Reflections on Ambulatory Pathways in the Post-Covid Era

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Abstract

The worldwide COVID-19 pandemic halted elective surgery in many countries, either as a result of staff and patient safety, or due to the loss of ambulatory facilities which were converted to assist in the management of COVID positive patients. The reintroduction of ambulatory surgery has required changes in the patient pathway for the foreseeable future to reduce the risks of viral infection. While the components of the ambulatory pathway remain unchanged, the delivery of the patient process now involves fewer face-to-face interactions between patient and health care professionals with unnecessary visits to the healthcare facility eliminated. When face-to-face interactions do occur, then appropriate Personal Protective Equipment (PPE) is required. Without doubt, the perioperative process has become more difficult to deliver, but in contrast, the preassessment component of the pathway and discharge processes have become more streamlined due to the enforced changes precipitated by COVID-19.

Keywords: Ambulatory Surgery, COVID-19, Patient pathway.

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Introduction

The classical ambulatory pathway consists of a planned series of steps, to allow the patient a seamless admission and discharge for their surgery, on the same working day (1). The COVID-19 pandemic has created new challenges for the ambulatory team, but also created new opportunities to streamline and modify the existing components of the pathway (Figure 1).

As elective ambulatory surgery is reintroduced as COVID-19 comes under control, the patient journey may continue as before – but with COVID precautions for both patients and staff. However, the more contacts each member of the multidisciplinary team has with the ambulatory patient, the greater risk of contracting the virus. Moreover, the more contacts, the more PPE required, most of which is disposable and therefore adds to costs. Therefore, as an ongoing process, changes are occurring in many centres to reduce patient contact by eliminating any unnecessary visits to the ambulatory unit before and after day surgery and reducing patient contact while attending for treatment. Our knowledge and understanding of the virus is constantly updated and pathway advice may change over time. However, while COVID remains a worldwide threat, infection precautions must remain in place.

Preassessment Pathway

Patient Referral

In countries where a primary care service exists, most consultations between patient and doctor can be conducted by telephone or video call rather than face-to-face. Demand for non-COVID consultations has dropped and the number of serious conditions undiagnosed is unknown. This may represent a genuine fear of patients to seek medical help or an elimination of consultations on trivial matters, or both.

The second level of triage occurs in the surgical out-patient department. Again, consultations may be conducted by telephone or video call. Successful remote consultations rely heavily on clinical experience to focus on the salient features of the patient's history without the aid of clinical examination. Many diagnoses of ambulatory procedures can be successfully accomplished with an accurate clinical history, and if required, the patient can send clinical pictures to the specialist or conduct the consultation by video call. If neither of these aids are available, then face-to-face consultation is required. This COVID experience of remote consultations has demonstrated that many face-to-face consultations may be unnecessary, especially when follow-up consultations are considered. On arrival at the

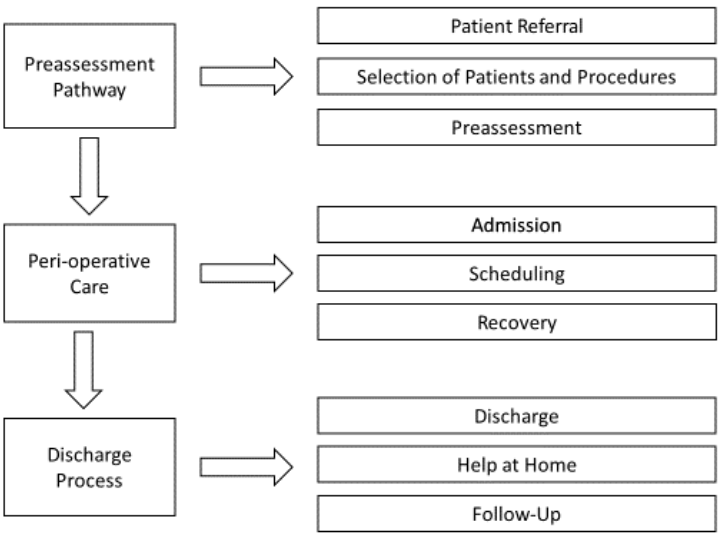

Figure 1 The Ambulatory Surgery Pathway.

clinical facility, patients commonly are questioned regarding potential COVID symptoms and their recent travels. Patients' temperatures can be quickly measured with forehead readings using infrared non-contact thermometers.

