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# ENHANCING PAEDIATRIC DENTAL OUTCOMES WITH DIGITAL DENTISTRY

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Tooth ankylosis, or the fusion of the teeth to the supporting bone, can occur as a result of severe dental trauma (e.g. tooth avulsion where the tooth falls out of the socket).

Ankylosed teeth will infraocclude (appear shorter) in a growing child (Figures 1.1 and 2.1). Management of such teeth can be complicated since this process is progressive and irreversible, and the long term prognosis of such teeth is generally poor. Apart from appearing unaesthetic, ankylosed teeth also compromises the feasibility of future treatment options such as dental implants due to restricted alveolar bone development.

One way to manage ankylosed teeth would be via autotransplantation. This involves removal of the ankylosed tooth and replanting a healthy tooth in its place, before securing it with a wire splint until it stabilises. This is a very attractive treatment option, particularly in patients with dental crowding as such patients often already require a premolar tooth to be extracted for orthodontic purposes. Thus, that extracted premolar would

serve dual purposes: to create space for orthodontic realignment, and to serve as a healthy donor tooth. Once the donor tooth has reintegrated and healed with the surrounding bone, normal tooth function and bone development will be restored.

However, autotransplantation can be technique-sensitive. To improve predictability and overall success rates, the extra-oral time between the extraction of the donor tooth and reimplantation at the surgical site should be kept to the absolute minimum. This will ensure maximum cell survival for favourable healing.

Other key factors include atraumatic surgical techniques to harvest the donor tooth and preparation of the recipient site (e.g. enlargement of the socket) to ensure a good fit. Multiple attempts to fit the donor tooth into the surgical site can damage the root surface of the donor tooth, which can lead to complications such as ankylosis and necrosis of the donor tooth.

One way to enhance outcomes of autotransplantation is via the use of digital dentistry. A cone beam

computed tomograph (CBCT), which is a 3D x-ray image, can be taken to determine the shape and size of the intended donor tooth. Models of the donor tooth can be 3D-printed to serve as a template to aid in surgical site preparation (Figures 1.2 and 2.2). Once the surgical site has been sufficiently prepared, the actual donor tooth can be extracted and reimplanted immediately for optimal healing and improved long term outcomes (Figures 1.3 and 2.3).

The management of patients requiring autotransplantation usually involves a multidisciplinary team consisting of Paediatric Dentistry, Orthodontics, and Oral and Maxillofacial Surgery, with assistance from lab technicians for digital printing. Since the start of the multidisciplinary clinics at the National University Centre of Oral Health Singapore (NUCOHS) in 2016, there have been a total of five autotransplantation cases involving digital CBCT planning. Majority of the cases are currently co-managed with orthodontics with at least one year follow up. Currently, all cases are showing favourable outcomes.



CASE 1 (courtesy of Dr Melissa Khor)



Figure 1.1 The upper right and left central incisors show clinical and radiographic signs of ankylosis after dental trauma

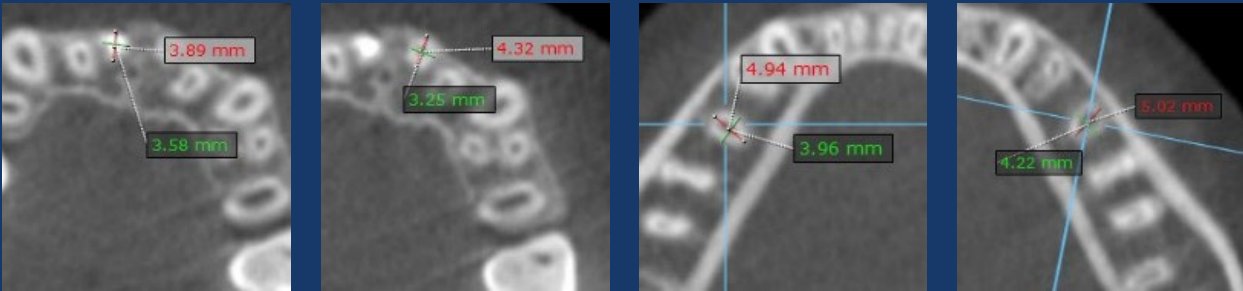


Figure 1.2 CBCT images to determine the size of the ankylosed teeth to be removed (A and B) and the size of the donor premolar teeth (C and D)



Figure 1.3 Using 3D models of donor premolar teeth for surgical site preparation before autotransplanting donor teeth to the surgical site



Figure 1.4 18-months post-autotransplantation showing successful healing and improved aesthetics

CASE 2 (courtesy of Dr Ishreen Kaur)



Figure 2.1 The upper right and left central incisors show clinical and radiographic signs of ankylosis after dental trauma

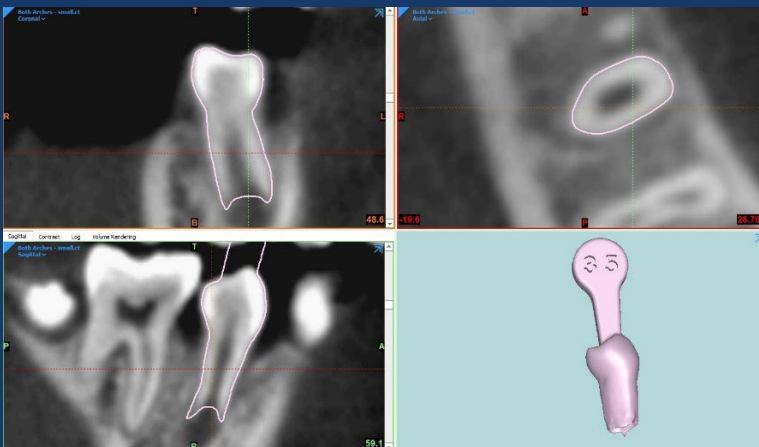


Figure 2.2 CBCT images used to print out surgical 3D models of intended donor teeth

