

# AMBULATORY SURGERY

ISSN: 0966-6532

International Journal covering Surgery,  
Anaesthesiology, Nursing and  
Management Issues in Day Surgery



*The Official Clinical Journal of the*  
INTERNATIONAL ASSOCIATION  
FOR AMBULATORY SURGERY

VOLUME 28.1 MARCH 2022



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VOLUME 28.1

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A happy somewhat belated 2022 to you all. I hope that working practices are slowly returning to a more normal basis, as the coronavirus pandemic recedes to manageable levels. The potential threat of the omicron variant is deemed to be mild, which suggests a reduction in hospital admissions and mortality. On this basis, there are potentially more beds to allocate to ambulatory care, and hopefully a progressive return to pre-pandemic levels of activity. As the world reacts to improving conditions, so has the IAAS with the resumption of their biennial Congresses.. but more about this later.

This edition of the Journal contains a pot pourri of offerings with an Anglophilic emphasis. The first is a review of digital technology in peri-operative care where the authors assess the development of non face to face care for management and administrative functions in healthcare. There is no doubt that acceleration of output has been facilitated by the corona pandemic, so this review provides a timely overview of the ways that such methods can be employed. In a similar vein is a reflective paper written by a junior doctor from England discussing methods of managing the coronavirus challenges in ambulatory surgery.

A third paper from England discusses ambulatory hip replacement, evaluating the patient perspective to the procedure, and enquiring about perceived outcomes that may influence the decision to undergo the operation as a

daycase. Post-operative pain, potential complications, and access to ongoing services in the peri-operative period were some of the perceptions most likely to influence patient judgement.

Finally, a brief case report describes the successful ambulatory management of a patient with uncorrected tetralogy of Fallot for retinal detachment vitrectomy. The heart lesion was confirmed by pre-operative echocardiography, and perhaps predictably, peribulbar block was chosen as the technique of choice.

An additional bonus is some correspondence from Naples, Italy, where the authors describe their experiences with maintenance of local anaesthetic plastic surgery sessions during the COVID pandemic.

A brief note.. as I'm sure you are all aware, the biennial IAAS Congress will be held in Bruges, Belgium from 30th May to 1st June. Abstracts are now being accepted for consideration, and the closing date is planned as 15th April 2022. All abstracts submitted will be published in the next edition of Ambulatory Surgery, so here's an opportunity not only to attend in Bruges, but also have your abstract replicated in print in this Journal. Sufficient stimulus surely, to put something of interest together for the meeting and this Journal?

**Dr Mark Skues**  
Editor-in-Chief

# Digital technology in Perioperative Care

Manpreet Singh, Yat Wah Li

## Abstract

Digital technology is becoming integral part of modern medicine. In this article we will describe various digital technologies used along the journey of perioperative care of the patients which can be used ranging from ambulatory surgery to major surgery. Electronic patient record is key component in integrated care programme and virtual

clinics. Apps and wearable technology might play vital role in remote monitoring underpinning perioperative journey of patient ranging from pre-habilitation to rehabilitation. We will discuss the pitfalls of digital technology that can lead to digital inequalities.

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## Introduction

Digital health, the use of digital technology in health is rapidly changing the practice of medicine from online education to robotic surgery; the way patients and healthcare professionals engage; improving the efficiency, access and quality of health and care; and supporting policy making decisions.

The World Health Organisation (WHO) recognises the value of e-Health which it defines as "the cost-effective and secure use of information and communication technologies (ICT) in support of health and health-related fields". This includes telehealth, telemedicine, mobile health (m-Health), electronic medical or health records (EMR/EHR), big data, wearables and artificial intelligence (AI)(1).

The field of perioperative medicine (POM) has undergone radical change in the last 30 years witnessing major advances in anaesthetic and surgical techniques whilst challenging what can be feasible in ambulatory surgery. With growing global aging population having complex medical needs undergoing surgery, personalised perioperative care pathways are required.

The COVID-19 pandemic has major impact on healthcare and delivery of perioperative care to patients. It is estimated that more than 2 million elective surgeries were cancelled or postponed worldwide during 12 weeks of peak disruption during the first wave of pandemic and this shortfall will be added up with subsequent waves of infection. At the end of November 2020, a total of 192,169 patients had been waiting more than 52 weeks for planned surgery in the National Health Service (NHS) while in the same month in 2019 the number was just 1398 (2).

With the coronavirus pandemic, there has been an acceleration in adoption of digital technologies across the NHS and globally. In this article we aim to discuss the use of digital technologies in the perioperative journey of patients in the NHS with focus on benefits and pitfalls that can be applicable to ambulatory surgery worldwide.

### *e-Health in perioperative medicine*

The involvement of the NHS in digital health can be tracked back to over three decades with the first national information technology (IT) strategy for the NHS in 1992 (NHS Management Executive 1992) with subsequent strategies in 1998 and 2002. This led to the National Programme for IT (NpIT) with the ambitious aim of creating a single national EPR connecting primary and secondary care. While it failed to meet objectives and was eventually abandoned, the digital agenda has continued to be pursued strategically in the NHS Five Year

Forward View and in the Wachter, Carter and Topol reviews.

In 2015, the perioperative medicine (POM) programme was adopted into the Royal College of Anaesthetists (RCOA) curriculum leading to the establishment of the cross-organisational Centre of Perioperative Care (CPOC) in 2019. CPOC has produced three evidence reviews exploring impact, multidisciplinary team (MDT) working and perceptions in perioperative care; highlighting the learning to benefit to patients, health service and workforce; and to define their six strategic priorities one of which is harnessing digital technology (3).

These digital technologies revolve around the patient, supporting their self-care, their pre- and post-operative care; and the health and care professionals delivering it (Table 1) involving mobile devices, remote diagnostic and advanced computing (Table 2).

**Table 1** Harnessing digital technology (adapted Strategy for the Centre for Perioperative Care (3)).

Patients	Staff	Pathways
Pre and post-op information	Accessible and scalable training	Automation and AI
Virtual clinics	Develop education programmes	Accessible shared records
Remote assessment and monitoring	Improved team communication	Structured multidisciplinary working and communication
Communication	Virtual meetings	Data collection

### *Telehealth and telemedicine*

Face to face (F2F) consultations were the norm for perioperative medicine clinics but these were interrupted due to the potential risk of coronavirus infection spread to patients and healthcare professionals. Virtual consultation involving the use of video or voice calls via mobile phone and computing devices became an alternative to F2F consultation and was rapidly implemented around the world.

A virtual clinic is a planned contact by the healthcare professional responsible for care with a patient for the purposes of clinical consultation, advice and treatment planning. It may range from telephone contact, telemedicine, teleconference or video link.

The concept of virtual clinics is not new and was being used in other specialties but acceptance across the NHS was slow due to various governance, cost, infrastructure, and clinical barriers but adoption has been accelerated during the pandemic with direct government support.