Selection of Patients and Procedures

There is now considerable epidemiological evidence regarding individual risk to COVID-19. Epidemiological data is constantly being updated and risk factors are complex and often inter-related. However there is a consensus that age, male sex, obesity (BMI>30), respiratory disease such as COPD and asthma, heart conditions such as coronary heart disease and cardiomyopathies, uncontrolled diabetes, sickle cell disease, and immunocompromised patients are more at risk than the general population (2,3). However, these risk factors may vary in different countries and within different ethnic groups.

A further risk factor is surgery itself. Any surgical procedure conducted on a COVID-19 positive patient carries a significant risk of postoperative pulmonary complications in half of cases and delaying non-essential surgery or seeking a non-surgical treatment is recommended (4). One of the benefits of the COVID crisis has been to focus on unnecessary surgery, which may be defined as any surgical intervention that is either not needed, not indicated, or not in the patient's best interest when weighed against other available options, including conservative measures (5). While there is mounting evidence that certain procedures are of low clinical value, the individual clinician requires more than ever to balance the risk of surgery in the individual patient for all interventions. For many patients, this may simply be a delay to their treatment, but for others, perhaps an unnecessary intervention has been avoided.

Preassessment

Even before the pandemic, there was a move away from universal face-to-face preassessment towards telephone or video interviews (6) due to the decreased costs involved. COVID-19 has certainly accelerated this process. This process can be aided by the use of online preassessment systems where the patient is given access to a secure portal and answers the assessment questionnaire. The results of this are reviewed online by the anaesthetic team and patient contacted by telephone or video call for further intervention (7).

Patients who are found to have comorbidities requiring further diagnostics are referred to a clinical facility for face to face evaluation under PPE conditions. Fortunately, very few patients requiring ambulatory surgery require preoperative tests providing there is adherence to strict protocols and guidelines (8).

Perioperative Care

Scheduling

The scheduling of ambulatory procedures requires advanced planning for the admissions team to book the patient and the scheduling team to formulate the content and order of individual lists. The ideal planning schedule commences several weeks ahead with a cohort of potential patients contacted regarding their availability. Suitable patients can then be remotely preassessed, allowing sufficient time to organise face to face diagnostics if required. While lockdown of ambulatory lists is normally scheduled for 2 weeks before surgery, it has always been possible to replace late unavoidable cancellations with substitute patients, providing preassessment can be conducted at short notice. Unfortunately, this is no longer possible as the incubation period for COVID-19, which is the time between exposure to the virus (becoming infected) and symptom onset, is on average 5-6 days, but can be up to 14 days (9). However, some people can test positive for COVID-19 from 1-3 days before they develop symptoms (10). On these data, patients are requested to self-isolate 14 days before their ambulatory procedure and are COVID-tested 72 hours before their surgery, the timing of testing is dependent on the turnaround time of COVID testing.

Admission

Patients should be admitted to the ambulatory facility on their own without a friend or relative accompanying them to decrease possible infective contacts. The exception, of course, is a parent accompanying their child or when caring for the vulnerable adult, but this may be dictated by local policy. Patient admission on the day of surgery requires both patient and clinical staff to wear loose-fitting surgical facemasks covering the nose and mouth. These facemasks are designed for one way protection, to capture bodily fluid such as large-particle droplets leaving the wearer, and are not designed to protect the wearer. In contrast, non-valved respirators are tight-fitting masks, designed to create a facial seal and provide good two-way protection by filtering both inflow and outflow of air. These are designed protect the wearer (when worn properly), up to the safety rating of the mask. In Europe, two different standards are used. The FFP (Filtering Face Piece) score is regulated by EN standard 149:2001 and the P1/P2/P3 ratings covered by the EN 143 standard. In the USA, respirator standards are maintained by NIOSH (National Institute for Occupational Safety and Health) and rated as NX, where N relates to resistance to non-oil particulates and X relates to the filter capacity. A comparison of European and USA standards is shown in Table 1 (11,12).

Table 1 Classification of Respirators.