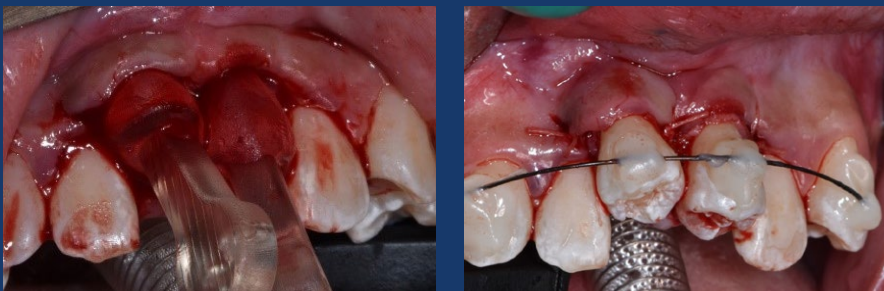


Figure 2.3 Using 3D models of donor premolar teeth for surgical site preparation before autotransplanting donor teeth to the surgical site

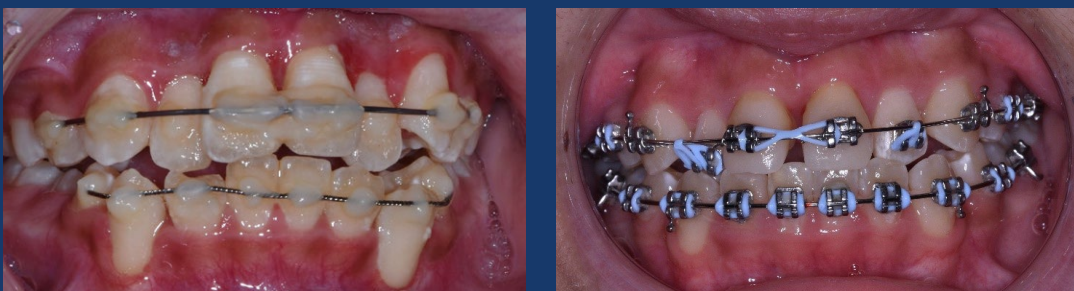


Figure 2.4 Before (A) after dental avulsion of the upper right and left central incisors VS after (B) 15-months post-autotransplantation



# HELPING ELDERLY SURGICAL PATIENTS GO FURTHER WITH MILES

*Elderly patients undergoing major surgery in NUHS are now routinely managed by the Management and Innovation for Longevity in Elderly Surgical Patients (MILES) Programme, an initiative run by a multidisciplinary team who works closely alongside the primary surgeon.*

## THE CASE FOR MILES

Elderly patients (defined as those aged 65 years and above) are at high risk of poor outcomes from surgery. To mitigate this population’s risk, NUHS started the MILES programme to enhance the perioperative management for elderly patients requiring major surgery. It is a holistic and individualised programme of collaborative management strategies aimed at:

- Optimising the preoperative status of elderly patients
- Reducing mortality and in-hospital complication rates
- Reducing length of stay
- Minimising readmissions and hospital visits
- Optimising their care transition between hospital and community
- Returning them to the health status they enjoyed before their illness
- Maximising their level of independence and quality of life

Given the complex care needs prevalent in this patient population, the programme is run by a multidisciplinary team comprising of surgeons, anaesthetists, perioperative physicians, MILES nurses, dietitians, physiotherapists, and occupational therapists.



The MILES Team. Credit: NUH

## AN IN-DEPTH LOOK AT THE PROGRAMME

Patients suitable for the MILES programme are identified by their primary surgeon using the following criteria:

- Aged 65 and above
- Electively undergoing major surgery code 5 and above in Ministry of Health's Table of Surgical Procedures
- Have a scheduled surgery date that is at least 2 weeks away

Eligible patients are then enrolled into the programme that is managed by the MILES multidisciplinary team in the one-stop perioperative clinic.

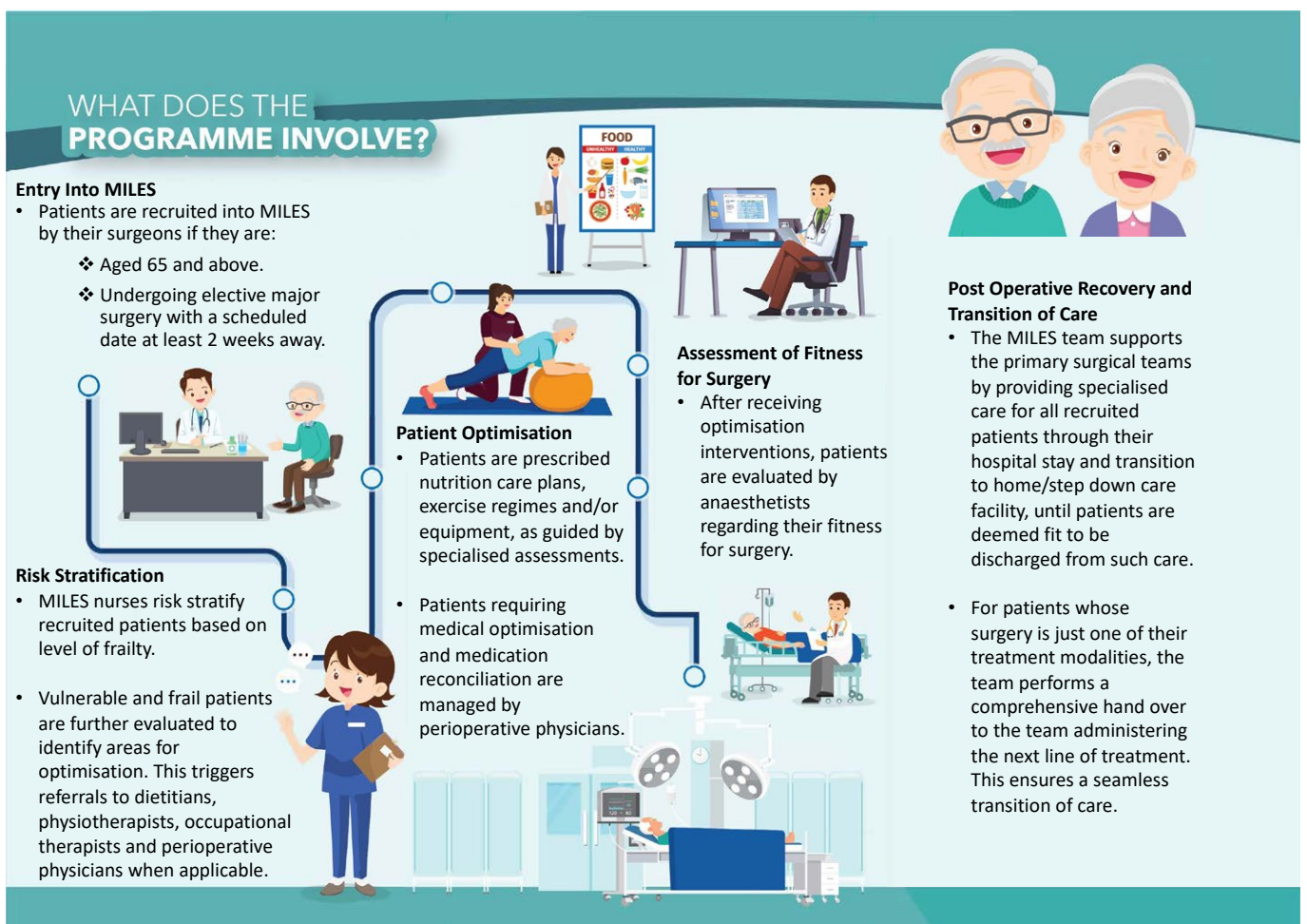
All patients recruited into the programme are risk stratified by MILES nurses based on their level of frailty. This risk stratification guides the level of input patients receive from the programme. Patients evaluated as fit (and therefore low risk) do not require any further specialised care.