**Table 2** Digital technologies and clinical utilisation..

Digital technology	Digital solution example	Clinical use example
Smart phone and mobile computers	<ul style="list-style-type: none"> <li>Voice and video calls</li> <li>SMS messages and e-mail</li> <li>Healthcare and lifestyle apps</li> <li>4G, 5G and data transfer speeds</li> </ul>	<ul style="list-style-type: none"> <li>Virtual clinics</li> <li>Remote consultation/ assessment</li> <li>Education and training</li> <li>Behavioural change</li> <li>Pre- and re-habilitation</li> </ul>
Cloud storage	<ul style="list-style-type: none"> <li>Shared care records</li> <li>EHR/EPR</li> <li>Remote access</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate MDT</li> <li>Access to medical records</li> </ul>
Wearables and smart diagnostics	<ul style="list-style-type: none"> <li>Biometric data collection e.g. heart rate, blood pressure, blood glucose</li> </ul>	<ul style="list-style-type: none"> <li>Patient self-care</li> <li>Remote consultation/ assessment</li> <li>Virtual wards</li> <li>Pre- and re-habilitation</li> </ul>
Computing and computer science	<ul style="list-style-type: none"> <li>Robotic process automation</li> <li>Artificial intelligence</li> <li>Predictive analytics</li> <li>Big data</li> </ul>	<ul style="list-style-type: none"> <li>Smart triage and referral</li> <li>Pathway optimisation</li> <li>Population health</li> <li>Personalised medicine</li> </ul>

NHS England (NHSE) provided a national procurement framework for online consultation to implementation across all care settings including mental health and community during the outbreak. NHSE and other governing bodies also developed guidance to support implementation and usage of these online digital platforms (see Table 3).

**Table 3** Remote consultation guidelines during COVID pandemic.

Digital technology	Digital solution example
Clinical guide for the management of remote consultations and remote working in secondary care during the coronavirus pandemic (Nov 2020)	NICE UK & NHS England <a href="https://www.nice.org.uk/media/default/about/covid-19/specialty-guides/specialty-guide-virtual-working-and-coronavirus.pdf">https://www.nice.org.uk/media/default/about/covid-19/specialty-guides/specialty-guide-virtual-working-and-coronavirus.pdf</a>
Principles for supporting high quality consultations by video in general practice during COVID-19 (Aug 2020)	RCGP/ NHS England <a href="https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/C0479-principles-of-safe-video-consulting-in-general-practice-updated-29-may.pdf">https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/C0479-principles-of-safe-video-consulting-in-general-practice-updated-29-may.pdf</a>
Remote consultations	GMC <a href="https://www.gmc-uk.org/ethical-guidance/ethical-hub/remote-consultations">https://www.gmc-uk.org/ethical-guidance/ethical-hub/remote-consultations</a>

Virtual consultations were on rise even before the pandemic, but coronavirus became the catalyst for further use to limit patient contact with infectious exposure and enabled clinicians who were

shielding to continue medical care. This technology has been successfully harnessed in various ways ranging from virtual pre-assessment, prehabilitation and rehabilitation clinics to remote MDT reducing patient's travel time, costs and exposure to hospital acquired infections; potentially improving their experience whilst simultaneously reducing clinic non-attendance. Like any technology, virtual clinics has its advantages and disadvantages which are tabled below (See Table 4).

**Table 4** Advantages and disadvantages of telehealth and telemedicine..

	Advantages	Disadvantages
Patients	<ul style="list-style-type: none"> <li>Convenience</li> <li>Reduced travel and costs</li> <li>Reduced exposure to infection</li> <li>Patient engagement</li> </ul>	<ul style="list-style-type: none"> <li>Equity of access to healthcare</li> <li>Digital literacy and training requirement</li> <li>Sustainability</li> <li>Loss of personal touch</li> </ul>
Health and care professionals	<ul style="list-style-type: none"> <li>Convenience</li> <li>Improve efficiency of consult</li> <li>Access to records</li> <li>Reduce clinic non-attendance</li> </ul>	<ul style="list-style-type: none"> <li>Digital literacy and training requirement</li> <li>Inability to perform physical examination</li> <li>Access to equipment</li> <li>Loss of personal interaction</li> <li>Regulatory risks</li> </ul>
Pathways	<ul style="list-style-type: none"> <li>Improve efficiency and productivity</li> <li>Facilitate MDT</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure and equipment costs</li> <li>Regulatory requirements</li> <li>Equity of access</li> </ul>

In the NHS, around 10% of outpatient appointments were classed as telemedicine in March 2020, compared to just 3.5% in March 2019 (4).

While virtual consultations cannot replace essential hospital visits, they can nevertheless complement the delivery of health services and have been successfully piloted as alternative to face-to-face therapy in the delivery of postsurgical rehabilitation (5), prehabilitation (6) and effective to deliver nutritional and psychological counselling (7).

### ***Wearables and apps: Patient self-care, prehabilitation and rehabilitation***

As life expectancy continues to improve and with medical advancements patients requiring surgery with complex healthcare needs will continue to increase; and technological advances will have an important role to play in perioperative care of patients.

There is a positive association of physical activity and surgical outcomes (8) and increased physical activity may slow frailty (9). Traditionally, physical activity evaluated by questionnaires and the gold standard like CPET to assess fitness needs time and resources. Wearable technology (wearables) containing various sensors such as accelerometer, gyroscope, compass, ambient light, and optical heartbeat; can enable the continuous monitoring of human physical activities and behaviours, as well as physiological and biochemical parameters during daily life and the evidence of benefit is growing (10,11).

Wearables in healthcare range from fitness trackers, smartwatches, wearable ECG & blood pressure monitors and continuous blood

glucose sensors; which combine software, hardware and data storage to capture patient health information. A smartphone is typically used to collect information and transmit it to a remote server for storage and analysis via an app.

Prehabilitation, defined as lifestyle interventions aimed to prepare patients for the physiological stress associated with surgeries, has demonstrable clinical importance in enhancing perioperative function and recovery (12) with information gathered from wearables that can be used to optimise medical conditions and increase physical activity (10) before surgery and improving patient outcomes.

NICE has developed standards that ensure new technologies are clinically effective and offer economic value. Apps providing real time data from patients to clinicians that can help in improving care with studies that are under way attempting to leverage consumer wearable sensing technologies to aid in clinical diagnosis of common diseases.

As an example, the Apple Heart Study is evaluating whether the Apple Watch can identify irregular heart rhythms such as atrial fibrillation (13). Data recorded by the wearable device was able to consistently approximate CPET results (14). This highlights the potential utility of wearable devices in formal assessment of physical functioning and suggests they could play a larger role in pre-operative risk assessment.

Pre-habilitation interventions can optimise the delivery of perioperative care, but accessibility to such interventions can be limited by geographic situation, lack of transportation and financial issues. Using video conferencing mobile technologies can help overcome those obstacles and tele-prehabilitation using mobile technology appears safe, feasible and generates good satisfaction with patients (15).

