

## The response to COVID 19: a journal of the initial institutional experience of general surgical units at the National Hospital of Sri Lanka, Colombo

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Sri Lanka is no stranger to calamities, man-made or otherwise. It has weathered a civil war of thirty years, the Boxing Day tsunami and the Easter Sunday bombings just a year ago. The country has paid a colossal price in human lives, material losses and attendant adverse socio-economic consequences. The COVID 19 pandemic, declared by the World Health Organisation (WHO) 7 weeks ago, is the latest, and probably one of the gravest challenges to the nation in general and the health services in particular.

The National Hospital of Sri Lanka (NHSL), Colombo is the largest tertiary and teaching hospital in the country with a capacity of almost 3300 beds. It comprises of eight general surgical units with 16 wards and a casualty surgical ward. The three general surgical theatre complexes serve 36 elective lists weekly from Monday to Saturday. In addition, the general surgical casualty theatre is available 24 hours and 7 days a week.

This narrative outlines the key events surrounding the re-organisation of general surgical services at the NHSL during this period. It has been a process in evolution with frequent review and re-assessment.

The fundamental principles that determined the decisions and measures taken at the NHSL were as follows:

- In the early days of the shut-down, uncertainty prevailed about the status of the NHSL with regards to care of COVID 19 patients. Rapid de-escalation of routine work provided time and space to plan for an eventual surge of ill COVID 19 patients, if such a situation arose
- This included increasing ICU or HDU capacity by identifying and designating operating theatres and contained ventilators for this purpose
- Designation and organisation of hospital infrastructure and spaces in conformity with safety recommendations and education of all HCWs on enhanced safety precautions to be taken to minimise infection and transmission

- Streamline manpower utilisation to minimise potential infection of HCWs leading to the subsequent shortage or absence of essential personnel
- Conservation and building capacity of personal protective equipment (PPE), essential drugs and surgical consumables to provide continuity of care for critically ill and emergency patients at the very least. With the subsequent designation of the NHSL as a non-COVID 19 hospital, this extended to be able to sustain cancer surgery and procedures to prevent limb or organ compromise or loss
- Institute the above while maintaining essential medical services and emergency care

The initial meeting of surgeons and anaesthetists took place on 20th March 2020. Key recommendations that were instituted in concurrence with the Director, NHSL included:

- All surgical and anaesthetic teams would work on a weekly rota basis to reduce non-essential staff
- The male and female general surgical casualty admissions will continue to ward 33 and the respective unit's female ward as before
- Diagnosed or suspected COVID 19 surgical patients to be managed in ward 31 (Christian priest ward) and ward 24 (Buddhist priest ward)
- Surgery will be restricted to urgent or emergency procedures only
- Theatre sessions to be limited to one per day i.e. from 8 am to 2 pm except under exceptional circumstances
- Only the main table will be used in all surgical theatres
- Theatre designation:
  - Operating theatres A and B (OTA & OTB) will be closed
  - All general and GI surgical units will share operating theatre D (OTD) for emergency procedures
  - Any diagnosed or suspected COVID 19 surgical patient will be operated in OTD
  - Casualty surgical theatre (GCOT) to function as normal

Subsequently, a committee appointed by the Director, NHSL proposed several recommendations with regard to conducting outpatient clinics on the 27th March 2020 (see below).

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On 3rd April, following a two-week period, surgeons and anaesthetists reviewed the situation, and recommended commencement of limited elective surgery from 6th April 2020. This was for malignancies and other surgical conditions where delay could result in significant morbidity and mortality such as organ dysfunction or limb loss.

The basis for their revised recommendation was:

- The NHSL was designated as an institution that will not cater to diagnosed COVID 19 patients and as such no such elective admissions will take place to the wards or ICUs
- A surge of COVID 19 cases, ICU admissions or resultant mortality had not been observed nationally over the past two weeks
- Anecdotal reports suggested a rise in non-COVID 19 related morbidity and probably mortality in excess of the COVID 19 cohort
- Indefinite delay could result in malignancies becoming inoperable or causing complications, in addition to the untold psychological stress and suffering from uncertainty of future care

The seven General Surgical Units, the Gastrointestinal Surgery Unit, the University Surgical Unit and the University Gynaecological Unit shared 10 theatre sessions on weekdays utilising all three theatre complexes from 8 am to 2 pm. Flexibility between units to share theatre sessions depending on case load enabled maximum utilisation of the available time.