Respirator Class	Filter Capacity (removes x% of all particles 0.3 microns or larger)	Function
FFP 1 and P1	Minimum 80%	Dust Mask eg DIY tasks
FFP 2 and P2	Minimum 94%	Protection against Influenza virus, Bubonic Plague, Tuberculosis
N95	Minimum 95%	
FFP 3 and N99	Minimum 99%	Protects against very fine particles such as asbestos and COVID-19
P3	Minimum 99.95%	Protects against very fine particles such as asbestos and COVID-19
N100	Minimum 99.97%	Protects against very fine particles such as asbestos and COVID-19

The equivalent respirator class to FFP2 and N95 in China is KN95, in Australia and New Zealand AS/NZ P2, in Korea 1st Class, and in Japan DS FFRs.

Full personal protective equipment (PPE) is required in the operating room when performing a procedure on a patient with proven or suspected COVID-19 and due to the dangers of asymptomatic infection, has become the 'new norm'. In addition to an FFP3 respirator, the operator and scrub-team require protection for the eyes, through a visor or goggles, fluid resistant disposable gowns and double disposable gloves. Local policy specifies procedure for donning and doffing PPE before and after operating.

The World Health Organisation operating room briefing, and safety checklist (13) has not only improved patient safety but also improved efficiency through better communication among all the healthcare professionals involved. It is recommended that day surgery units follow this checklist or an equivalent nationally agreed checklist that may have additional components (14). Post-Covid, the most important additional question relates to confirmation that a COVID test has been performed 72 hours before surgery and that the test is confirmed negative.

The operating room is a potential rich source of possible Covid vectors. Current knowledge confirms the virus has been identified in respiratory tract, in faeces, blood, serum, saliva and lymph (15). The greatest risk to operating room personnel is likely from aerosol generating procedures (AGP's), primarily as a result of procedures involving open suctioning of the respiratory tract (Table 2). Therefore all procedures performed under general anaesthesia are categorised as AGP's but in terms of specific interventions, upper ENT airway procedures and upper GI endoscopy are other obvious AGP's. In addition, many orthopaedic operations become AGP's when high speed devices such as drills are used. There is also a theoretical risk of transmission of COVID 19 during laparoscopy via possible release of virus in the form of an aerosol with CO2, creating oral, nasal and ocular exposure (16). However, in the absence of evidence supporting this theoretical consideration, there is at present no need to exclude laparoscopic procedures from ambulatory surgery and theoretical risk that should be weighed against the benefit of laparoscopy (17).

Aerosol Generating Procedures (AGPs) are currently considered to be potentially infectious AGPs for COVID-19 (18) and are shown in Table 2.

Table 2 Selection of Common Aerosol Generating Procedures.

Intubation, extubation and related procedures e.g. manual ventilation and open suctioning of the respiratory tract (including the upper respiratory tract)
Tracheotomy/tracheostomy procedures (insertion/open suctioning/removal)
Bronchoscopy and upper ENT airway procedures that involve suctioning
Upper Gastrointestinal Endoscopy where there is open suctioning of the upper respiratory tract
Surgery and post mortem procedures involving high-speed devices
Some dental procedures (e.g. high-speed drilling)
Non-invasive ventilation (NIV) e.g. Bi-level Positive Airway Pressure Ventilation (BiPAP) and Continuous Positive Airway Pressure Ventilation (CPAP)
High Frequency Oscillatory Ventilation (HFOV)
Induction of sputum
High flow nasal oxygen (HFNO)

To reduce aerosol transmission, ventilation in both laminar flow and conventionally ventilated theatres should remain fully on during surgical procedures. Clearly, those closest to aerosol generation are most at risk, but the dilution of aerosols by operating room ventilation, offers some protection to operating room personnel. At the completion of an AGP, droplets remain suspended in the air of the operating room. What time should elapse before it is safe to return to the operating room to commence the next case? The rate of clearance of aerosols in a confined space is dependent on the degree of ventilation. It is generally assumed that a single air change removes 63% of aerosol contamination (19) and that 5 air changes are sufficient to remove more than 99% of airborne contaminants (20). The aerosol clearance time (ACT) is the time in minutes for a complete air exchange in a room and is calculated by dividing 60 minutes by the number of air changes per hour. Different operating rooms are built with differing air exchange rates and an accurate assessment of an operating room's ACT requires this data. However, the American Institute of Architects Guidelines for Healthcare (21) recommends a minimum exchange rate of 15 air changes per hour for staff safety regarding anaesthetic gases. Therefore, most operating rooms are constructed with this minimum standard in mind. When considering COVID safety, this would equate to an ACT of 20 minutes, meaning that it is not safe to enter the operating room without wearing airborne PPE for at least 20 minutes. In practice, most operating rooms have more than 15 air changes per hour. Laminar flow theatres can have up to 300 air changes per hour, for which the ACT would be 1 minute. Between cases, and at the completion of the operating list, the operating room should be cleaned as per local policy for infected cases paying particular attention to hand contact points on the anaesthetic machine (22).

