

Anaesthesia Clinical Evaluation (ACE) Clinic: a nurse-led preoperative assessment clinic

Dr Charlene Kwa, Dr Chau Keen Chong, Dr Monica Tan, Dr He Yingke, Dr Quak Sumin, Dr Loh Huey Peng,
Ms Soh Ling Ling, Ms Ong Wei Shi, Ms Yick Kit Ngoh, Ms Fadhilah Bte Ibrahim, Ms Li Peizhen, Dr Yew Woon Si

Background

SNEC performs approximately 20000 ophthalmic surgeries annually. As a standalone ambulatory centre without intensive care or inpatient facilities, it is paramount that patients are assessed for suitability and optimized before surgery.

Previously, all patients undergoing general anaesthesia (GA) were referred to SGH Preoperative Assessment Centre (PAC) for their preoperative assessment. Pre-operative investigations were ordered by surgeons and performed prior to PAC visit. For patients undergoing sedation, selected patients with complex comorbidities would be referred by ophthalmologists to SGH Preoperative Assessment Centre (PAC) for detailed assessment. The rest of the patients undergoing sedation would be assessed at SNEC and comprised blood pressure, heart rate and BMI measurement, ECG and capillary blood glucose (when indicated). As SGH PAC appointment slots are finite, it was challenging to obtain an appointment before surgery with adequate window for optimization.

Problem

Prior to ACE, preoperative assessment for patients undergoing sedation was not standardized. Referrals to SGH PAC was at the discretion of the surgeon, leading to many unnecessary referrals, or under referrals, resulting in cancellations due to inadequate optimization. Previously, all GA patients, approximately 50 cases a month, and complex sedation patients were referred to SGH PAC. SGH PAC appointments were limited to 2 per day. SNEC GA caseload alone exceeded the availability of appointments. The difficulty of obtaining an appointment had led to postponement of surgeries. 'Routine' preoperative investigations being ordered unnecessarily due to a lack of awareness on latest recommendations resulted in wasted resources, unnecessary referrals and a strain on specialist clinics, surgery postponement, increased costs and patient anxiety.

Problems faced:

1. Inability to get early appointments at SGH PAC, resulting in a delay in surgery,
2. SGH PAC appointment on a separate day from SNEC Pre-op visit due to time limitations,
3. Tendency to miss SGH PAC appointment due to lack of appointment reminder or patients getting lost due to unfamiliarity,
4. Fragmented preoperative care as there is no standardized way to handover and follow up on preoperative plans made,
5. Lack of standardization on the threshold to refer patients undergoing sedation to SGH PAC, leading to complex cases not being assessed and optimized prior to surgery.

Proposed solution

We proposed an in-house nurse-led preoperative clinic, ACE clinic, to assess all patients undergoing GA with mild to moderate comorbidities and patients undergoing sedation with significant comorbidities warranting a full preoperative assessment. GA and sedation patients with complex medical conditions will be referred to SGH PAC for a doctor-led assessment. By assessing the less complex cases inhouse, appointments slots are freed up for complex cases at SGH PAC. This leads to an earlier assessment with time for optimization.

This concept was inceptioned in 2022 and is a collaboration between SNEC Nursing, SGH Anaesthesiology and SNEC Anaesthesiology. Team members comprised anaesthesiologists and nursing senior leadership working alongside other stakeholders including ophthalmologists, departments of anaesthesiology at SNEC and SGH, nurses in SNEC Pre-Surgery Services, Day Ward nurses reviewing the patient on the day of surgery, administrative staff in charge of surgery listing and SGH specialties receiving referrals from our clinic, for example Cardiology, Internal Medicine Perioperative Team, and Endocrinology. We discussed our concept with key personnel from the Ophthalmology department, following which we presented to surgeons, nurses and anaesthesiologist to gather feedback, hence obtaining their buy-in. Prior to opening, we conducted a simulation of a patient's perioperative visit through the various stations, including ACE clinic, to identify potential gaps in the proposed workflow. ACE opened its doors in April 2023 to a small subset of GA patients, expanding in phases to cover all patients undergoing GA and high-risk sedation cases by July 2024 (Figure 1).