In rehabilitation, there have been a large number of studies involving these sensors that have focused on the upper body following stroke showing clinical evidence of small improvements (16). The wider range of wearable sensor systems that may assist in home-based rehabilitation, including body sensor networks, smart clothing, and wearable cameras that provide complementary information to these movement sensors are also helping self-care.

The big data generated by wearable devices is both a challenge and opportunity for researchers who can apply artificial intelligence (AI) techniques on these data in the future.

Smartphones and tablets have unique role to play in the perioperative care of the patients with the use of health applications (Apps). Mobile apps which commonly interface with wearables can provide a real-time dataset by enabling a much faster feedback loop between patients and their care teams. Their ease of use, smartness, accessibility, mobility, and connectivity create unique opportunities to transform medicine and improve quality of care. These apps provide an avenue for patients to become participants in co-creating their care pathway and open the door for shared decision-making, which may have other behavioural benefits in terms of adherence and encouraging gamification of health. Apps are available for self-management of chronic diseases which can be monitored remotely by responsible clinicians. While there are many health and care related apps to download, NHS digital have assessed and approved disease specific, fitness, nutrition and mindfulness apps in their library which clinicians can recommend and patients can access. This is important as the UK Medicines and Healthcare Products Regulatory Agency (MHRA) have recently introduced regulation around apps that aid diagnosis or recommend treatment (17).

### **Remote monitoring**

Remote patient monitoring is a method of healthcare delivery that uses information technology to gather patient data outside of traditional healthcare settings. It can improve condition management

for both patients and clinicians by providing care closer to home, enhancing the quality of life and outcomes for patients; and delivering a more efficient health service through patient self-management and fewer hospitalisations. This has involved telephonic consultations but more recently virtual video consultations and the use of various apps and wearable devices. Remote patient monitoring can use an array of technologies that vary according to a particular condition and tracked metrics. This can be utilised for expanding the complexity of cases done under ambulatory care.

### **Utility in post-operative care: Virtual wards**

The use of virtual ward rounds during the covid-19 pandemic enabled hospitals to limit the exposure of their workforce but also allowed medical staff to preserve an element of human connection with patients. In particular, the system has made it easier for nurses who have often needed to be heavily masked when in close patient proximity to have unmasked contact with patients for an hour or more outside their room through the use of virtual intercom systems thereby reducing patients' social isolation.

NHS England has recently published guidance on COVID virtual wards to support the earlier and safe discharge of COVID-19 patients and successfully implemented COVID oximetry@home pathway for safe admission avoidance (18). This involved the use of oximeters, patient self-reporting via a dedicated app, admission into virtual ward and governance.

Current systems for monitoring patients postoperatively, on surgical wards and after transition to home, are commonly inadequate. The frequency of vital signs monitoring decreases from in the post-operative period, on the in-hospital ward to no vital signs monitoring at home lead to potentially undetected or delayed detection of compromised vital signs in higher risk patients and leading to poor outcomes. Postoperative remote automated monitoring (RAM) on surgical wards and at home can help improve postoperative care by increasing vital signs monitoring when there is limited clinical resource and by directing frontline clinical response. RAM is improving with recent technological advances of medical standard wearables that enable data integration and analysis; and studies have shown improved clinical outcomes particularly in combination with hospital-to-home virtual patient engagement interfaces (19). Such combined systems typically include a Bluetooth-enabled vital signs monitor, a patient tablet interface featuring interactive symptom surveys, and a secure video connection to facilitate clinician assessment and follow-up (20). Preoperative risk stratification presents an opportunity to identify those at sufficient risk to warrant RAM interventions.

### **Perioperative intelligence**

#### **Artificial intelligence and robotic process automation**

Artificial intelligence (AI) refers to the ability of a computer system to perform functions and reasoning typical of the human mind and is making space in the field of perioperative medicine called 'Perioperative intelligence'.

Perioperative intelligence provides a framework for collaborative work to deliver safe, timely and affordable perioperative care using artificial intelligence ranging from identification of at-risk patients with referrals, early detection of complications, control of anaesthesia, ultrasound guidance, pain management to operating room logistics (21).

This international AI ecosystem needs best practice and standards including clinical trial protocols (22) with most applications of AI in anaesthesia still in research and development focussing on ways to improve clinical decision making and performance.

Commonly confused with AI is robotic process automation (RPA),

software that uses virtual workers (robots) to perform and automate repetitive administrative tasks. Though established in industry, intelligent automation incorporating RPA and artificial intelligence is being adopted by various NHS hospitals saving time and money by increasing efficiency and productivity such as managing clinic appointments, smart triage, and referral.

### Big data

Digital health encompasses a wide range of novel digital technologies related to health and medicine. Such technologies rely on recent advances in the collection and analysis of ever-increasing amounts of 'big data'. Big data is a concept to describe gathering and analysing data which is high in volume, velocity and variety which can give insights that lead to better decisions. As we are dealing with health data, robust governance frameworks should be in place to protect privacy. The OECD has published a set of recommendations for health data governance (23). At the European level, the recently promulgated General Data Protection Regulation (GDPR), which replaced the Data Protection Directive of 1995, aims at creating a more homogeneous legal framework in European Union member states for the governance of personal data, including personal health data. GDPR has considerably raised the bar of accountability on data controllers in comparison with the previous data protection directive.

An electronic health record (EHR) is digital record of information about a person's contact with a health care provider and include various pieces of information (e.g., current treatments, test results, clinical notes, care plans, correspondence between professionals). It has been vastly adopted in primary healthcare but there is fragmented adoption beyond primary care. The integrated care programme by NHS digital is working to join up IT systems across health and social care to make them interoperable so that information can be exchanged swiftly across organisations. This will help in improved and quicker decision making with immediate access to records and associated documents but also to drive population health and the use of AI.

### Summary

The coronavirus crisis has highlighted the importance of preparing health systems around the world for the threat of future pandemics. The potential for using data and technology more effectively is undeniable not only for patient-facing care but also for management and administrative functions.

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# Overcoming COVID-19 challenges in Ambulatory Surgery: Reflections of a Junior Doctor

Jessica Griffin

## Abstract

The COVID-19 pandemic has affected the UK in many ways; with the NHS being put under unprecedented pressure. It led to the cessation of elective surgery for months; causing a back log of deteriorating patients. With the introduction of COVID vaccines and a call for return to normality, new ways of delivering elective surgery to waiting patients,

**Keywords:** Ambulatory Surgery, Covid-19, Recovery of Day Surgery.

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presents an opportunity to find sustainable ways to ensure continuity of treatment in an unstable health economy.

The challenges of Covid to ambulatory surgery are outlined and strategies to overcome these challenges discussed.

