senior Consultant
Dept
Cardiology
Sub-specialty
Echocardiography



Asst Prof Paul Lim
Senior Consultant
Dept
Cardiology
Sub-specialty
Electrophysiology & Pacing



Asst Prof Louis Teo
Senior Consultant
Dept
Cardiology
Sub-specialties
Heart Failure, Echocardiography



Asst Prof Ong Boon Hean
Senior Consultant
Dept
Cardiothoracic Surgery
Sub-specialties
Cardiac Surgery (Adult), Thoracic Surgery, Lung Transplantation

PROMOTIONS – CONSULTANTS



Dr Chong Jun Hua
Consultant
Dept
Cardiology
Sub-specialty
Cardio-Oncology



Dr Zameer Bin Abdul Aziz
Consultant
Dept
Cardiothoracic Surgery
Sub-specialty
Cardiac Surgery (Adult)

APPOINTMENT – ASSOCIATE CONSULTANT



Dr Tham Yi Chuan
Associate Consultant
Dept
Cardiothoracic Surgery



NEW APPOINTMENT



Dr Koh Yeow Hoay
Head & Consultant

Neurology Service
(NNI@CGH)

PROMOTIONS – SENIOR CONSULTANTS



Dr Carol Tham Huilian
Senior Consultant
Dept
Neurology



Dr Xu Zheyu
Senior Consultant
Dept
Neurology



Dr Purohit Bela Satish
Senior Consultant
Dept
Neuroradiology



Dr Joanna Pearly Ti
Senior Consultant
Dept
Neuroradiology

PROMOTION – CONSULTANT



Dr Pang Yu Zhi
Consultant
Dept
Neurology

APPOINTMENTS – ASSOCIATE CONSULTANTS



Dr Chan Hiok Hong
Associate Consultant
Dept
Cataract & Comprehensive Ophthalmology
Sub-specialty
Ophthalmology



Dr Chew Cher Yong Milton
Associate Consultant
Dept
Cataract & Comprehensive Ophthalmology
Sub-specialty
Ophthalmology

Recruitment

Embark on a Life-Changing Journey with a Career at SingHealth

If you are a qualified doctor, a challenging career awaits you at SingHealth. We seek suitably qualified candidates to join us as:

- SENIOR CONSULTANTS/
CONSULTANTS/
ASSOCIATE CONSULTANTS
- RESIDENT PHYSICIANS
- STAFF REGISTRARS/
SERVICE REGISTRARS

Interested applicants are to email your CV with full personal particulars, educational and professional qualifications (including housemanship details), career history, present and expected salary, names of at least two professional references, contact numbers and email address together with a non-returnable photograph.

Please email your CV to the respective institutions' email addresses/online career portals with the Reference Number DM2204.



The SingHealth Duke-NUS Academic Medical Centre draws on the collective strengths of SingHealth and Duke-NUS Medical School to drive the transformation of healthcare and provide affordable, accessible, quality healthcare.

With 42 clinical specialties, a network of 4 Hospitals, 5 National Specialty Centres, 8 Polyclinics and 3 Community Hospitals, it delivers comprehensive, multidisciplinary and integrated care.

Singapore General Hospital

Departments seeking:

Resident Physicians and Staff Registrars

- Anaesthesiology
- Breast Surgery
- Colorectal Surgery
- Diagnostic Radiology
- Emergency Medicine
- ENT- Head & Neck Surgery
- Gastroenterology & Hepatology
- General Surgery
- Haematology
- Hand & Reconstructive Microsurgery
- Infectious Diseases
- Orthopaedic Surgery
- Plastic, Reconstructive & Aesthetic Surgery
- Rehabilitation Medicine
- Renal Medicine
- Rheumatology & Immunology
- SPRinT (Sarcoma, Peritoneal & Rare Tumours)
- Vascular Surgery
- Urology