Recovery

If the pandemic overcomes the capacity of a hospital's intensive care facilities, the stage 1 recovery area or the post-anaesthesia care unit (PACU) can provide temporary overflow. If utilised for patient recovery, patients with COVID-19 must be physically separated from non-COVID patients (23). However, as patients undergoing ambulatory surgery are usually elective, are treated in a separate facility from in-patients, and have been COVID-tested 72 hours before admission, then the ambulatory PACU is considered a non-COVID area. Nevertheless, appropriate PPE is recommended for PACU personnel. COVID-testing can produce false-negative results and there is also a risk that the patient becomes COVID-infected after their test and before surgery but are pre-symptomatic or asymptomatic. Furthermore, the recovering patient is liable to coughs or sneezes due to airway irritation. As PACUs are open facilities, each unit must determine how to maintain adequate space between patients. A two metre distance apart is considered adequate and patients should be transferred from the operating room to PACU with a face mask in place (24).

Discharge Process

Discharge

Discharge, as always, is best conducted by an agreed Ambulatory Unit protocols, rather than delaying discharge while awaiting clinician decisions. The patient is accompanied by an ambulatory staff member to a waiting area outside the facility to meet the friend or relative who will ensure a safe journey home, thereby reducing the risk of transmission to other members of the ambulatory team. Both patient and helper are advised to use face-coverings

Help at Home

For elderly patients discharged after a day case procedure, help at home is essential. Their return is often a worry and any physical disability as a result of their operation is often magnified and is a source of concern as to how they will cope with everyday activities in the immediate postoperative period. Add in the lingering effects of sedation and anaesthesia, and it is quite clear that it is essential to have help present on the first night home as the patient adjusts to their

new situation. However, in this post-COVID era, with age being a risk factor for the infection, the helper should also wear a face covering and observe social distancing where possible, unless they normally live with the patient.

For others, the situation is less clear. Many people nowadays live alone, and unless essential, many would prefer not to have anyone accompanying them at home in the postoperative period. Nevertheless, patient safety is a priority.

A pragmatic approach is to ensure anyone who could suffer covert bleeding, as with operations in the abdominal cavity, such as laparoscopic cholecystectomy, should have help available on the premises and able to act if the patient's health deteriorates. For others where the surgical procedure is non-invasive, such as hernia repair or removal of 'lumps and bumps', any postoperative haemorrhage is overt and take the form of a haematoma or be controllable with simple pressure. Where the patient is aware of their complications, the availability of nearby help, contactable by telephone, is all that is required. Procedures where postoperative bleeding can affect the airway, such as after tonsillectomy or thyroid surgery, then the presence of help at home actively monitoring their charge is essential (25).

Follow-up

For discharge support, a 24-hour telephone number should be available for the patient (or their helper) to contact is case of complications or forgotten questions. Many units routinely contact the patients the following morning while others offer a dedicated day-time contact for advice or information.

There is increasing experience with the use of teleconsultation to reduce the need for patients to visit the hospital during the post-operative period. Examples include the follow-up of patients' wounds or the monitoring of surgical drains at home, following more complex surgery (26). The next development is the ability to include remote monitoring of patients' vital signs. In its simplest form, patients record their BP, temperature, pulse and saturation using conventional monitors and enter the data onto an App or web-portal but more sophisticated systems under development can upload data to a secure cloud server where it can be reviewed by clinical staff. Many sensors are wearable like a watch or a patch attached to the patient and can provide several days of recordings of heart rate, respiratory rate, temperature and movement (27).

Follow-up for many ambulatory patients is not routinely required as day surgery procedures are usually straightforward. If out-patient follow-up is required, then this can be conducted by telephone or video-call to reduce the number of face-to-face consultations in the out-patient clinic. A welcome consequence of the move to teleconsultation has been a reduction of 'Did Not Attend' rates with one study reporting a fall from 25% to 10% (26)

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