Patients assessed as vulnerable or frail undergo further assessment to identify areas for optimisation, which triggers referrals to the other members of the multidisciplinary team.

Subsequent specialised assessments by the relevant allied health professionals then provide patients with appropriate nutritional intervention, exercise regimes and/or equipment, all personalised to their capacity and needs.

In addition, patients requiring medical optimisation and medication reconciliation are referred to a perioperative physician for further management. These synergistic strategies optimise patients before they are evaluated by anaesthetists with regard to their fitness for surgery. This helps to increase the number of patients cleared for surgery, reduce operative risks, and improve outcomes.

In addition to playing a crucial role in the preoperative period, the multidisciplinary team provides continual specialised care for all patients in the programme through their hospital stay and transition to home/step down care facility.

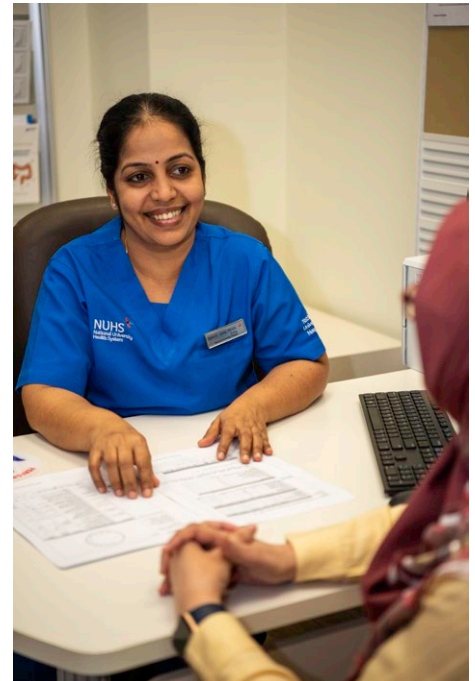


Credit: NUH



Patient in consultation with the perioperative physician.

Credit: NUH



Patient undergoing an assessment with the MILES nurse.

Credit: NUH

The MILES specialist nurses conduct frequent follow-up calls and visits to facilitate and coordinate care. The allied health teams continue to partner closely with the primary surgical teams in the post-operative period to help identify and provide appropriate interventions. This input continues even after discharge, whenever necessary, until the patients are deemed fit to be discharged from their specialised care.

This is especially important for elderly patients with cancer, where surgery is often just one of their treatment modalities. In such cases, the team also performs a comprehensive handover to the team administering the next line of treatment to ensure a seamless transition of care.

Following this overview, the next subsection explores, in detail, the unique services provided by the MILES nurses, dietitians and physiotherapists,

as patients in the programme most frequently require input from these disciplines.

### MILES NURSES

The MILES nurses, who are all experienced surgical nurses with additional speciality training in geriatrics, are the linchpin of the programme. They see every patient from the point of programme entry through to their discharge from the programme. They also serve as care coordinators for patients who may have challenges finding comprehensive care within the programme.

At programme enrolment, all patients are seen by MILES nurses who risk assess them based on their level of frailty as determined by the Edmonton Frail Scale (EFS).

The EFS classifies patients as fit, vulnerable, or frail, which influences

the level of input they receive from the multidisciplinary team. Patients evaluated as fit undergo a standard clinical assessment by the nurses, who then provide comprehensive counselling on what to expect during the entire perioperative journey, including the measures patients can undertake to optimise their own outcomes. The nurses also formulate a discharge plan at this stage which includes identifying an appropriate caregiver and/or the need for step down care.

In comparison, patients identified as vulnerable or frail receive further, more specialised input from the MILES team (in addition to the care received by the fit patients). To better tailor this input, the nurses supplement the information already obtained by the EFS with a thorough evaluation using a comprehensive geriatric assessment (CGA).



They also perform a complete physical examination including the measurement of hand grip strength, postural blood pressure and post void residual urine volume. Particular attention is paid to patients' functional status, cognitive ability and nutritional status in addition to their level of frailty. This facilitates referrals to the other members of the multidisciplinary team, so that an individualised and coordinated care plan to optimise them before surgery can be developed.

In the post-operative period, the nurses work alongside the primary team to prevent, identify and manage post-operative complications such as delirium. They also help facilitate right siting of care, patient discharge, and a smooth transition home through close follow-up.