Associate Consultant/Consultant/ Senior Consultant

- Occupational & Environmental Medicine
- SPRinT (Sarcoma, Peritoneal & Rare Tumours)
- Clinical Epidemiologist

Website: www.sgh.com.sg

Career Portal: www.sgh.com.sg/careers

Email: careers.medical@sgh.com.sg

Changi General Hospital

Departments seeking Resident Physicians and Staff Registrars

- Anaesthesia & Surgical Intensive Care
- Accident & Emergency
- Aviation Medicine
- Diagnostic Radiology
- General Medicine
- Geriatric Medicine
- Ophthalmology
- Orthopaedic Surgery
- Otorhinolaryngology - Head & Neck Surgery
- Surgery

Associate Consultants

- Anaesthesia & Surgical Intensive Care
- Gastroenterology & Hepatology
- Orthopaedic Surgery
- Renal Medicine
- Surgery

Website: www.cgh.com.sg

Email: medical_hr@cgh.com.sg

Sengkang General Hospital

Departments seeking:

Resident Physicians and Staff Registrars

- Anaesthesiology
- Cardiology
- Emergency Medicine
- Surgery
- General Medicine (with interest in Dermatology and Palliative Medicine)
- Intensive Care Medicine
- Orthopaedic Surgery (with interest in Hand Surgery and Orthopaedic Surgery)
- Otorhinolaryngology - Head & Neck Surgery
- Plastic, Reconstructive & Aesthetic Surgery Service
- Urology

Senior Consultant, Consultant, Associate Consultant

- Gastroenterology
- Infectious Diseases
- Intensive Care Medicine
- Otorhinolaryngology - Head & Neck Surgery
- Pathology
- Radiology

Website: www.skh.com.sg

Career Portal: www.skh.com.sg/careers/Pages/careers.aspx

Email: careers@skh.com.sg

KK Women's and Children's Hospital

Senior Consultants/Consultants/ Associate Consultants

- Pathology & Laboratory Medicine (Gynaecologic & Breast Pathologist, Microbiologist and Chemical Pathologist)

Associate Consultants/Consultants

- Dermatology

Senior Consultants/Consultants/ Associate Consultants

- Diagnostic & Interventional Imaging

Staff Registrars

- Child Development
- Diagnostic & Interventional Imaging
- Neurology Service
- Paediatric Surgery

Family Physician

- Family Medicine

Resident Physicians

- Diagnostic & Interventional Imaging
- Emergency Medicine
- Ophthalmology Service
- Orthopaedic Surgery
- Otolaryngology
- Paediatric Surgery
- Psychological Medicine
- Women's Anaesthesia

Website: www.kkh.com.sg

Email: medical.hr@kkh.com.sg

National Cancer Centre Singapore

Departments seeking Resident Physicians

- Breast Surgery
- SingHealth Investigational Medicine Unit (IMU)

Website: www.nccs.com.sg

Email: HR-Clinical@nccs.com.sg

National Heart Centre Singapore

Departments seeking Resident Physicians and Clinical Associates

- Cardiology
- Cardiothoracic Surgery

Website: www.nhcs.com.sg

Email: falicia.tui.y.x@nhcs.com.sg

National Neuroscience Institute

Departments seeking Resident Physicians and Service Registrars

- Neurology
- Neuroradiology
- Neurosurgery

Website: www.nni.com.sg

Email: nni_hr@nni.com.sg

Singapore National Eye Centre

Department seeking

- Resident Physician, Ophthalmology
- Staff Registrar, Ophthalmology

For more information, please visit the Career Opportunities section on the Singapore National Eye Centre website.

