Role of NHS and Orthopaedic Recovery Post COVID – 19 Pandemic

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Submission towards British Orthopaedic Associations Future Leaders Programme 2019-2020.

Acknowledgements

1) Prof Mike Reed
2) Mr Jaime Candal-Couto
3) Mr Hiro Tanaka
4) Mrs Lisa Hadfield-Law

In a very real sense, the spread of Covid-19 is a product of the digital and technological revolution that has transformed our world over the past century. Unlike the “Spanish flu” of 1918, which became an international epidemic over the course of a year, Covid-19 has spread to every inhabitable continent within weeks, outpacing our health system’s ability to test, track, and contain people with suspected infection.[1]

It’s your reaction to adversity, not the adversity itself, that determines how your life’s story develops. – Dieter F Uchtdorf

To reduce avoidable exposure of patients and healthcare workers, and to prevent consumption of essential resources, in mid-March 2020 NHS England recommended pausing all elective procedures until the spread of the virus is contained in the United Kingdom. The result has been large scale deferment of elective surgery.

Once the elective-surgery deferment is lifted, it is extremely unlikely that we will be able to revert immediately to the fully functioning pre-pandemic production level. This is because the individual factors that affect the production function—i.e., capital and labour—will continue to remain affected. Although health-care workers (labour) can probably, barring illnesses, return to nearly full capacity, the limiting factor would be capital. [2] Fixed capital in terms of hospital beds and surgical equipment may be initially accessible. However, interruption of manufacturing and transportation resulting in disruption of the global supply chain may result in relative scarcity of consumables (circulating capital), such as those used in the perioperative setting, including personal protective equipment, surgical packs, implants, anaesthesia supplies, and medications. As the cumulative backlog increases and the amount of net demand starts to exceed supply, it will create a relative shortage of fixed capital and labour as well.[2] Furthermore, the existing process for presurgical care—with patients having to be evaluated, assessed for whether surgery is indicated, counselled, enabled to provide consent, and medically and financially cleared—will contribute to the ramp-up time once the deferment of effective surgery is lifted.

The Orthopaedic recovery post COVID-19 could be considered under following heads

1) Re-starting of elective orthopaedic practice
2) Shifting to Out-Patient Care
3) Telemedicine
4) Distance learning
5) Mental Wellbeing

Appropriate planning prior to the resumption of elective inpatient orthopaedic surgical procedures is critical and will rely on volume projections, geographic location, the regional COVID-19 prevalence, hospital capacity, diagnostic testing capabilities, PPE and ventilator availability, and variables specific to local patients and health-care systems. This re-emergence must consider the safety of surgical patients, health-care workers, and patients with COVID-19 being cared for now and in the future.

Prior to restarting inpatient orthopaedic multispecialty service lines, 6 thresholds (6 Ds) should be considered to promote the safety and sustainability of elective orthopaedics (Table I). [3]

Table 1

Criteria	Interventions
Disease patterns	Five COVID-19 indicators can help to accurately evaluate the disease prevalence and burden for hospital systems and treatment regions9: (1) new COVID-19 diagnoses per population, (2) new COVID-19 hospitalizations, (3) the COVID-19 inpatient census, (4) ICU bed occupancy, and (5) the COVID-19 mortality rate. Prior to proceeding with an elective inpatient or outpatient orthopaedic surgical procedure, these indicators should be improving for 10 to 14 days within a health-care region
Diagnostic Capacities	Surgical candidates: RT-PCR within 24 to 72 hours of surgery Health-care staff: varies by regional disease burden, PPE, and diagnostic testing capacity—if no testing, then stringent PPE precautions Appropriate PPE precautions based on test reliability and community disease burden
Delivery of care & PPE	Inpatient COVID-19 census must comprise <15% of hospital beds and <10% of ICU beds Educate and promote same-day discharge when feasible Utilize COVID-free facilities if possible If inpatient stay is required, house in isolated ward with stringent visitor restrictions and enforce PPE compliance
Design modification	No patient waiting rooms or visitors Pre-anesthesia and post-anesthesia wards at half-capacity OR establish dedicated elective orthopaedic anesthesia wards