## Introduction

When the COVID-19 epidemic was declared a pandemic by the World Health Organisation in March 2020 [1], the impact and duration of the disease could not have been foreseen. As of November 2021, there have now been more than 5 million deaths worldwide with over 140,000 being in the UK [2]. In the 18 months since the UK first went into lockdown, the impact of COVID-19 on surgery within the UK has been far reaching; with both short and long-term consequences for both patients and staff [3]. The impact was compounded by second and third waves of infections especially when experienced in the winter months; a time when hospitals in the UK are normally overstretched.

COVID-19 has adversely affected all elective surgery, including day surgery. The pandemic has restricted the surgical footprint in many hospitals as the challenge of accommodating Covid cases peaked. In many hospitals, day units were ideally used as covid surge areas due to their self-containment and in others the day unit provided an ideal setting for overflow intensive care units. Despite day surgery proceeding in some hospitals as the only way to perform elective surgery, covid cancellations and postponements have created a surgical backlog of unprecedented proportions [4].

With patients waiting ever longer for surgical treatment, there is mounting pressure on the National Health Service (NHS) to resolve the issue. With time, patients are liable to deteriorate, both physically and mentally [5], adding to the urgency of the problem. A strategy to address the waiting list issue is required.

### *Challenges to day case surgery during the COVID pandemic*

Ambulatory surgery faces a multitude of challenges to return to pre-pandemic levels of activity. These can be considered direct or indirect factors leading to delays in performing their surgery.

#### **Direct Factors**

##### **Preoperative Testing**

One of the biggest challenges facing surgery is the availability of PCR testing to allow procedures to proceed as planned. The UK government's guidelines suggest patients should have a negative PCR test 3 days prior to surgery [6]. Many patients do not receive their results in time, due to factors including postage delays, technical errors and lost samples [7], leading either to cancelled procedures or delays to their procedure while an urgent 'on the day' request is

ordered. Delays and postponement of surgery may even invalidate the 72hour PCR Test itself, contributing further to delays in planned surgery.

When test results are not available, patients by necessity, are considered positive unless proven otherwise, adding further delays to surgery due to extra covid precautions [8]. This impacts theatre scheduling timelines, causing further delay to the backlog of day surgery cases [9,10]. If the patient is cancelled, the theatre slot is usually left unfilled, adding to theatre inefficiency. An alternative is self-testing but trusting a negative test poses further issues in relation to user error, false negative tests [11] and the resultant risk to clinicians and other patients.

#### **Changing Government Advice**

Advice from governmental bodies on the length of isolation pre surgery also varies from the time of PCR test [12] to 2 weeks prior to procedure if the patient is considered at higher risk of complications from COVID [13]. The terms social-distancing and self-isolation also appear to be used interchangeably, causing further confusion. The result is that individual hospitals formulate their own guidelines regarding precautions before surgery with regard to COVID-19 [12]. The changing variants of COVID-19 and the variability in vaccines and vaccine doses also contribute to the uncertainty of preoperative patient information and places an evolving burden on ambulatory services throughout the UK.

#### **Indirect Factors**

##### **Healthcare Personnel**

There is an ever-present threat that a member of the surgical team contracts COVID or is forced to self-isolate [14] as a covid contact, leading to a cancelled or delayed list as the team searches for a last minute replacement. In addition to this, many departments across the UK are also having to manage with exhausted staff members from what they have endured [15] and the threat of what is yet to come in this COVID-19 pandemic [16].

##### **Access to Imaging**

Most day surgery procedures require little, if any, imaging. However, where complex imaging such as MRI or CT scanning is involved, patients may require negative covid tests before attending for diagnostics and delays in performing the imaging may result in further delayed surgical procedures [17].

## **Surgical Complications**

There is a risk of a surgical complication even in low-risk ambulatory surgery. The unplanned overnight admission may not have an identified bed, leading to low-risk day surgery being prioritised over higher risk day surgery procedures or patients leading to further delays to treatment.

## **Discharge Planning**

Day surgery discharge requires a responsible adult to ensure a safe return home and depending on the surgery, someone at home on the first night after discharge. The pandemic has impacted this recognised pathway in several ways. New cases of COVID among family members, isolating or restricted movement by government stay at home orders [18] and deaths in family units have all had effects on current surgical lists and may impact the preassessment process as yet another consideration in determining the suitability of a patient for day surgery.

## ***Overcoming the challenges to day surgery during the Covid-19 pandemic***

There is no single strategy to return Ambulatory surgery to Pre-Covid levels but there are a number of philosophies which may improve efficiency.

### **Reduce clinical contacts on the patient pathway**

The introduction of a baseline assessment to check the patient's suitability for day surgery at the start of the pathway can reduce later workload and reduce unnecessary clinical contact. This initial baseline can be provided by a primary care health screen or a preclinic questionnaire. The fewer contacts the patient has with healthcare personnel, especially in the hospital environment, the lower the risk of hospital-acquired covid. The pandemic has accelerated the introduction of the remote consultation to the patient pathway. This is most appropriate where the patient's history is more important than physical examination in determining the diagnosis. Pictures of physical signs are an adjunct to diagnosis.

Where the patient requires physical examination, the clinic appointment should be combined, where possible, with any necessary diagnostics and preassessment to create a one-stop clinic, a concept well-recognised in other fields of medicine such as cancer care [19]. One of the effects of patients on long waiting lists relates to out-of-date preassessments or diagnostics which may have to be repeated closer to the operation date

### **Infrastructure**

Covid infections are likely to be with us for the foreseeable future. It is clear that the critical factor in conducting efficient ambulatory surgery is the timely availability of Covid testing. Hospital specific sites with capacity for patient testing in the required preoperative timeline would allow rapid confirmation on site of problematic test results and allow the hospital to be in control of its own preoperative testing. Some hospitals have overcome the risk of delayed results by arranging a courier service to transfer their patients' Covid tests to the laboratory for analysis [20]. The financial implications of both of these innovations would perhaps be prohibitive if considered nationwide.

Maintaining a designated ambulatory surgery unit within hospitals is also key in continuing to work through the backlog of cases. At the start of the pandemic, hospital-integrated day surgery units were the ideal facility for conversion to overflow intensive care or high dependency units. They were often self-contained within the hospital and could easily be quarantined from other clinical facilities. However, with the restart of elective surgery as the initial covid peak waned, day surgery capacity was significantly curtailed, despite being the ideal management for surgical patients in times of pandemic: short time

in hospital and less contact with other hospital departments. As the pandemic progresses, ringfencing these day-case beds has been cited as being key in maintaining elective surgery lists [21].

### **Human Resources**

The COVID-19 pandemic has enabled teamwork of unprecedented levels between different departments and specialties; allowing the NHS to rise to the challenge of COVID-19. Of course, this is unsustainable in the long term as team members return to their own duties.

Currently, healthcare workers are Covid-fatigued and the NHS is chronically understaffed [23]. The NHS has run on minimal staffing for some time and the vacancy rate overall is currently greater than 10% [24]. However, the admiration for front-line healthcare workers during the pandemic has seen applications for nursing and medicine increase by about 30% [25,26]. However, it will take several years for these new recruits to become productive members of the NHS workforce.