### **Theatre complexes**

In the initial two weeks, two general surgical theatre complexes OTA & OTB were closed. The general surgical casualty theatre (GCOT) continued to function normally. The third general surgical theatre complex (OTD) was reserved for all emergency surgery including surgery on COVID 19 suspected or confirmed patients.

Operating theatres were provided guidelines for ensuring the safety of HCWs in theatre (Supplementary 1).

Following the decision to re-start cancer surgery and other essential elective procedures each general surgical unit was allocated one theatre list per week from 8 am to 2 pm with the facility to extend if necessary. This allowed most postponed cancer procedures to be completed.

### **Wards & in-patient care**

All non-essential admissions were curtailed from the second week of March. Most in-patients were managed and discharged on medication for up to a week, where appropriate. If required, patients were pre-registered in

outpatient clinics to prescribe medication for longer periods of up to a month.

With uncertainty around the conduct of clinics, postoperative patients and others who required follow-up including wound dressings were advised to present directly to their respective wards for review.

The nursing staff in surgical wards augmented safety measures, placing hand-sanitisers at the entrance and regular intervals in the wards with clear instructions to remind staff to use them (Fig 1). In some units, nurses replaced their standard uniforms and donned theatre scrubs (Fig 2). Washbasins were placed outside surgical wards for patients and visitors to wash their hands prior to entry.

All elective and emergency admissions to surgical wards were administered a COVID 19 questionnaire (Supplementary 2) to screen for patients at high risk of infection and referral to the Infection Control Unit for a PCR test.

### **Outpatient clinics**

Routine clinics continued to function though with a drastic reduction in patient attendance due to the curfew and the corresponding temporary closure of the VS OPD clinic. Patients who did not require urgent attention and high-risk category patients (Elderly > 60 years, immunosuppressed and those with malignancies) were discouraged from attending clinics. A proposal to issue routine medication directly from OPD pharmacies without clinic attendance was abandoned owing to concerns expressed by the pharmacists. However, arrangements were made to issue patients two months of medication on any day of the week provided it was authorised by the unit doctor. Subsequently, on a Ministry directive, medication was packed and posted to the homes of the patients. Two hotlines with WhatsApp facilities were established in surgical clinics enabling patients to contact staff and send images of their prescription.

A major concern was the lack of access to specialist surgical care for new patients in the community with potential malignant and other surgical disorders that required expedited management. This was compounded by their inherent fear of visiting hospital in the current circumstances.

In an attempt to address this, two telephone hotlines were established in the VS OPD to receive calls from the public. Communiques in all three languages were printed in state media advising those with 'red-flag' symptoms to contact these numbers for advice. Medical officers at VS OPD clinic would then be able direct them directly to the relevant surgical clinic of the day. (Supplementary 3)

## **Procedural guidelines**

### **Surgery**

Following the initial meeting on 20th March, guidelines based on the those advocated by the combined Royal College of Surgeons, the Association of Upper Gastrointestinal Surgeons of the UK (AUGIS) and the American College of Surgeons were adapted for the management of emergency surgery (Supplementary 4).

Based on their risk status, patients were categorised into those whose COVID 19 status was unknown or low-risk and those who were diagnosed with or strongly suspected to have COVID 19 infection. It was recommended that 'full PPE' was used for the latter group which in practice meant use of N95 respirators in addition to the standard protection kit (Fig 3).

Once the decision to re-commence cancer surgery and other essential elective surgery on 6th April 2020 was made, several measures were proposed to minimise inadvertent exposure of HCWs, especially operating theatre staff to infected patients. These included:

- Admission of patients at least 48 hours prior to surgery to observe for pyrexia and respiratory symptoms
- Completing the COVID 19 screening checklist for all surgical ward admissions
- Mandatory chest x-ray for all in-patients
- A chest CT in those obtaining an abdominal CT and those with a suspicion of pulmonary affliction
- Requesting COVID 19 PCR tests at the discretion of the surgeon or anaesthetist based on the planned procedure or patient status
- Designation of the surgical intensive care unit (SICU) for surgical critical care patients only

### **Endoscopy**

Being a high-risk procedure for aerosol generation, routine endoscopy lists were halted. It was continued though for acute gastrointestinal bleeds, suspected malignant lesions and stenting in obstruction. ERCP lists were operated by the Gastroenterology Unit for patients who required urgent or early biliary decompression.

### **Laparoscopy**

In keeping with the guidance issued by the joint Royal Colleges of Surgeons of the UK, AUGIS and the American College of Surgeons, laparoscopic surgery was discouraged in the interim period. Aerosolization of blood borne virus particles by the increased pneumoperitoneal pressure was the concern behind this recommendation.