Disease detection	Diagnostic and antibody testing in conjunction with regional COVID-19 monitoring
Disease defence	Correct testing and donning and doffing techniques

All patients undergoing surgery during the pandemic should have their temperature and pulse oximetry measured and be screened with a series of questions that will stratify them into various risk groups.[4] The questions should aim to ask the patients about COVID-19 symptoms (fever, shortness of breathing, cough, loss of smell and taste, diarrhea, headache, sore throat) as well as TOCC information (travel to regions with a high prevalence of COVID-19, occupation with a high risk of COVID 19 infection, contact with people known to be infected with COVID-19, or close proximity with a COVID-19-positive case).[5] Those with a high risk of being infected should have surgery deferred, and should be quarantined as per local guidelines, unless adequate testing can be performed to rule out COVID-19. All patients have to be tested for SARS-CoV-2 by RT-PCR within 1-3 days before surgery and quarantined for 14 days prior to elective surgery.[4,5,6]

Whenever possible separate elective centres are attractive because COVID 19 pts were not and have not been treated in this site of care. This may help lessen the patient anxiety of coming into the hospital for consultation and elective surgery.

Many orthopaedic patients need imaging studies during consultation. USS has been miniaturised but it needs a trained person even now. General practitioner can try and organise relevant imaging if they are competent before hospital visit. There are no miniatures x-rays or MRI. However, we do not know in 10 years where the technology might head into. So presently what could be done is patient can go to GP surgery or nearby imaging centre and this imaging can come up in patients' electronic records and access that have discussions with patient.

Home testing at least in the time being the testing nurse can go to patient home and test 2-3 days before operation.

Additional education should be provided to the patient regarding infection-prevention protocols (hand hygiene, wearing a mask, etc.). All patients and providers should use a surgical mask during encounters. Providers should use protective eyewear as well. The risk of infection and transmission should be minimized by utilizing general social distancing principles.[6,7,8]

How to improve social distancing – Tele-medicine would help this in a big way. Lesser appointments face to face. Waiting rooms not opened and patients wait in cars. Call and inform receptionist for check in. When there turn arrives they are called and then come to clinic. One-way traffic flow especially helpful if hospitals have narrow passages and hence a separate entrance for entering and exit when possible. the surgical team should avoid direct contact with family members and should update the families via telephone or video conferencing.

When patients should be housed in single rooms, if possible. When patients are housed in the same room, the beds should be distanced at least 2 m (6 ft) from each other, and all patients should wear a surgical mask.[6]

There are many guidelines in place for intra-operative management of trauma and emergency cases which are already in operation and these can be extra-polated for elective surgery. Whenever possible surgery should be done under regional anesthesia.

In the post-operative period there are many interventions which we could follow to stay safe[6]

1. The length of hospital stay for patients should be minimized.
2. Postoperative rounds by the surgeon may be done with use of telemedicine, whenever possible.
3. Patients should be discharged home, and transfer to inpatient rehabilitation should be minimized.
4. The patient should be instructed how to perform selfdirected physical therapy at home.
5. Post-discharge visits to the office should be minimized, with the majority of the follow-up being done by telemedicine.
6. Office visits should be limited to those who are having issues/complications such as woundhealing problems, suspected fracture, stiffness, and so on.
7. Digital health programs and wearable sensor technologies that allow monitoring of patients will play a larger role in management of patients in the future.
8. Social distancing should be resumed and at-home visits avoided, unless absolutely essential.

Telemedicine

In the face of the COVID-19 outbreak, healthcare systems are waking up to the limitations of their analogue health care system. Our analogue system of care has shown

that it can lead to transfer of virus and we need to migrate on to digital care not by choice but necessity, Hospitals were contaminated and shut down, we had to protect health care workers and then there is a question of PPE shortages. So, idea of remote visits made a lot of sense. Importance of building trust is based on contact. When things closed for COVID-19, patients thought everything is shut and they would not have any contact. But that simple act of getting on phone and explaining to the patient has been very powerful and impactful and psychological well-being. This has been a personal experience when we contacted them at the start of the pandemic.