In the operating theatre, the absence of a single member of the team can often result in widespread cancellation of activity as staffing levels may be considered unsafe. Therefore, it makes sense, going forward, to consider a contingency or back up team to stand in should they be required [22]. This has cost implications, but with £5.4bn (6.5bn Euros) already allocated for waiting list recovery [27] these extra staff costs are certainly affordable

### **Patient Selection**

The key for day case surgery to be effective and efficient, is correct patient selection. With a deteriorating patient population and the fragility of surgical lists, this has never been more important to allow surgery to go ahead [28]. Patient criteria will need to be more stringent and tightly controlled than ever before; with age, pulmonary co-morbidities, obesity, heart disease and other health factors, dependent upon the surgery required, considered more carefully. This approach is twofold; in ensuring the patient is able to go home on day of surgery as well as mitigating risk of them catching COVID-19 and suffering associated complications post-operatively [29]. In addition, it allows appropriate planning of both surgically fit and unfit candidates to aid their perioperative experience as required [30]. Once selected, pre-assessing patients as close to their day of surgery as possible allows their condition to be accurately assessed, diagnostics to be relevant and useful and enables the creation of an effective surgical plan [31]. Elective surgery in Covid times involves additional risks to pre-pandemic surgery [32] and the consent form in the UK usually includes the risks on contracting Covid.

## **Conclusion**

While COVID-19 has presented challenges to day surgery cases, it has also provided a stepping stone for innovation and novel approaches to improve the field in the future.

The ever-evolving situation with COVID-19 presents additional layers of complexity to ambulatory surgery services to enable them to overcome and plan for their services to recover and exceed pre-COVID levels in order to solve the backlog of surgical cases.

There have been many suggestions and trialled methods for overcoming restrictions of COVID-19 from across the globe and within the UK; showing that necessity breeds innovation and a desire by healthcare providers across the world to get back to doing what they do best... helping others.

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# Establishing the Patient Perspective on Day Case Arthroplasty

A Jain, C O'Dowd Booth, P Cay, R Jones, C Wakeling

## Abstract

Day case surgery has been validated as a strategy to reduce hospital stays for arthroplasty patients. With pressure on hospitals such pathways offer an option to conduct elective activities safely. We aim to establish patient demographics, aiding selection, whilst identifying concerns that adversely affected perception. Data was collected using an anonymized questionnaire during preoperative assessment allowing qualitative and

quantitative analysis. Seventy-nine patients responded with 43% preferring same day discharge. Postoperative pain and surgical complications were significant concerns. Younger patients preferred same-day discharge. Our results confirm interest in day case arthroplasty and understanding patient perspectives enables perioperative protocols to be formulated.

**Keywords:** Patient perspective, Day Case Surgery, Enhanced Recovery, Joint Replacement Surgery, Arthroplasty.

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## Introduction

Total joint arthroplasty is a core element of elective orthopaedics. According to the National Joint Registry, over 160,000 total hip (THA) and knee (TKA) replacements are performed in the UK each year [1]. The length of stay (LoS) for arthroplasty patients varies between units, with a number of influencing factors. Foote et al in 2009 demonstrated a median length of stay of 8 days with a majority leaving the hospital by two weeks following primary total hip replacement [2]. Furthermore, Burn et al discovered that average length of stay in 1997 was 16 and 14.4 days respectively for primary knee and hip replacements respectively. In comparison to 2014, the average length of stay fell to 5.4 and 5.6 days [3]. A recent study demonstrated mean length of stay for 2000 patients at a high-volume unit of four days [4]. The Reducing Length of Stay programme announced in June 2018 has been a priority for NHS trusts to improve efficiency in elective services [5]. There have been advances with Enhanced Recovery Programs which aim to have standardised perioperative protocols with combined participation and input from all professionals within the multi-disciplinary team. Day Case Joint Replacement offers the next evolutionary step in this development, encouraging early mobilisation and further reducing length of inpatient hospital stay, and as a result reducing the demands on acute healthcare settings.

The ongoing Covid-19 pandemic has intermittently halted many elective activities including joint replacement surgery [6]. As a result, waiting-lists for surgery have increased dramatically, with widely published issues in both scientific and national media [7]. A recent study estimated in November 2020, the national waiting list for joint replacements would be up to 1.4 million, three times the pre-COVID average [8]. There will inevitably be interest in strategies able to tackle this increasing demand. Day Case Arthroplasty offers one such solution, achieving improved cost effectiveness of arthroplasty [9,10] and shorter inpatient stays for patients, reducing opportunity for nosocomial transmission of infections and improving hospital efficiency.

Outcomes of Day Case Joint Replacements have been published and recent evidence has suggested that these protocols are equivalent to more traditional inpatient rehabilitation. Darrith et al validated the safety of outpatient arthroplasty when looking at ninety-day complications [11]. Rosinsky et al demonstrated improved 2-year patient reported outcomes including postoperative pain in patients

undergoing outpatient THA when compared to inpatient pathways [12]. Hoorntje et al discovered lower anxiety and depression scores in outpatient groups when compared to a fast-track discharge pathway [13]. Day case patients are also more likely to recommend the procedure to friends or family [14].

Patients on enhanced recovery pathways with early mobilization would also benefit from clinical benefits such as lower risk of complications from inpatient stays such as hospital acquired infections and thromboembolic events [15]. Other benefits would include faster recovery and quicker return to normal activities [16].

The patient perception of outpatient joint replacements has been investigated previously. In a cohort of patients interviewed preoperatively, 34.3% were comfortable with outpatient arthroplasty, with men more likely to approve [17]. Considering perceived barriers to same-day discharge, the involvement of the primary caregiver and the presence of a support network are essential [18]. In another previous study on patient perspective, seventy per cent of patients did not think they would be able to have their joint replacement as an outpatient for concern of postoperative pain, ability to go to the bathroom and an increased risk of falls [19].

Our study aims to further investigate the patient perspective into day case arthroplasty. We aim to establish preference for same-day discharge and highlight patient-perceived barriers to day case arthroplasty through a preoperative questionnaire for patients undergoing joint replacement (hip and knee) surgery. We also hope to identify demographic factors in our population that may aid in patient selection. These will be investigated with an aim to formulate effective perioperative protocols for patients on the day case pathway.

## Materials and Methods

Data was collected using a structured, anonymized questionnaire during preoperative assessment for patients undergoing THA or TKA. The questionnaire design incorporated both quantitative and qualitative questions, allowing patients the opportunity to elaborate further on aspects of day case joint replacement.