The debate though on the safety of laparoscopy continues with the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and the European Association of Endoscopic Surgery (EAES) endorsing its use provided appropriate safety precautions are followed. These include small port incisions to prevent leakage, minimum CO2 insufflation pressures and safe evacuation of the pneumoperitoneum via a filtration system before closure, trocar removal, specimen extraction or conversion to open.

### **Personal protective equipment (PPE)**

To complement stocks provided by the Ministry of Health, significant quantities of protective equipment were produced on site. Polyethene overalls were sewn by members of the infection control unit, orderlies of surgical wards and theatres working together using raw material available in the hospital and donated by well-wishers (Fig 4). High quality protective visors were made by the infection control unit in addition those donated by well-wishers (Fig 5). Fluid resistant surgical face masks were made available for all hospital staff. However, availability of N 95 respirators was limited and issued to front-line high-risk staff only. Subsequent donations of N 95 respirators contributed significantly towards establishing baseline supply in theatres, casualty wards and endoscopy units to be used in high risk situations.

Prioritisation, pragmatism and education remain the cornerstones of optimal utilisation of the limited supply of PPEs and minimising wastage.

### **Undergraduate and postgraduate training**

The NHSL, Colombo is the biggest medical undergraduate and postgraduate training centre in the country. With the advent of the COVID 19 crisis the Faculty of Medicine, Colombo was closed, and students returned home. Postgraduate surgical training too was severely curtailed with the reduction in patient numbers and the curtailment of elective surgery. However, both undergraduate and postgraduate training continues with online sessions using platforms such as Zoom.

### **Institutional initiative**

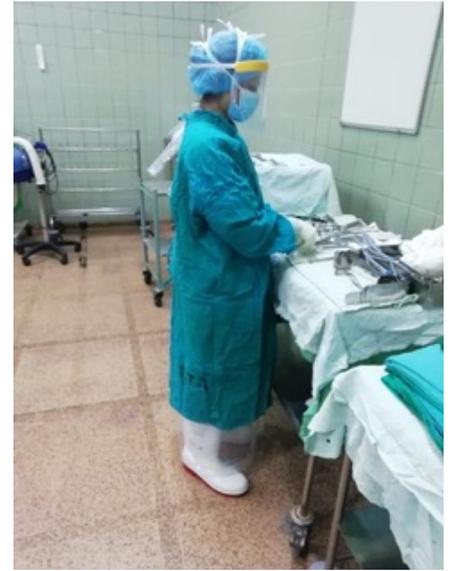
The NHSL, Colombo has thus far exemplified a proactive, cohesive and dynamic response at institutional level to a national challenge of yet unknown dimensions within the constraints of the available resources. It has demonstrated that the coordinated efforts of clinicians, nurses, healthcare staff and administrators are capable of developing institutional guidelines and actions prior to Ministry of Health directives. This was borne out by the fact that subsequent Ministry of Health directives mirrored what was already in practice at the NHSL. There are anecdotal reports of surgical units in other hospitals also adopting the NHSL guidelines.



**Figure 1.** Placing hand-sanitisers at the entrance and wards with clear instructions to remind staff to use them.



**Figure 2.** Nurses replaced their standard uniforms and donned theatre scrubs.



**Figure 3.** Full PPE



**Figure 4.** Polyethene overalls sewn by members of the infection control unit, orderlies of surgical wards and theatres.



**Figure 5.** High quality protective visors made by the infection control unit

While directives and guidelines from the Ministry of Health are essential for an organised national effort, institutional guidelines facilitate their adaptation to local circumstances. This is because hospitals are heterogenous in terms of geography, accessibility, facilities, manpower, available specialities and the population catered to.

### **The way ahead and an exit strategy**

If global and local trends are anything to go by, the medical profession at large is still struggling to size up this virus and the disease. Many unanswered questions remain with regard to the heterogeneity observed in disease prevalence, demography, presentation, morbidity and mortality. The answers probably lie in the complex interaction between factors both genetic and environmental; viral strains, host innate and adaptive immunity, population density, patterns of mobility, climate and a host of yet undetermined factors.

Nations have employed social distancing, aggressive testing, contact tracing, geospatial technology, enforcement of quarantines and national lockdowns in conjunction with capacity building of health services to tackle the crisis. The image crystallising before us hints that each nation will have to strike its own path through this crisis using these strategies in varying proportions based on their disease burden and economic realities. It is highly likely that in hindsight, the direct medical consequences this virus are likely to be dwarfed by longer lasting and more serious secondary problems.