We are now in a phase of orthopaedic recovery and what is required to get us back into practice and delivering orthopaedic care. In a study carried by American Medical Association showed there has been a huge uptake and pre-COVID-19 adoption was 28% and now 68-90% and varies by specialty.[9] However, we need to see how this goes on in post COVID-19 scenario. We know it would not be 90% but definitely would be higher than 28%. Clinics always over run and hence social distancing can always be an issue. Increasing use of telemedicine would help us overcome this barrier and we should ask ourselves before each encounter if it can be performed virtually thus minimising face to face contact.

Initially there were lots of rules and regulations for use of this technology. There has been a relaxation of rules which has helped in adopting virtual care. Series of waivers which was important to attack to barriers in licensure, reimbursement, connectivity- broadband and looking into these created a surge. However, it is important not to reduce costs and cut quality. Issues do exist – data privacy, how do u make connection is secure. There are again challenges on patient side – do they have access to internet, access to tools. But this pandemic has encouraged people to try something new. The pandemic has surged the information technology acceptance and positivity at both patient and doctor ends. Audio only – incredibly easy for some cohort especially for people who may find Zoom, or other apps difficult.

Challenging is going in future how do we integrate into daily practice – whether we have sessions for telehealth in the work plan of doctors and where do doctors do it from, their homes or offices – other companies like uber have integrated digital with face to face experience nearly a decade ago and we need to integrate in practice. With most of health records being cloud based access during telemedicine and storage of further conversation is convenient. Anything which does not need you to touch the patient for treatment or diagnosis can be done with telehealth in real time.

How do we have regulations that allow us to explore new things and stay safe? Even if we are moving fast don't cut corners. Facetime, Facebook live, tik tok – are not appropriate. Most importantly as there are number of people who are on the higher spectrum of age we need to get processes in place to make this technology simpler. Patients can get care where they are and where they need it. As we are catching people in virtual the no show rate also comes down. Apps equivalent of Zoom and star leaf which are specially designed for healthcare systems can be integrated into electronic patient records and can make the working simpler. Devices, monitoring devices can give more information. Home testing. All these devices may proliferate and all these may help make these virtual visits more plentiful and meaning full. Remote monitoring would improve with artificial intelligence and machine learning.

An Israeli start-up Binah.ai is using all those hours spent on WhatsApp and Facebook to simultaneously run essential medical tests – constantly monitoring the user's vital signs – via their smartphone camera. Leveraging artificial intelligence, signal processing and machine vision capabilities, the company has developed technology to transform smart devices into a vital sign monitoring tool. Analysing video of a person's face captured by their smartphone camera, the company's app monitors an individual's heart rate within seven seconds, oxygen saturation within 10 seconds, respiration rate within 30 seconds, and heart rate variability within 45 seconds. Within 90 seconds, the app can also assess mental stress levels. Binah.ai is now finalizing its ability to monitor hemoglobin levels, and is hoping to soon unveil the capability to measure blood pressure and blood glucose levels. Many such promising technologies are coming up and it's a matter of time the could be integrated to make the experience more wholesome.

In spite of best efforts in environments we have created it is still hard to social distance. Remote care management tools are becoming increasingly more important to help patients prepare for and recover from orthopaedic surgery. The combination of site of care changes along with digital care management tools can allow surgeons and providers to optimise care during this global pandemic and beyond.

Why remote care management matters

Pre-operatively – help patients prepare for surgery via time based, procedure specific content. Also, after the first clinic visit further review of investigations could be done through telemedicine and so also discussion regarding management and consent. There could be integrated systems to show surgical animations and further consent discussion using many good resources either generic available online like 'consent plus' or something tailor made

by NHS for use by all trusts within the UK. The consent can then be signed on the day of operation. Appropriate legislations would need to be formulated for these.