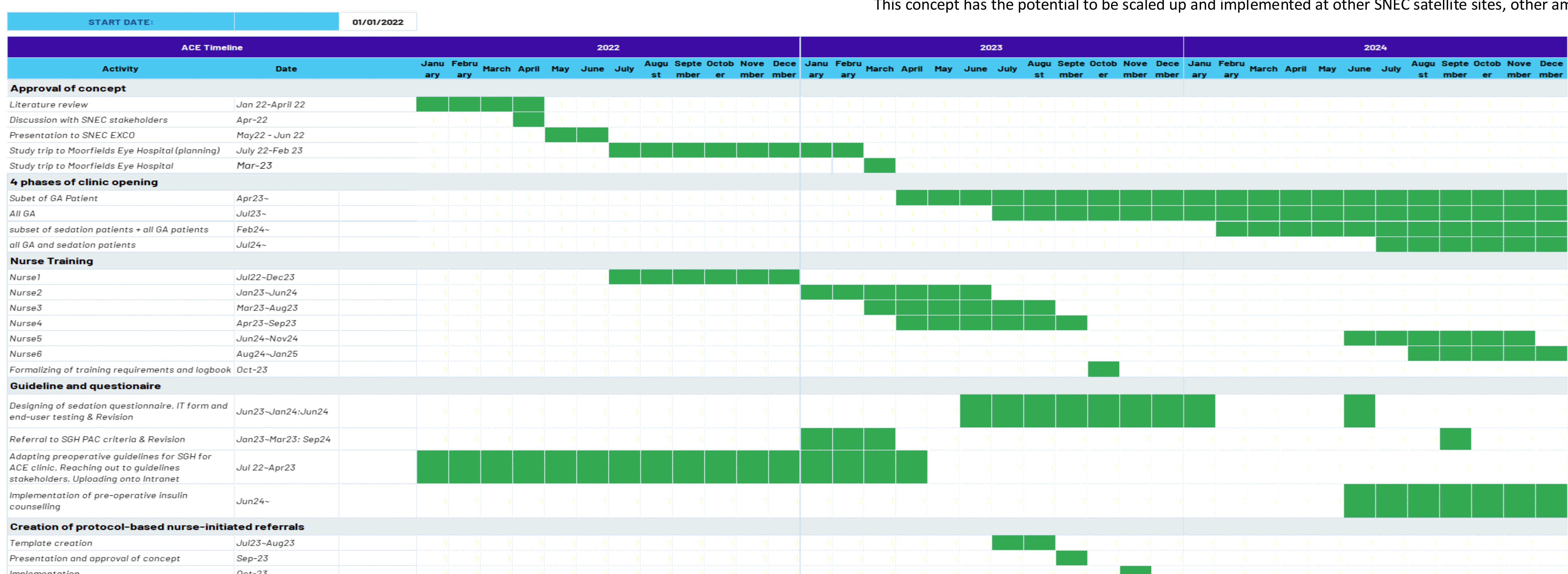
In addition, we designed a structured screening questionnaire to assess the high volume of approximately 19000 patients per year undergoing sedation. This will ensure that all patients are assessed in a standardized manner. Based on the questionnaire, the patients scheduled for surgery under sedation may be cleared to proceed or referred to the ACE nurse for further assessment. Prior to implementation, we conducted a pilot to estimate the number of patients undergoing sedation that would be referred to ACE clinic based on the questionnaire to help us estimate clinic workload.

At ACE clinic, the entire consultation is performed by nurses and investigations and optimization of medical conditions are guidelines driven. Guidelines were aligned with well-established, evidence-based guidelines at SGH PAC and adapted to the SNEC setting as required. An anaesthesiologist is rostered to answer any queries from the ACE nurses, with a plan of gradually withdrawing to remote supervision. Preoperative investigations were individualized based on guidelines and no longer a standard set including a chest X-ray and ECG for all patients. We created referral templates and nurses are empowered to make protocol-based referrals for selected conditions.

ACE clinic nurses were selected based on work experience and qualifications to undergo a structured training programme for 10 weeks. The training programme consisted of exposure in various points along the perioperative journey, including SNEC operating theatre, post-operative day ward and SGH PAC. The ACE nurses were supervised by an anaesthetist or ACE nurse trainer for each patient until they have passed through various levels of supervision following the entrustable professional activity (EPA) framework.

We set up an online ACE Feedback form available from the hospital intranet and accessible by all staff to identify any downstream issues. This channel enabled us to identify and work on any gaps in the workflows accordingly.