Seven weeks since the pandemic declaration, tropical nations including Sri Lanka have been fortunate to escape the worst effects of COVID 19 ravaging Europe and the USA. While the reasons for this remain largely unknown, taking advantage of this position, tentative steps are being advanced towards an exit strategy from the lockdown.

A significant concern is the plight of patients with non-COVID surgical disorders. The true impact on this group in terms of morbidity and mortality due to delayed and suboptimal care will probably be only known much later.

With the designation of other institutions to manage COVID 19 patients, the NHSL as the largest multi-specialty tertiary healthcare institution in the country should take a leading role in providing specialist care to patients with non-COVID conditions. The guiding principles of this measured yet steady process should be the safety of HCWs and patients, capacity maintenance and enhancement and most importantly the

delivery of quality surgical services expected of this institution.

Paradoxically, the advent of this crisis has also allowed for reflection of the organization and delivery of surgical services at NHSL and promises to be a stimulus for improving efficiency.

### **Supplementary 1:**

#### **National Hospital of Sri Lanka, Colombo Safe Surgery in COVID – 19 Summary of Theatre Precautions**

- Minimum number of staff in theatre
- Take only **one patient at a time** into theatre
- Bring minimum personal belongings into theatre –  
**No** wallets, watches, books, pens, keys & mobile phones
- For communication of team keep one designated mobile phone in space away from table – **wipe clean** before and after session with 70% alcohol
- Patient notes and documentation to be done in **separate room**, using a **separate pen** after completion of procedure and **cleaning hands with 70% alcohol**
- Surgeons and other HCWs not needed for intubation should remain **outside the OT until anaesthesia induction and intubation** are completed.
- Minimum required protective PPE for HCWs to include the following: **Sterile gown with long sleeves, plastic disposable apron, cap, masks and gloves.**
- Surgeons, anaesthetists and scrub nurse to use **plastic disposable long-sleeved top + apron, double gloves, fluid resistant masks, visors / goggles & boots.**
- Stop positive ventilation in theatre during procedure and for at least 20 minutes after the patient has left theatre.
- Use suction for smoke evacuation for diathermy / other energy sources.
- Patients should be **intubated and extubated within the theatre** – staff immediately present should be at a minimum.
- NG tube placement – by anaesthetists with PPE is needed.

## Supplementary 2:

### Screening for COVID 19 University Surgical Unit, NHSL, Colombo

Name:                      Age:                      Residence:

A	History of fever or temperature > 100.4 F	Yes	No
B	Presence of cough, breathlessness or sore throat (any one)	Yes	No
C	Returning to SL from any country within last 14 days or history of travel to or residence in a location designated as a high transmission area of COVID 19 within last 14 days of symptom onset.	Yes	No
D	History of close contact with a <b>confirmed or suspected</b> COVID 19 patient during last 14 days or prior to symptoms	Yes	No
E	Presence of severe acute pneumonia or presence of fever with respiratory distress (RR > 30/min, Spo2 < 90%), regardless of travel or contact history as decided by treating consultant.	Yes	No

#### Clinically suspected case:

1. Presence of A+B+C
2. Presence of B+D
3. E (Not explained by any other aetiology\*)

## Supplementary 3:

### Notice to patients

Are you concerned about some new symptoms?

Would you like to contact a doctor?

The doctors at the National Hospital of Sri Lanka (NHSL), Colombo are available to take your call and advise you on what to do next

Are you over 40 years?

and / or

Have you recently noticed one or more of the symptoms below?

- Difficulty in swallowing
- Continuous vomiting
- Loss of appetite
- Weight loss
- Worsening tiredness, lack of energy
- Blood in your stools
- Tarry coloured stools

- Constipation
- Jaundice / yellow discoloration of your eyes
- Worsening abdominal pain
- Swelling of your tummy
- Lump in the breast
- Lump in the neck
- Lumps in the armpit or groin
- A smoker or diabetic with a painful foot or infected wound
- Or another symptom that is worrying you

Call: 011 361 8724 or 076 818 5157

and speak to a doctor between 8.00 am to 1.00 pm from Monday to Saturday.