The questionnaire covered (Figure 1):

- Patient demographics including age, gender, occupation, driving status, presence of pets and any previous history of joint replacements

- Issues pertaining to discharge planning such as home environment issues and the presence of a caregiver
- Level of concern related to several common problems faced by patients after joint replacement surgery e.g. postoperative pain, nausea and vomiting, access to medical support
- Whether patients feel their rehabilitation from surgery and postoperative symptoms could be managed effectively at home
- Patients were asked to hypothetically choose between day case

arthroplasty or more traditional rehabilitation protocols

Data was analysed using Microsoft Excel 2016 (Microsoft, Washington, USA) and IBM SPSS Statistics Software (SPSS (version 28, Chicago, USA)). The Chi Square Test was used for all categorical values with the paired T-test used to analyse the relationship between continuous and categorical variables. To define the level for statistical significance  $p < 0.05$  was used. Thematic analysis of free text answers was conducted to establish the key themes in patient responses.

Figure 1 Questionnaire given to patients.

**Demographics:**

1. What is your Age? .....

2. What is your Gender? .....

3. Are you currently working? Yes  No   
If so, what is your occupation? .....

4. Do you drive? Yes  No

5. How many flights of stairs do you have in your home? .....

6. Are your kitchen, bathroom and bedroom on the same level? Yes  No

7. Do you have a family member or friend, living with you, who can look after you after the operation?  
Yes  No   
If not, do you have someone who will come to stay with you after the operation?  
Yes  No   
Do you have a neighbour or friend nearby who will be able to support you?  
Yes  No

8. Do you have any pets?  
Yes  No   
If so, how many? ..... Which type? .....

**Operation Details:**

9. Have you had a previous joint replacement?  
Yes  No   
Hip  Knee  Other (please specify): .....

10. What procedure are you on the waiting list for?  
Hip  Knee   
Right  Left

12. Where do you think your postoperative pain could be managed effectively?  
(If given the appropriate medication)  
Hospital  Either home or hospital

13. Where do you think your postoperative nausea could be managed effectively?  
(If given the appropriate medication)  
Hospital  Either home or hospital

14. Where would you feel most comfortable seeking advice?  
Advice Line  Calling 111  Accident & Emergency  GP

15. Would you be happy receiving physical therapy at home, following an initial assessment in hospital prior to discharge?  
Yes  No

16. How would you feel if you were offered a day case joint replacement?  
No concern      Mild concern      Moderate Concern      Major Concern

17. Do you have any other comments? If so please specify:  
.....  
.....  
.....  
.....

18. If you were initially offered a choice, would you have chosen to have a day case joint replacement?  
Yes  No

**Yours thoughts:**

11. How concerned would you be regarding these factors?  
*If you were having the procedure as a day case:*

Postoperative Pain:  
0 1 2 3 4 5 6 7 8 9 10

Postoperative wound healing problems/infection:  
0 1 2 3 4 5 6 7 8 9 10

Access to appropriate physiotherapy:  
0 1 2 3 4 5 6 7 8 9 10

Home environment/equipment issues:  
0 1 2 3 4 5 6 7 8 9 10

Access to medical help if required from the:  
a) Hospital  
0 1 2 3 4 5 6 7 8 9 10  
b) GP  
0 1 2 3 4 5 6 7 8 9 10

Complications from the surgery:  
0 1 2 3 4 5 6 7 8 9 10

Availability of an advice line:  
0 1 2 3 4 5 6 7 8 9 10

Any anaesthetic issues such as nausea or vomiting:  
0 1 2 3 4 5 6 7 8 9 10

Other – Please specify .....

0 1 2 3 4 5 6 7 8 9 10

## Statement of Ethics

Approval was granted in line with local research policies and due to the nature and design of data collection ethical approval was not required. Consent was implied when completing the anonymous questionnaire.

## Results

The patient demographics are shown in Table 1 (near here). Data were collected for a consecutive series of 79 patients with a mean age of 68 with our population in keeping with the standard arthroplasty population [20]. On further statistical analysis, decreasing age was the only factor found to be significantly related to a preference for day-case surgery ( $p = 0.038$ ).

**Table 1** Patient Demographics.

Patient Demographics	Number (%)	P value
Age (Mean in years)	68 (range: 34-92)	0.038
Gender (Male Gender)	41 (52%)	0.183
Still Working? (Yes)	23 (29%)	0.136
Do you still Drive? (Yes)	61 (77%)	0.692
Presence of Stairs? (Yes)	49 (62%)	0.265
Is someone available to look after you postop? (Yes)	77 (97%)	0.215
Presence of Pets (Yes)	34 (43%)	0.143
Have you previously had joint replacement surgery? (Yes)	33 (42%)	0.171
What joint are you having replaced? (Hip: Knee)	46:33	0.859

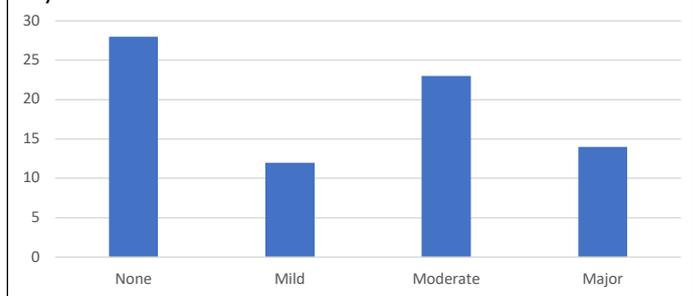
Thirty-four (43%) of patients would choose day case arthroplasty if given the choice. When asked about level of concern for day case surgery, 36% of patients reported that they would have no concern if discharged on the same day with the most significant concerns being postoperative pain, complications from surgery and wound healing problems (Figure 2 and Table 2). The majority of our patients felt that their postoperative recovery and rehabilitation could be completed at home just as safely as in hospital (Figures 3 and 4).

Important themes raised in free text comments from our cohort included some apprehension with same-day discharge (“Would feel safer in hospital”, “Would be scared to leave hospital on the day”). Patients with previous difficult experiences with postoperative symptoms displayed more concern for day case arthroplasty (“Sick with previous hip replacement, 6-day inpatient stay;” “Worried partner wouldn’t cope if day case;” “Concerned about day surgery as have previously passed out/vomited over 24 hours post-surgery”).

## Discussion

Increasing demand paired with a reduction in capacity for elective care has led to a need to for shorter hospital stays and more efficient practices. Day case arthroplasty potentially plays a key role in onward strategies for improved service provision, and by understanding the patient perspective, we will be better able to design a patient-centred service, using patient feedback to guide these changes. The NHS Five Year Forward View identifies the need to involve people in their own care [21] and evidence has shown that this approach enhances

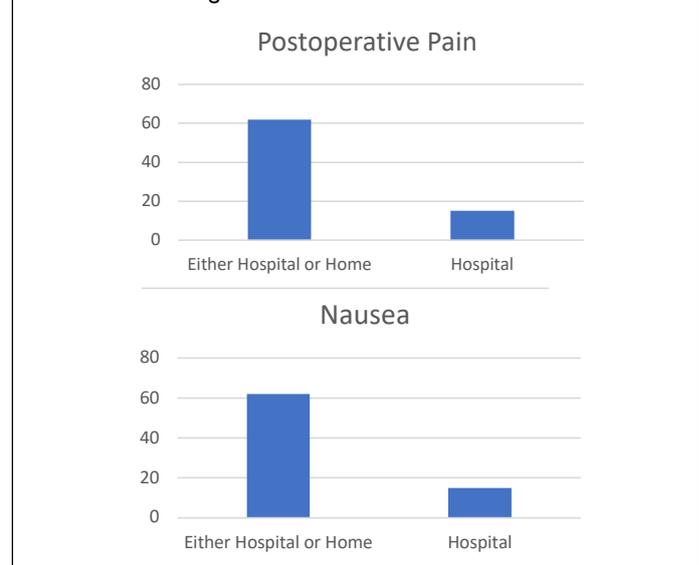
**Figure 2** Degree of Concern if having Joint Replacement as Day Case.