### DIETITIANS

With malnutrition as a strong modifiable reason for poorer outcomes from surgery, dietitians are an integral part of the MILES team. They conduct a comprehensive nutrition assessment through a combination of a nutrition focused physical examination (NFPE) and dietary assessment on all patients highlighted by MILES nurses to be at risk.

The NFPE identifies the presence of muscle and fat loss, signs of nutrient deficiencies, as well as issues that impact on nutrition such as those affecting a person's ability to eat. The dietary assessment, done via a detailed diet history, yields an understanding of a patient's eating habits and helps determine the nutritional adequacy of his/her diet.

This comprehensive assessment feeds into the Subjective Global Assessment

(SGA), which allows the dietitians to arrive at a nutrition diagnosis for the referred patients. They then formulate individualised nutrition care plans that balance the acute nutritional needs of the surgical journey with therapeutic diets managing patients' chronic medical conditions.

These care plans commonly involve a combination of diet modifications and nutrition supplements. As the key to their success lies in patient education, the MILES dietitians also expend considerable effort into addressing dietary myths and misconceptions in relation to patients' medical conditions.

This helps patients and caregivers better understand the science between diet and disease, which leads to more informed dietary choices. Such crucial support from the dietitians is continued in the postoperative period until patients are deemed fit to be discharged from their specialised care.

### PHYSIOTHERAPISTS

Physiotherapists are essential in the MILES programme because a significant proportion of MILES patients are vulnerable/frail with (a high risk of) functional decline.

These patients, when referred to the physiotherapists, undergo a holistic physical evaluation consisting of:

1. Elicitation of symptoms which may impact on health, for example, fatigue, pain and changes in strength and tolerance
2. Functional assessments, including the Functional Independence Measure (FIM) score, balance assessment, 5 times sit to stand, gait speed and 6-minute walk test
3. Specific evaluation of frailty such as handgrip strength

As patient compliance is a significant issue, their level of readiness and motivation as well as caregiver availability and support are also routinely assessed.

This comprehensive assessment helps physiotherapists prescribe exercise programmes that are customised to patients' needs and circumstances, instead of simply advocating a regime that rigidly adheres to the generally accepted exercise guidelines of 150min of moderate intensity aerobic exercise with 2 to 3 sessions of strengthening exercises per week.





Patient engaged in an exercise with the physiotherapist. Credit: NUH

To further increase the effectiveness of the prescribed exercise programmes, the physiotherapists conduct in-depth patient education and engage patients in collaborative goal setting. The programmes are also offered in a variety of settings such as hospital-based group and individual classes, community-run programmes, as well as home-based exercises. This level of highly customised care is offered from the pre-operative phase through to when the patients are well enough to be discharged from specialised physiotherapy care after hospital discharge.

In summary, the MILES team uses current best practice clinical protocols to minimise operative risk and enhance patient outcomes from surgery.

**OUR EXPERIENCE SO FAR**

The feedback from patients who have been through the programme has been incredibly positive. In particular, patients with complex care needs appreciate having the MILES nurses as a touch point to help coordinate their care.

In addition, the programme has helped patients recover their mobility earlier in the post-operative period<sup>1</sup>. Under this programme, patients with cancer are more likely to complete the recommended post-operative adjuvant chemotherapy/radiotherapy compared to those who did not undergo the programme<sup>1</sup>.

*In conclusion, the MILES programme is an invaluable service for elderly patients needing surgery. This is particularly so for those who are frail and may otherwise have been excluded from curative surgery without the optimisation performed by the multidisciplinary team running the programme.*

*Moreover, with upcoming plans to introduce innovative technologies in collaboration with top researchers, one can anticipate furthering the aims of the programme, yielding even more benefits for this particular population in the future.*

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**References**

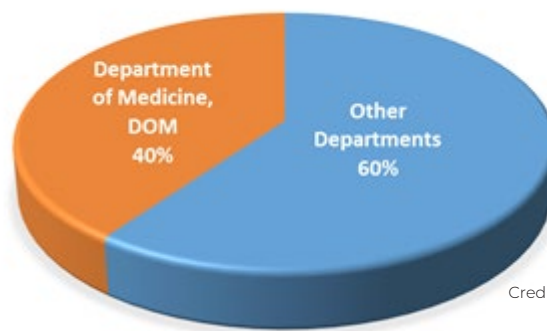
1. Pang NQ, He SS, Foo JQX et al. Multimodal prehabilitation before major abdominal surgery: A retrospective study. Ann Acad Med Singap. 2021;50:892-902.

# NUH DEPARTMENT OF MEDICINE - TELEMEDICINE TRAILBLAZERS!

Many probably think that the COVID-19 pandemic gave rise to the use of telemedicine, but for NUH, it started its telemedicine journey much earlier, with the NUH Department of Medicine (DOM) being one of the early adopters within the hospital. This article shares some of the learning points of NUH DOM's journey and insights on a study conducted by the Department of Dermatology, showing where the bright spots are.

The NUH DOM accounts for about 40% of all teleconsultations conducted in NUH in FY2021. There has been a steady uptake within the department, including clinics which are traditionally examination-based like respiratory medicine, rehabilitation medicine, as well as neurology.

TELEMEDICINE IN NUH (Y2021)



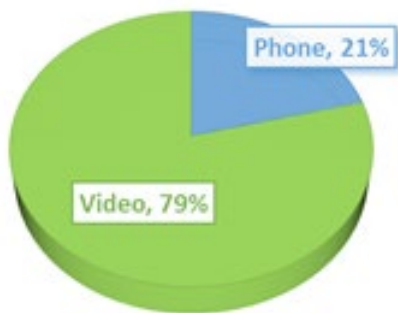
Credit: NUH



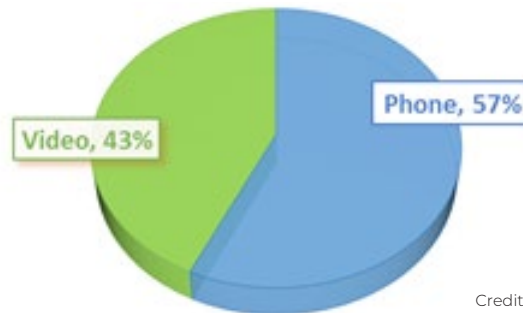
Credit: Envato Element Stockphoto



TYPES OF TELEMEDICINE AMONG DOCTORS IN NUH (Y2021)



TYPES OF TELEMEDICINE AMONG ALLIED HEALTH/NURSING IN NUH (Y2021)



Credit: NUH

### TELEMEDICINE IN NUH DOM

Telemedicine can be provided either by phone or video. Various specialties practise telemedicine differently. For instance, the Division of Dermatology conducts only video consultations given the nature of the specialty and expectation of both patients and doctors for visual review. Interestingly, age does not seem to be a barrier to adoption of video-consultation. In Geriatrics, patients are predominantly seen via video. This could be because there are young family members helping to facilitate.