Provides baseline PROMS and biometrics to provide patients and clinicians with measurements by which progress can be measured.

Post-op – impacted by social distancing

1) At home physician recommended care plans and self-directed exercise programs
2) A virtual connection with surgeon and care team – Can send pictures or video to the care team and unless any problems does not need a hospital visit.
3) Similarly, physical therapy is very effective with daily automatic reminders and animated therapy videos.
4) Provides an opportunity to minimise unnecessary in office visits

All this would reduce high rate of cancellations and rescheduling in Orthopaedics. Patients would be spared traffic congestion and the horrendous time taken to travel, parking issues. It should improve patient satisfaction rate and would be in line with NHS 10 Year Forward Plan of taking healthcare to the patient.

Health records system which are common to various trusts will be helpful in reducing the costs in accessing this technology and also can move with the person when there is transfer of care so there can be communication between two different NHS trusts.

Staff-management firms have come up with app-based technology which aims to relieve managers of the scheduling and administration burden of managing healthcare workers. It quickly generates rotas based on staff availability, qualifications and roles. Managers use a dashboard for a complete overview of their workforce, while employees can download an easy-to-use app on their phone which gives them greater control over their shifts and availability for overtime. Some systems like 'Deputy' also incorporates new touchless clock-in, which has been designed in response to the global pandemic. It uses facial recognition and voice commands to enable employees to clock in and out of work, as well as start and end breaks, without touching a screen.

Distance learning

Flying 1000 miles to hear a lecture would soon be a thing of past. Though online learning has been increasing over the years pandemic has given an opportunity for an accelerated increase. Unfortunately, in the coming year British Orthopaedic association, EFORT and many academic societies have cancelled their conferences. Some are going in

for a virtual platform to hold these. Societies need to allocate CME points to these webinar sessions so these can be used at the time of appraisals.

Locally applications like Zoom and Star Leaf can be used to conduct audit meeting, registrar teaching programs and journal clubs. These would be extremely beneficial in trusts which span vast geographic area. Also save the trust money in form of travel allowance as well as trainee time can be used more productively by avoiding travelling.

Induction program which the staff undergoes is again different at different trust and often involves huge crowd. These can happen online as well. NHS England can make the induction programs centralised through Health Education England website so these can move with the trainee as they change NHS trusts. This will result in cost savings as well as improving productivity of trainee workforce with shorter induction mandatory training.

While some believe that the unplanned and rapid move to online learning – with no training, insufficient bandwidth, and little preparation – will result in a poor user experience that is unconducive to sustained growth, others believe that a new hybrid model of education will emerge, with significant benefits. However, the integration of information technology in education will be further accelerated and that online education will eventually become an integral component of medical education.

Mental Health

Understaffing has become a pain point for many clinical specialities and clinicians. The demand for healthcare keeps going up with population getting older and more demand but the number of workers are not increasing to meet that demand. In a survey conducted by Nursing Times [10] - Almost all nursing staff are feeling more stressed and anxious than usual, with a third describing the state of their mental health as bad during the Covid-19 crisis. Half of nursing staff who responded to the survey considered the current level of support being provided to health and social care staff on mental health and wellbeing as inadequate. But a third told *Nursing Times* they had needed support and felt unable to ask for it. Worse still, 87% of respondents rated themselves as either “a lot” or “a little” more stressed at work than usual, while 90% said they were “a lot” or “a little” more anxious than before the outbreak.

Concerns about contracting the virus and the health of family and friends, as well lack of sufficient supplies of personal protective equipment (PPE), treating something that is new, emotional fears – did I do enough, did I do right, am I able to keep my team safe are the most common reasons in healthcare staff causing stress and anxiety. Mental health

counselling and resilience training would need to be made available to the staff. Use of technology for Automated scheduling and virtual interviews would help improve staff numbers and efficient scheduling.

Churchill said ‘’Never let a good crisis go to waste’’ and this is a crisis and this crisis has caused some of the things to accelerate. Many lessons learnt would change the delivery of healthcare for the future.

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