The Director  
NHSL

## Supplementary 4:

### COVID-19 Guidelines for Surgical Care at NHSL, Colombo

#### General Principles

##### 1. Emergency surgery

- COVID-19 should be sought in any patient needing emergency surgery by,
  - History – symptoms (fever, cough, sore throat, anosmia) contact, travel
  - Chest X ray (CT chest if possible)
  - Any patient undergoing abdominal CT to also have a chest CT scan
  - Treat all as potential COVID-19 positive

##### 2. Urgent planned surgery

- Must be assessed for COVID-19 as above.
- Greater risks of adverse outcomes factored into planning and consent.
- Consider stoma formation rather than anastomosis.
- Maximum protective gear (PPE if available) should be used for laparotomy except when the patient is convincingly negative for COVID-19.
  - Note that current tests include false negatives
  - Full PPE includes visors or eye protection

##### 3. Laparoscopy

- Best avoided until further recommendations are issued
- Only in selected cases where clear benefits override risks in current context (mortality & morbidity)

#### 4. Theatre Precautions

- Minimum number of staff in theatre.
- Bring no / minimum personal belongings into theatre – no wallets, watches, books, pens keys & mobile phones
- For communication of team keep one designated mobile phone in space away from table – wipe clean before and after session with 70% alcohol
- Patient notes and documentation to be done in separate room, using a separate pen after completion of procedure and cleaning hands with 70% alcohol
- Surgeons and other HCWs not needed for intubation should remain outside the OT until anaesthesia induction and intubation are completed.
- Minimum required protective PPE for HCWs to include the following: sterile gown, plastic disposable apron, cap, masks and gloves and covered footwear.
- Surgeons, anaesthetists and scrub nurse to use double gloves and visors.
- Stop positive ventilation in theatre during procedure and for at least 20 minutes after the patient has left theatre.
- Use suction for smoke evacuation for diathermy / other energy sources.
- Patients should be intubated and extubated within the theatre – staff immediately present should be at a minimum.
- Approaching a coughing patient: protection including eye shield is needed.
- NG tube placement – by anaesthetists with PPE.

#### 5. Endoscopy

- Only emergency endoscopic procedures for acute bleeds should be performed.
- Upper GI procedures are high risk and full PPE must be used.

#### Specific Conditions

##### 1. Acute Haemorrhoidal Thrombosis / Necrosis

- Most can be managed non-operatively.
- Emergency procedures should be reserved for significant bleeding & severe disease or failed non-operative measures.

##### 2. Perianal or Perirectal Abscess

- May be managed with incision and drainage with local anaesthesia (LA)
- Otherwise incision and drainage (I&D) under spinal anaesthesia (SA)

#### 3. Soft Tissue Infections

- Superficial & localized abscess - manage with I&D with LA or wide bore needle aspiration
- Large abscess / intra-muscular extension / necrotizing infection - drainage & debridement in the OT under SA > general anaesthesia (GA).

#### 4. Acute Pancreatitis with Necrosis

- The “step up” approach is recommended which includes:
  - Percutaneous drainage
  - Endoscopic debridement or by interventional radiological techniques  
(note that interventional radiology techniques may be preferred in COVID positive patients due to risk of aerosolization with endoscopy)
  - Open operative drainage if no other option available

#### 5. Pneumoperitoneum, Intestinal Ischemia, Intestinal Obstruction

- Should proceed with emergency open surgery.
- Small bowel obstruction secondary to adhesions: Non-operative management according to the usual practice.

#### 6. Appendicitis, Uncomplicated

- IV antibiotics followed by transition to oral antibiotics.
- Duration of hospital stay should be weighed against the use of OT resources in this circumstance and should be based on surgeon judgment.

#### 7. Appendicitis, Complicated

- Can be managed per usual practice.
- IV antibiotics until clinically improving, followed by transition to PO antibiotics.
- Defined abscess should undergo percutaneous drainage.
- Evidence of perforation may be managed with percutaneous drainage or open surgery based on patient condition.
- Failed non-operative management should proceed to open surgery.

#### 8. Choledocholithiasis

- Without signs of cholangitis may be managed expectantly.
- For those with worsening jaundice who fail to spontaneously pass their stone do endoscopic

retrograde cholangiopancreatography (ERCP) with sphincterotomy.

- Elective cholecystectomy is delayed.

### 9. Acute Cholecystitis

- Conservative management with antibiotics
- Failure to improve on antibiotics and worsening signs of sepsis should undergo USS guided percutaneous cholecystostomy

### 10. Cholangitis

- Broad spectrum antibiotics and appropriate resuscitation.
- Those who fail to clinically improve and those with severe sepsis, urgent ERCP and sphincterotomy is indicated
- Elective cholecystectomy is delayed

### 11. Diverticulitis

- Uncomplicated diverticulitis: IV antibiotics with transition to oral antibiotics.
- Diverticular abscess: IV antibiotics +/- percutaneous drainage depending on response
- Generalised peritonitis with diffuse pneumoperitoneum – open surgery.
- Failed non-operative management – move to open surgery

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

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