The charts above show that usage of the two modalities of telemedicine (video vs phone) differs across doctors, allied health professionals and nurses. This likely implies that the adoption rates are correlated to the extent of integration of telemedicine within each sub-specialty's work and their staff's comfort level with technology.

Some sub-specialties have established formal workflows on telemedicine services, complete with a fee charging model for each teleconsult session.

Other sub-specialties are introducing teleconsults as a pilot project to test out the effectiveness and viability for possible mainstreaming into standard clinical service.

The pharmacist-led, clinician-reinforced Gout Virtual Monitoring Clinic is one such example undergoing a trial. The service was found to be clinically effective in achieving outcomes and cost effectiveness compared to the traditional face-to-face physician-led model. This clinical service is currently being reviewed by MOH for mainstreaming, which would allow patients to tap on the 3Ms (Medishield Life, Medisave and Medifund).

### PATIENT'S PREFERENCES FOR TELEMEDICINE

Telemedicine provides an alternative way for patients to keep to their appointments, even if they are not physically able to do so. Patients who are feeling under the weather, or are unable to visit NUH due to their schedule can now request for their appointments to be conducted via teleconsult. This allows them access to

care at a location of their convenience. Flexibility is key - our patients are able to convert their teleconsult appointment to a physical consult if they choose to do so at a later time.

*With telemedicine, eligible patients can look forward to multi-disciplinary care but at a lower cost. At the Gout Virtual Monitoring Clinic, pharmacists engage patients through teleconsults, to manage specific medication prescribing and titration. The pharmacists work closely with the patient's doctor to ensure that patient care is not compromised.*

*Patients enrolled in this clinic now see their specialists twice a year and in between, have two teleconsults with the pharmacist. In the past, they were required to visit their specialists four times a year to titrate their chronic medications.*

**FINDINGS FROM NUH DOM TELE-DERMATOLOGY STUDY**

In June 2020, at the height of the COVID-19 pandemic, the Division of Dermatology conducted a study to understand how the willingness to use tele-dermatology differs between individuals and within individuals, and how the temporal progression of the pandemic changed the perception of tele-dermatology and patients' perception of the real value of tele-dermatology.

*In terms of factors associated with willingness to use tele-dermatology, patients reported being more willing to use tele-dermatology during the pandemic (47%) compared to before (26%).*

In a multivariate regression analysis, we found that the higher willingness was associated with:

- i. Younger age
- ii. Higher daily computer use
- iii. Increased willingness to show sensitive body areas over photo/video
- iv. Higher perceived quality/accuracy of tele-dermatology
- v. Increased awareness of need for social distancing
- vi. Desire to reduce commuting

There was an increase in uptake of tele-dermatology at the height of the pandemic as there was increased availability of telemedicine, greater familiarity with the technology and the need for telemedicine. The willingness to use tele-dermatology declined with the easing of COVID-19 movement restrictions and this was mediated by lesser need for social distancing and

increased perception that existing delivery models are acceptable.

Less than 50% were willing to pay in-person consultation fees, although in our qualitative survey, some patients recognised that it could be priced the same because time spent by the doctor is equivalent. The factors associated with the willingness to pay include being female, having prior experience with tele-dermatology and having higher perceived quality and diagnostic accuracy of tele-dermatology.

In terms of experience, 7.4% participants had a prior experience with tele-dermatology, In the quantitative survey, 12.6% felt that tele-dermatology experience was better, 39.1% reported no difference, while 48.5% rated the experience as poorer when compared to in-person visits. In contrast, in our qualitative interview, 14 out of 15 participants reported a good experience with a prior tele-dermatology consult. Overall, patients did find their tele-dermatology experience acceptable but probably

poorer when they compared them to in-person visits.

The study also found that tele-dermatology is suitable not only for stable patients on chronic follow-up but also individuals who are comfortable with self-management regardless of disease severity. The patients also need to accept the benefits and trade-offs of tele-dermatology before they choose to embark on this service. To improve the diagnostic accuracy, patients are also encouraged to send in photographs.

In addition to the strides taken during the pandemic, Dermatology's journey with tele-dermatology began already in 2015 with a quality improvement project with the NUH Emergency Department. Since then, there have been collaborations with other institutions, like Alexandra Hospital and National University Polyclinics. These workflows have been integrated within the division and beyond, all stemming from the outcomes from the 2015 quality improvement project.



(From left to right) The NUH DOM team Dr Ellie Choi, Dr Ivan Chan, Assoc Prof Nisha Suyien Chandran, Ms Png Yan Ting, Ms Cassandra Lee, Dr Amelia Santosa and Mr Peter Forbes

Credit: NUH



# MY ROLE IN COLORECTAL CANCER SCREENING? *MORE THAN JUST A FIT KIT*

Screening for colorectal cancer (CRC) has been shown to result in earlier detection and improved outcomes, and is strongly advocated worldwide. The two main modalities for screening for CRC in Singapore are colonoscopy and the faecal immunochemical test kits (where it detects occult blood in the stool). However, our research in CRC screening at National University Hospital (NUH) has demonstrated that we cannot adopt a “one size fits all” strategy in CRC screening.