**Table 2** Mean Patient reported concern when undergoing day case arthroplasty for common postoperative problems..

Common patient concerns post joint replacement	Mean patient reported concern on a numerical scale from 0-10
Postoperative Pain	6.1
Complications	5.8
Wound Healing Problems	5.7
Access to GP	5.5
Access to Hospital Services	5.2
Access to Appropriate Physiotherapy	5.2
Availability of an advice line	5.1
Postoperative anaesthetic issues such as nausea	5.0
Problems with home equipment	4.1

**Figure 3** Where do you think your postoperative symptoms could be best managed?



patient satisfaction [22]. The results from this study inform and guide this approach to develop the creation of a patient-centred day case arthroplasty service.

We identified the most significant patient perceived barrier as postoperative pain, further building on the work of Adelani et al. Further to this, the other key themes identified included a fear of postoperative complications and problems with wound healing. With these identified, it is possible to formulate an effective perioperative protocol and focus preoperative patient education, to improve

the uptake of day case arthroplasty while improving the patient journey. Patients selected for this pathway should be provided with information on peri- and post-operative pain control. Clear guidance must be given on when and where to seek help should further assistance be required.

Although the majority of patients preferred rehabilitation protocols with an inpatient stay, 43% of patients showed a preference for same day discharge which is comparable to the figure quoted by Meneghini of 34.5%. In our cohort, however, we found no statistical difference for preference in gender, however we observed a statistical difference in patient age, with younger patients more likely to favour same day discharge. The protocol currently in place for day case arthroplasty in our unit includes a further review by the therapy team between three and five days postoperatively, to help mitigate some of these concerns.

The limitations of this study lie in sample size with a relatively small number of participants making subgroup analyses difficult. Due to the anonymized nature of the data collection, the free text responses were limited and lacked depth into the patient's viewpoint. Further research with more in-depth interviews with focus groups would give a more detailed picture of the patient perspective.

Having established the degree of interest from our patient group, day case arthroplasty has started being implemented. As greater numbers of patients go through the day-case arthroplasty protocol in place at our unit, we will further review the patient cohorts who succeed or not to achieve same-day discharge for any additional indicators to help in patient selection. It is currently discussed with and offered to more active, younger (under 70 years) patients, at operating surgeon discretion, prior to a more detailed discussion in the preoperative "joint school" education clinic.

## Conclusion

Our study identifies postoperative pain, complications and wound healing as patient perceived barriers to day case arthroplasty. However, it does also confirm an interest in such a service with younger patients favouring same day discharge. The results of this study will contribute to the development of effective patient selection and perioperative protocols to ensure successful implementation of a patient-centred day case arthroplasty service.

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# Vitrectomy in a 62-year-old outpatient with uncorrected Tetralogy of Fallot: Case Report

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## Abstract

Uncorrected Tetralogy of Fallot (TOF) in adulthood is a rare condition and only 3% of patients reach 40 years old. Non-operated TOF patients suffer from chronic hypoxia and decreased pulmonary blood flow resulting in considerable physiological changes. The optimal management of these patients, therefore, requires a thorough understanding of the pathophysiology of the uncorrected TOF, as minor pharmacological

intervention may result in severe clinical complications. We present the case of successful management of a 62-year-old man with uncorrected TOF, scheduled for a retinal detachment vitrectomy in ambulatory setting. We discuss anesthetic considerations and highlight the importance of regional anesthesia (peribulbar block), in the management of patients with severe conditions in the ambulatory setting.

**Keywords:** Tetralogy of Fallot, ambulatory, peribulbar block, regional anesthesia.

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## Introduction

Tetralogy of Fallot (TOF) is a cyanotic heart disease (CHD) composed by four major abnormalities: a right ventricular hypertrophy and outflow obstruction, an overriding aorta and a ventricular septal defect (1).

TOF is one of the most common causes of CHD and occurs in 3 out of 10,000 live births (2). Most patients without surgical repair would die during childhood. Survival data shows that 24% lived until the age of 10 and only 3% until 40 years old (3). Hence, a surgically unrepaired Tetralogy of Fallot in the seventh decade of life is extremely rare. There are only two documented reports of patients who survived more than 80 years without surgery (4).

## Case report

A 62-year-old, 73 kg man came to preanesthetic assessment for ambulatory surgery. He presented for a left eye vitrectomy for retinal detachment. He did not take any medications and states no prior surgeries or any significant medical history. His medical records only show a prior echocardiography (dated five years before), stating an unrepaired TOF. When confronted with this information, the patient claimed that, at age of 10, he was advised to undergo surgical repair but his parents refused surgery (as himself since he became an adult) due to his asymptomatic status. He denies having chest pain or dyspnea for moderate efforts, adding that he regularly walks 10 km on weekends. Patient was classified as ASA 3 and another echocardiography was requested at this initial assessment and confirmed the unrepaired TOF showing preserved left ventricular function, mild mitral/aortic insufficiency, a large interventricular shunt with low velocity and a mean pulmonary pressure of 46 mmHg. The patient was normotensive and 94% oxygen saturation on room air. Physical examination showed nail clubbing and a barrel chest. Chest auscultation showed widespread crackles. An arterial blood gas analysis, with the patient breathing spontaneously, revealed pH 7.436, pCO<sub>2</sub> 38.7 mmHg, pO<sub>2</sub> 76.5 mmHg, HCO<sub>3</sub> 25.6 mmol/L and lactic acid 0.89 mmol/L. General anesthesia was considered "high risk" and peribulbar block (PB) was chosen as the safest strategy, since in a PB, the local anesthetic is injected into the extraconal compartment, avoiding optic nerve injury and brainstem anesthesia (associated with ophthalmic regional anesthesia in the past).

Prior to surgery, the patient was monitored according to ASA standards and premedicated with 50 mcg of fentanyl and 1 mg of midazolam. A 5ml injection of 1% ropivacaine was performed at the inferotemporal quadrant of the orbital border and a second injection of 3ml at the lacrimal caruncle. A 25Gx25mm needle was used and no complications or accidents were reported with the technique. A Honan balloon was applied, and 30 mmHg pressure was kept for 15 minutes. Upon the Honan balloon removal, complete akinesia and sensitive block was obtained and surgeons were given permission to start the surgery. The surgery underwent uneventful for 90 minutes and the patient was sent to post-anesthesia care unit (PACU) and discharged home successfully 10 hours later. Follow-up telephone calls were made 24 hours, 48 hours and 1 month later and no clinical deterioration, pain or other postoperative side effects were reported.