Website: www.sniec.com.sg

Email: recruitment@sniec.com.sg

SingHealth Community Hospitals

(Sengkang Community Hospital, Outram Community Hospital and Bright Vision Hospital)

Department seeking:

Staff Registrars, Resident Physicians

- Family Medicine

Website: <http://www.singhealthch.com.sg/>

Career Portal: www.singhealthch.com.sg/SCH/careers/Pages/Careers.aspx

Email: schrecruitment@singhealthch.com.sg

SGH Weekly Lunchtime GP Q+A Sessions (Apr - Jun)



Meet our specialists as they address your questions on the latest updates in their specialty area, patient care and the referral process.

Date Every Wednesday	Time 1pm to 2pm	Hosted via Zoom Webinar	Free admission
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Date	Session 1 (1pm to 1.30pm)	Session 2 (1.30pm to 2pm)
APRIL		
13 Apr	Dept of Orthopaedic Surgery Dr Kenny Tay (Consultant)	Dept of Gastroenterology & Hepatology Dr Mark Cheah Chang Chuen (Consultant)
27 Apr	Dept of Pain Medicine Dr Lin Xufeng (Consultant)	Dept of Head & Neck Surgery Clin Assoc Prof Tan Hiang Khoon (Senior Consultant), Dr Gerald Tay Ci-An (Senior Consultant), Dr Rena Dharmawan (Consultant), Dr Szymon Mikulski (Associate Consultant)
MAY		
11 May	Dept of Upper Gastrointestinal & Bariatric Surgery Dr Eugene Lim Kee Wee (Senior Consultant)	Dept of Rheumatology & Immunology Dr Tan York Kiat (Senior Consultant)
25 May	Dept of Breast Surgery Dr Julie Liana Bte Hamzah (Consultant)	Dept of Endocrinology Dr Suresh Rama Chandran (Consultant)
JUNE		
8 Jun	Dept of Emergency Medicine Dr Chan Jing Jing (Consultant), Dr Gayathri Devi Nadarajan (Consultant)	Dept of Nuclear Medicine and Molecular Imaging Dr Aaron Tong Kian Ti (Consultant)
22 Jun	Dept of Obstetrics & Gynaecology Dr Ang Xiaohong Joella (Associate Consultant)	Surgical Retina Department (SNEC) Clin Assoc Prof Lee Shu Yen (Head & Senior Consultant)



Scan the QR code to register.

For enquiries and to submit questions, please email to gpnetwork@sgh.com.sg.



CMEs & Courses

Paediatric Eczema Online Workshop 2022



KK Women's and
Children's Hospital
SingHealth

Date 28 May 2022 (Saturday)	Time 8.30am to 5pm	Hosted via Zoom Webinar	CME points will be awarded	Fee \$15 per participant
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Atopic dermatitis or eczema is extremely common in the paediatric population, affecting about 20.1% of children in Singapore. This online workshop aims to provide knowledge and skills on the diagnosis, investigations and management of atopic eczema.



Scan the QR code to register.

Registration closes on 25 May 2022 (Wednesday).

Slots will be confirmed on a first-come, first-served basis.

For enquiries, please email to marcoms@kkh.com.sg.



Lynch Syndrome – More Than Just the Patient



National Cancer
Centre Singapore
SingHealth

Date 29 April 2022 (Friday)	Time 1pm to 2pm	Hosted via Zoom Webinar	1 CME point awarded	Free admission
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What is Lynch syndrome?

Are my patient and family at risk?



Join our cancer genetics specialists as we discuss the case study of a patient with colorectal cancer, and how genetic testing helped the patient and family members in their management.



Scan the QR code to register.
For enquiries, please email to
gpnetwork@nccs.com.sg.



HOTLINES



GP Fast Track Appointment Hotlines

Singapore General Hospital 6326 6060	KK Women's and Children's Hospital 6692 2984	National Heart Centre Singapore 6704 2222
Changi General Hospital 6788 3003	National Cancer Centre Singapore 6436 8288	National Neuroscience Institute 6330 6363
Sengkang General Hospital 6930 6000	National Dental Centre Singapore 6324 8798	Singapore National Eye Centre 6322 9399

www.singhealth.com.sg

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