As an academic hospital, NUH seeks to translate our research into changes in clinical practice and guidelines. Over the years, we have been advising the Health Promotion Board (HPB) on ways

to improve CRC screenings. I have just taken over from Professor Yeoh Khay Guan as the Chairperson of the HPB CRC Screen For Life (SFL) Operations Committee, where its main task is to advise on strategies to improve the uptake of CRC screening and follow-up in Singapore. My firm belief is that everyone has a role to play in the advocacy of CRC screening, be it the healthcare worker, CRC patients, family of CRC patients, and even the general public.

Our research delving into CRC screening has uncovered numerous key findings which we have shared with the HPB. I will highlight two pertinent areas in this article.



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### COLORECTAL CANCER PATIENTS AND THEIR FAMILY MEMBERS

It is well reported that first-degree relatives of CRC patients have an increased risk of developing CRC and polyps and are advised to undergo colonoscopy, instead of the FIT, based on our National CRC screening guidelines. But this is not the reality as we have found out.

Siblings and children of CRC patients are unaware of their increased risks of developing CRC and face numerous barriers towards undergoing colonoscopy, one of which is the **lack of recommendation from the doctors**<sup>1-2</sup>.

Patients hold high regard for the healthcare professions in Singapore and are more likely to act on the advice of doctors for healthcare matters, including that of screening. A local study demonstrated that patients seen in the family practice were more likely to undergo CRC screening if advised by the doctors to do so<sup>3</sup>.

CRC patients are also unaware of the increased risk present amongst their first-degree relatives<sup>4</sup>. Since the findings were published, the colorectal surgeons in NUH have been actively advising CRC patients to relay this information to their first-degree relatives to undergo screening colonoscopy.

### NOT ALL INDIVIDUALS WITH POSITIVE FIT ARE THE SAME

Amongst average risk individuals (where there is no history of colonic polyps/family history of CRC/personal history of particular cancers), undergoing the FIT is often recommended.

Typically, patients are required to take stool samples on two separate days and send them for detection of occult blood. A positive test is defined as the presence of occult blood in either tests and would merit further evaluation with a colonoscopy.

What is not known prior is the clinical significance of individuals with one positive versus two concurrent positive test results.

We have demonstrated that individuals with two concurrent positive FIT had a 13% chance of harbouring CRC compared to less than 2% in patients with only one positive test. This equates to a proportion of 1 in every 8 patients!<sup>4</sup> Around 60% of patients who are double FIT-positive have colorectal polyps as well.

This has huge ramifications and after the findings of this study, NUH will perform the colonoscopy in all patients with double FIT-positive patients within two weeks of the initial consultation to facilitate earlier detection of any colorectal pathology.

### DIRECTIONS AHEAD

While we have made great strides in advocating CRC screening in Singapore over the decades, more can be done and numerous questions remain. What are the main barriers towards undergoing CRC screening in the community and what can we all do to increase the adoption rates in Singapore? How can we get more patients with a positive FIT to undergo colonoscopy? How do we encourage patients with an initial negative FIT to continue undergoing FIT in the subsequent years? Should Singapore reduce its screening age of CRC to 45 years old?

Suffice to say, CRC screening is more than just advocating a FIT kit. While the team in NUH will continue to strive to uncover more of such issues to improve the outcomes of CRC in Singapore, every one of us can play a huge role in encouraging our patients, friends, family members and loved ones to undergo CRC screening.

### References:

1. Tan KK, Lim TZ, Chan DKH, Chew E, Chow WM, Luo N, Wong ML, Koh GC. Getting the first-degree relatives to screen for colorectal cancer is harder than it seems-patients' and their first degree relatives' perspectives.
2. Int J Colorectal Dis. 2017 Jul;32(7):1065-1068. doi: 10.1007/s00384-017-2818-4.
3. Tan KK, Lim TZ, Chew E, Chow WM, Koh GC. Colorectal cancer patients can be advocates for colorectal cancer screening for their siblings: A study on siblings' perspectives. *Psychooncology*. 2020 Dec 29(12):2028-2032. doi: 10.1002/pon.5496.
4. Chua AH, Koh GC. Does patient education and recommendation result in increased uptake of colorectal cancer screening using the fecal occult blood test? *Ann Acad Med Singap*. 2014 Oct;43(10):517-8.
5. Lim TZ, Lau J, Wong GJ, Tan KK. Colorectal cancer in patients with single versus double positive faecal immunochemical test results: A retrospective cohort study from a public tertiary hospital. *PLoS One*. 2021 Jun 4;16(6):e0250460. doi: 10.1371/journal.pone.0250460.

# CRACKED TEETH IN TIMES OF PANDEMIC

*Have patients ever come to you complaining of pain when biting down, or pain in their temporomandibular joints? Such stress-related oral health conditions have been getting increasingly common, especially during the COVID-19 pandemic<sup>1</sup>.*

COVID-19 has wreaked havoc in our lives, causing immense amounts of stress on various fronts. This has manifested in many ways, from panic-buying, compulsive checking of news, to self-isolation and avoidance behaviours.

Through the eyes of dentists, we see evidence of this stress in the form of stress-related oral health conditions including bruxism, temporomandibular disorders, and cracked teeth. Polls among American dentists conducted by the American Dental Association have found that these conditions have increased in prevalence by around 60-70% during the COVID-19 pandemic<sup>2</sup>.

## WHAT IS A CRACKED TOOTH AND WHY SHOULD I CARE?

A cracked tooth is defined as a tooth with a disruption in the dental hard tissues, without any fragments becoming separable. Treatment depends on the extent of the crack, and usually includes a crown, with or without root canal treatment.

However, if the crack extends too deep, the tooth may require an extraction. This is why early detection and timely management of cracked teeth is so important, and where general practitioners may be able to play a role in helping patients to seek timely assessment when they develop masticatory pain.