## Discussion

Regional anesthesia techniques allow a better titration, or even avoidance, of general anesthesia and a lot of cardiac and respiratory complications can be minimized in patients presenting unexpected conditions such as uncorrected TOF. This approach allowed us to safely treat the patient in an ambulatory setting, improving satisfaction at a lower cost. Submitting this patient to general anesthesia would mean a higher level of intra and postoperative monitoring with a longer hospital stay and a higher risk of hospital acquired infection and thromboembolism.

Peribulbar block provides an excellent alternative to GA in most ophthalmologic procedures and also gives prolonged satisfactory analgesia with mild systemic non-opioid drugs, minimizing the risk for post-operative nausea and vomiting as well.

## Conclusion

There is scarce information about late survival in unrepaired TOF patients. We have reported the first case of ambulatory surgery in a patient with unrepaired TOF. The PB was the safest anesthetic plan for this patient with a rare and unexpected condition. The PB is a technique with low rate of complications and with a postoperative care easily managed at home. Thus, we believe that most of these patients could be done as ambulatory surgery under a PB instead of changing the surgical setting to inpatient surgery and stepping-up to higher levels of postoperative care.

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# COVID-19 impact on Plastic Surgery local anesthetic lists

Editor,

Given the Covid-19 circumstances, the subject of local anesthetic workload in a university hospital's Plastic Surgery Unit is very relevant and up to date; maximizing utilization of theatre time and prioritizing patients during the current pandemic is an important issue throughout the public healthcare system. [1]

Our Plastic Reconstructive and Aesthetic Surgical unit is part of the University of Naples Federico II's with a high demand in plastic surgery patients coming from all parts of Southern Italy.

During the Covid-19 emergency, starting in February 2020, National Health Service constraints forced hospital management to revise resource allocation in order to cope with the sudden and urgent inflow of Covid-19 patients, with Italy being the first and the most affected country in Europe. Plastic Surgery Units, even if not directly impacted, were not spared in the first Pandemic wave; as a result of hospital Covid-19 protocol modifications and restrictions in hospital admissions and patient operating lists, we were forced to immediately rearrange the organization of our Unit Local Anesthetic (LA) theatre, which had followed routinely 7-8 patients/list for many years.

Out of a university hospital system, plastic surgery cases, according to the priority score, can be often delayed. Nevertheless, in patients with progressive diseases such as skin or head and neck cancers, delaying the surgery, can lead to cancer progression. [2]

Given the emergency situation, a reasonable approach in clinical practice was considered to postpone all elective surgery and carry out only the most urgent procedures in order to preserve staff resources and minimize contamination. [3]

Back in March 2020, since a high percentage of referrals in our unit were for skin cancer, a dedicated Plastic Surgery theatre extra nurse was hired to join the Local Anesthetic staff, made of two surgeons and one scrub nurse. This dedicated LA theatre nurse duty was to accomplish with all the new COVID protocol checklists, ensuring continuity to our weekly operating LA schedule of three mornings-a-week scheduled patients on Mondays, Wednesdays and Thursdays from 8.30 a.m. to 1.30 p.m.

Our operating theatre platform includes one theatre specifically dedicated to local anesthetic plastic surgery patients, having two separate accesses, one for staff and a separate one for patients. The platform has two separate changing rooms allowing for the admission of two patients simultaneously. After undergoing the procedure, patients return to the changing room by way of a separate exit route and finally discharged. Since our LA patient corridor is only a few meters long, ID bands are not necessary.

To meet the new Covid-19 protocols, the dedicated nurse admitted the patients and guided them through the pre-established route. For each patient admitted, the nurse recorded body temperature, confirmed the negativity of the Covid-19 test done at least 48h before and filled in a statement in which the patients declined any respiratory symptom and any possible contact with positive patients.

LA surgery theatre protocol contemplated that the first patient entered the operating room at 8.30 am, the second at 9.30 am, the third at 10.30 am and so on, with 60 minutes scheduled for performing each surgical procedure and discharging the patient outside the theatre platform.

A discharge letter was provided to each patient with medication and wound dressing instructions; patients' postoperative care was managed via an institutional Plastic Surgery Unit e-mail and through WhatsApp [4] in order to reduce follow-up returns to the hospital, in accordance with hospital Covid-19 protocols.

Thanks to the dedicated nurse, the LA operating sessions continued to be performed without interruption.

We have retrospectively analyzed our clinical data from March to June 2020, during the first Covid-19 emergency wave: over a period of 4 months 241 patients were treated: we performed 284 plastic surgery procedures, of which 221 skin cancer lesions' excision +/- reconstruction, over 48 LA surgical sessions with an average of 5,02 patients per session and 15,1 per week.

This workload led to 241 Discharge Codes (DRG) counting for 373.550€, with an average value of 1550€ per patient. The DRG values in Euro were calculated through our Hospital operative system.

Pre pandemic data referring to the same period summed up for 291 procedures in 284 patients, counting for 382.757 € with a difference of just 9.207 € (2,4%).

Within the costs-profits analysis, considering the extra cost of 5000€ for the mentioned project-based contract to employ the extra-nurse per 4 months, the benefits provided to the Hospital management were evident.

Excessive downtime in local anesthetic (LA) patient lists leads to surgeon frustration, patient delays, and wasted resources, which, due to the necessity of meeting the new Covid-19 protocols could only become worse. [1] Many hospitals are affected by this problem and expend their resources to find opportunities to improve efficiency. Prior to the COVID pandemic outbreak, our group was also involved in the deployment of a hand trauma day surgery (HTDS) operating list with several advantages resulting from a systematic organization and schedule. [5]

Before the Covid-19 pandemic, our LA theatre would have treated 7 to 8 patients per session, including various elective procedures (lipoma and sebaceous cyst excision, scar revision, nipple area complex reconstruction, etc.) Since the outbreak, what we found was that even with restrictions and specific protocol rules, we succeeded in treating five patients per session, by employing our extra LA theatre, redesigning our LA theatre coordination process and reducing patients' number.

Based on our short-term retrospective study, we concur with the findings of the article: "Maximizing efficiency in plastic surgery local anesthetic lists", that the accumulation of small gains shortens downtime and leads to improved efficiency. [1]

Notwithstanding restrictions, as healthcare providers to the general public, we report that, thanks to our procedural adjustments and the hiring of an extra LA nurse, we have succeeded in maintaining almost the same skin cancer workload as before the outbreak of the pandemic, which has circumvented the expected prolonging of skin cancer waiting lists and maintained satisfactory patient levels.

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