Fig.1 Gantt diagram illustrating events leading up to the setup in phases



End user benefits

END USERS	BENEFITS
Patients and next-of-kin	Convenience of pre-op assessment within SNEC Surgery less likely to be postponed Reduction in investigations that are not indicated
Ophthalmologists	Decreased surgery cancellations Coordinated preoperative management Decrease workload burden
Anaesthesiologists	Standardisation of assessment and optimisation
Cardiologists	Decreased referrals and downstream investigations
Nurses	Empowerment of nurses and elevation of professional status

Table 1 : End Users and their Benefits

Outcomes

Table 2 : Pre and post-implementation Cancellation rates according to type of surgery

Implementation of ACE clinic	Number of Surgeries		Number of Cancellations		Cancellation Rate (%)	
	Pre	Post	Pre	Post	Pre	Post
Total no of Surgeries	9290	10722	127	80	1.37	0.75
Sedation	8960	10452	126	79	1.41	0.76
GA	330	270	1	1	0.30	0.37

Table 3 : No of GA patients being referred to SGH PAC and same-day cancellations of surgery pre and post implementation

Period	Number of surgeries under GA	Number referred to SGH PAC	Number of cancellations on day of surgery
Pre-implementation	330	330	1
Post-implementation	270	17	1

Pre-implementation: July - Dec 2022
Post-implementation: July - Dec 2024

- Reduction in overall cancellation rates on the day of surgery due to patient not medically optimized
- Low cancellation rate for GA cases (1 GA case in 6 months period pre and post implementation)
- Reduced pre-operative investigations
- Reduced pre-operative referrals and downstream investigations
- 57% reduction in cardiac referrals from SNEC to NHC pre and post implementation of removal of routine ECG for cataract patients
- Potential cost saving from ECG for cataract surgery/year: approx. \$430000
- Potential cost savings from downstream referrals and investigations/year: approx. \$740000
- Standardized management of abnormal investigation results and incidental findings
- Nurse empowerment to perform new roles traditionally held by physicians
- Shorter wait time to surgery due to availability of preop assessment appointments
- Reduced referrals to SGH PAC

Cost effectiveness

On average, two ACE-trained nurses, each with a clinic room, are required to provide this service. An anaesthesiologist is assigned to cover the clinic to provide guidance to the nurses. The implementation of this clinic has led to a significant reduction in surgical cancellations, unnecessary investigations, and specialist referrals, resulting in substantial cost savings that can offset the clinic's operational cost.

For example, the reduction in routine ECGs before cataract surgery, cardiac referrals and downstream investigations alone is estimated to save nearly \$740,000 per year. These savings highlight the clinic's efficiency and cost effectiveness while ensuring better patient care and resource utilization.

Population Health Impact

- Structured pre-operative assessment and workflows for referral
- better capitalize on perioperative period for diagnosis and optimization of chronic conditions e.g. hypertension and diabetes
- Revision of blood pressure thresholds for pre-op optimization (aligned with local guidelines on hypertension)
- Decreased cancellation rates reflect better optimization in chronic medical conditions at the time of surgery and likely beyond
- Given the large volume of surgical patients of approximately 20000 per year at SNEC, we believe the impact on population health would be significant.
- Pre-op screening for obstructive sleep apnoea, referral of patients with high risk scores for further evaluation.
- Counselling of patients with morbid obesity and referral to bariatric clinic

Lessons learnt and Future Plans

Implementing a new process involves careful consideration of all stakeholders. In this case, there were multiple stakeholders spanning across multiple disciplines. Processes are interconnected and even a small change, such as adding a new screening questionnaire, requires clear communication with everyone involved, both upstream and downstream, to prevent confusion on the ground. Similarly, communication is vital for any changes in the electronic forms.

One anticipated challenge is transitioning the training of nurses from being doctor-led to nurse-led. Anaesthesiologists were heavily involved in the training and supervision of the first batch of ACE clinic nurses. For sustainability, the training and supervision of new nurses should be ideally handed over to experienced and proficient ACE nurses.

Nurses are the cornerstone of this nurse-led clinic. If we started over again, we could have trained a larger group of nurses to accommodate attrition, for example due to deployment to areas of higher priority or unforeseen hospitalization or training leave. Training a nurse to reach a level of proficiency and independence takes months. Having a committed team of nurses and addressing feedback and challenges are important in growing the pool of trained nurses confident in this area.

This concept has the potential to be scaled up and implemented at other SNEC satellite sites, other ambulatory surgery settings.