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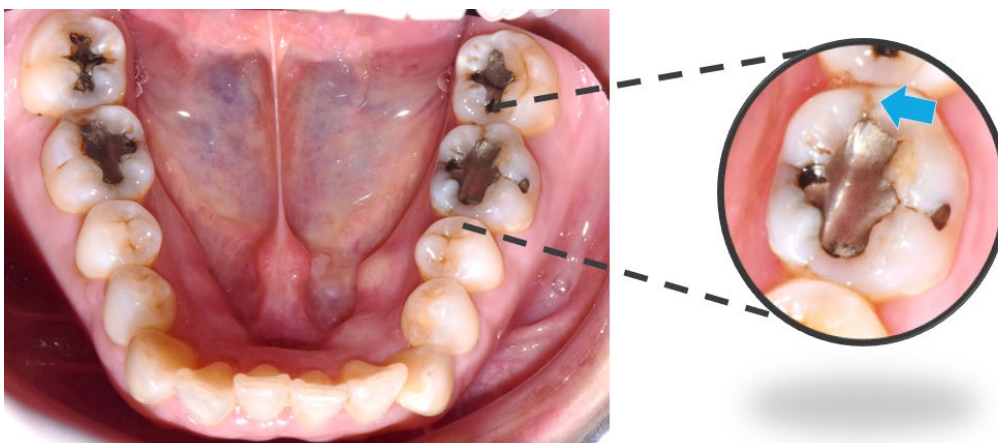


Figure 1. Clinical photograph of lower dental arch. Magnified view of lower left first molar shows a crack on the distal margin (arrow)

### EPIDEMIOLOGY AND NATURAL HISTORY OF CRACKS

Patients presenting with cracked teeth are usually middle-aged or older<sup>3</sup>, usually in the 40 to 50-year-old age bracket, although anecdotal evidence has found that the average age of patients is getting younger due to increased levels of stress. There is no gender predilection.

Cracks primarily occur on molars and premolars, and they may even occur on pristine teeth or those with few or shallow fillings. While certain anatomical features may predispose some teeth to cracks,

patients' parafunctional habits also play a large role. Patients with bruxism, clenching, and damaging masticatory (e.g. using teeth to open beer bottle caps) and dietary habits (e.g. frequent consumption of hard foods such as nuts, crushing ice/bones/shells with teeth), are particularly susceptible to cracked teeth.

Cracks originate as microscopic hairline cracks known as "craze lines", confined only to enamel, the outermost layer of the tooth. With continued use and function on the tooth, these craze lines deepen into crack lines that progress towards the periodontium (gum) and the dental pulp within

the tooth (containing the tooth's neurovasculature).

As the crack deepens, it will wedge open with masticatory forces on the tooth, leading to sensitivity and pain. If the crack progresses, parts of the tooth may break off or the entire tooth may split.

### WHAT SIGNS CAN GENERAL PRACTITIONERS LOOK OUT FOR?

Obtaining accurate pain history helps to identify if the pain is related to the tooth. (Table 1)

<b>Pain History</b>	<ul style="list-style-type: none"> <li>• Tenderness/pain on biting                     <ul style="list-style-type: none"> <li>◆ This pain may have started acutely after biting on something particularly hard</li> </ul> </li> <li>• Sharp sensitivity to food/drinks of extreme temperatures</li> <li>• Constant or spontaneous pain (in later stages)</li> </ul>
<b>Patient Features</b>	<ul style="list-style-type: none"> <li>• Squarish face (prominent masseters)</li> <li>• Attrition of teeth (flattened teeth)</li> </ul>
<b>Patient Habits/History</b>	<ul style="list-style-type: none"> <li>• Known parafunctional habits (bruxism, clenching)</li> <li>• Damaging dietary habits (hard foods e.g. nuts, bones, shells, ice)</li> <li>• Damaging masticatory habits (e.g. using teeth to open beer bottle caps)</li> <li>• Temporomandibular joint tenderness, clicking/popping</li> </ul>

Table 1



Figure 2. Clinical photograph of a lower dental arch with severe attrition. Such patients should be referred to a dentist for oral rehabilitation.



### WHAT TREATMENT WILL BE RENDERED FOR A CRACKED TOOTH?

Treatment will depend on the extent of the crack and whether the pulp of the tooth is affected. A metal ring called a molar band, or a temporary crown, can be cemented on the tooth as a temporary means of bracing the crack. Thereafter, the tooth will need a crown to provide long-term bracing.

If the dental pulp of the tooth is irreversibly inflamed or necrotic, root canal treatment will also be required. During the root canal treatment procedure, an operating microscope may be used to evaluate the extent of the crack. If the crack is too extensive, the prognosis will be deemed unfavourable and the tooth will need to be extracted (Fig. 3a and 3b).

Sometimes, if part of the tooth has fractured off and the fracture extends too near the level of the periodontium and bone, a minor periodontal surgery called a crown lengthening surgery may be required to expose the margin of the fracture. If the patient suffers from bruxism, a mouthguard is recommended to reduce the effects of this damaging habit on initiating and propagating cracks.

### WHAT ELSE COULD IT BE?

Other possible causes of discomfort on biting could include myalgia of the muscles of mastication, temporomandibular disorders, periodontal disease, maxillary sinusitis, post-operative sensitivity after a recent filling, dentinal hypersensitivity and so forth<sup>4</sup>. A dentist will need to perform various tests and take radiographs in order to arrive at a diagnosis.

### WHAT ADVICE CAN GENERAL PRACTITIONERS GIVE TO PATIENTS?

While cracked teeth are not emergencies (unless the patient is in severe pain), patients should be advised to see a dentist as soon as reasonably practicable for an evaluation and diagnosis.

If it is indeed a cracked tooth, the earlier it is detected, the more treatable it is, and the less complicated and expensive treatment will be. In the meantime, patients can be advised to avoid biting on the painful area, reduce consumption of hard foods, and avoid damaging habits that may exacerbate the situation. Patients can also be advised to reduce stressors and use relaxation techniques before bed to reduce bruxism.

For more information, visit <https://www.nucohs.com.sg/Pages/Find-Conditions.aspx>

### REFERENCES

1. Dadnam D, Dadnam C, Al-Saffar H. Pandemic bruxism. *Br Dent J*. 2021 Mar;230(5):271. doi: 10.1038/s41415-021-2788-3. PMID: 33712754; PMCID: PMC7953193.
2. HPI poll dentists see increased prevalence of stress related oral health conditions. American Dental Association. (n.d.). Retrieved August 5, 2022, from <https://www.ada.org/publications/ada-news/2021/march/hpi-poll-dentists-see-increased-prevalence-of-stress-related-oral-health-conditions>
3. Lubisich EB, Hilton TJ, Ferracane J; Northwest Precedent. Cracked teeth: a review of the literature. *J Esthet Restor Dent*. 2010 Jun;22(3):158-67. doi: 10.1111/j.1708-8240.2010.00330.x. PMID: 20590967; PMCID: PMC3870147.
4. De Laat A. Differential diagnosis of toothache to prevent erroneous and unnecessary dental treatment. *J Oral Rehabil*. 2020 Jun;47(6):775-781. doi: 10.1111/joor.12946. Epub 2020 Feb 29. PMID: 32061108.



Figure 3a. Clinical photograph of a molar band placed on the cracked lower left first molar seen in Figure 1. A molar band was placed to minimise the risk of crack propagation.

Figure 3b. Periapical radiograph of a lower left first molar, with root canal treatment and crown completed.



## ASST PROF TAN WEE BOON

- Senior Consultant, Division of General Surgery (Endocrine & Thyroid Surgery), Department of Surgery, National University Hospital
- Sub-Specialties: Endocrine & Thyroid Surgery, General Surgery, Surgical Oncology (Head & Neck Surgery), Surgical Oncology (Thyroid & Endocrine Surgery)
- Special Interests: Thyroid Surgery, Parathyroid Surgery, Adrenal Surgery, Minimally Invasive Surgery

*Assistant Professor Tan Wee Boon is currently practicing as a Senior Consultant in the Division of General Surgery (Endocrine & Thyroid Surgery). Assistant Professor Tan's special interests are in endocrine surgery and hernia surgery.*

*He is also highly involved in undergraduate medical education as well as curriculum-planning for Yong Loo Lin School of Medicine. He has received Dean's Award for Teaching Excellence and Certificate of Commendation for AY 2014/5. He is also actively involved in the training of surgical residents and is one of the core faculty members for the Surgery-in-General residency programme in NUH.*

### Why did you decide to specialise as a surgeon?

I decided to specialise in General Surgery because it is a specialty that is rewarding, challenging and fun. It has been almost 20 years since I graduated from medical school and I cannot imagine myself doing anything else. Surgery is indeed an art, and surgeons are distinguished by our ability to combine our knowledge and skills to perform surgical procedures to help patients. Being a very hands-on person, surgery is naturally a very attractive specialty to me.

### Tell us a little known fact about surgeons.

We do a lot more than just surgeries! We have to work up the patient's condition, decide if surgery is needed, and then optimise them prior to the surgery to ensure the best outcome. Some patients will require long term follow-up after their surgeries to monitor for potential complications and recurrence of disease.

### Can you share one common misconception about your profession?

A common misconception about surgeons is that we are fierce and short-tempered. We are often perceived as impatient and demanding. In actual fact, most surgeons are really approachable and enjoy working closely with other team members who are involved in the care of the patients.

### What is the most rewarding part about being a surgeon?

The most rewarding part of our job is our ability to make a significant impact in a patient's life. It is always gratifying to help patients establish their diagnosis and relieve them of their symptoms without any major complications from the surgery.

**Describe your most rewarding / satisfying experience you have had with a patient.**

One of the most satisfying patient encounters I have had was with a female with primary hyperparathyroidism. Like many cases of primary hyperparathyroidism, her initial symptoms were non-specific and she was only diagnosed after a few months from the start of her symptoms. She subsequently developed complications from the disease and was eventually wheelchair-bound from myopathy and osteoporotic fractures. After successful localisation of the disease gland, she underwent a focused parathyroidectomy with a 1-day stay in the hospital. Over the next few months, she improved dramatically and regained her pre-morbid level of daily activities.

**What do you find the most challenging among all your current roles?**

The most challenging part of my job is to juggle the different roles I have to play besides being a surgeon. A lot of our work involves educating trainees as well as undergraduate students. This has been made more difficult in times of COVID, where direct patient contact was limited. We are also involved in many administrative duties and research studies which can be time-consuming. It is therefore challenging yet crucial to maintain a high standard of patient care despite the various other commitments.



**Assistant Professor Tan's involvement in numerous medical conferences.**

Credit: Assistant Prof Tan Wee Boon



**What do you do in your free time when you are not taking care of patients?**

I try to keep aside my free time for exercise. This can be in the form of weight training at the gym, badminton, or a slow jog around the estate. A huge proportion of my free time is spent with my dog whom I adopted two years ago. I frequently bring him out to the beach, park, and the pool.

**What are the three most important things to you in your life?**

I would have to say family, friends and my dog. I regret not spending enough time with my parents who are no longer around. Therefore, I always remind the residents to ensure they have a work-life balance and not to neglect their loved ones because of work.



**Assistant Professor Tan enjoying the outdoors and spending quality time with his dog.**  
Credit: Assistant Prof Tan Wee Boon





### Primary Care Engagement (PCE)

At National University Hospital (NUH), we recognise the pivotal role general practitioners (GPs) and family physicians play in general healthcare provided within the community. As such, we believe that through closer partnerships, we can deliver more personalised, comprehensive, and efficient medical care for our mutual patients.

Primary Care Engagement Department aims to facilitate collaboration among GPs, family physicians and our specialists. As a central coordinating point, we support patient referrals and organise continuing medical education (CME) events. Through building these important platforms of shared care and communication, we hope that our patients will be the greatest beneficiaries.

### Continuing Medical Education (CME) Events

At NUH, we strive to advance health by integrating excellent clinical care, education and research. As part of our mission, we are committed to providing regular CME events for GPs and family physicians. These events aim to provide the latest and relevant practical clinical updates towards patient care.

Organised jointly by Primary Care Engagement Department and the various clinical departments within NUH, our specialists will present different topics in their own areas of specialties during these symposiums.

**We would love to hear your feedback on MEDICO. Please contact us at:**

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**For more information on our CME events, please visit:  
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**A Publication of NUH Primary Care Engagement Department  
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