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Coronavirus disease 2019 pandemic: staged management of surgical services for gynecology and obstetrics



Emily E. Weber LeBrun, MD, MS; Nash S. Moawad, MD, MS; Eric I. Rosenberg, MD; Timothy E. Morey, MD; Laurie Davies, MD; William O. Collins, MD; John C. Smulian, MD, MPH

The global, national, and local healthcare response to the novel coronavirus disease 2019 (COVID-19) provides an opportunity to share best practices for managing surgical services during a health-related crisis. A response to any health emergency must be tailored to the specific threat, be it infectious (such as COVID-19 or influenza), a natural weather event, bioterrorism, or an active shooter. The role of surgical services in a health-related emergency is important and has potentially modifiable components related to healthcare delivery. Variables to be considered when determining how surgical services might be adjusted must factor in the anticipated impact and duration of the event, the reliance on perioperative and institutional resources, and the impact of adjusting routine operations on both affected and unaffected patient populations. Decisions regarding the cancellation, postponement, and prioritization of surgical services are frequently dictated by the specific threat, but the timing of making changes can present the most difficult challenge. Importantly, the principles that guide decisions are similar regardless of the emergency. We present principles of management of surgical services during a health emergency and provide specific guidance to help with decision making to help institutions or clinical practices considering changes to surgical services because of the COVID-19 pandemic.

Planning considerations

The World Health Organization (WHO) provides an all-hazards list of key actions to be considered by hospitals in response to any disaster event.¹ This tool provides guidance on establishing a command center, consistent and effective communication, prioritization of safety and security, the logistics of triage and supply management in light of surge capacity while maintaining essential services, and postdisaster recovery planning. In 2014, the WHO hospital emergency response checklist was used as an evaluation tool kit in a cross-sectional study to assess the preparedness of 15 hospitals in Italy. It showed that most had adequate command and

control response operations but had insufficient communication systems for potential disaster.² Although there is some correlation between the level of hospital care and preparedness, there was a poor level of readiness to implement strategic and logistical plans. In fact, some hospitals successfully anticipated infrastructure needs, such as water, sanitation, and electricity, but failed to demonstrate a coordinated and strategic plan for surge capacity.

Inpatient surge capacity is the ability to generate staffed beds in response to a surge in demand for inpatient healthcare services. In times of emergent increase in healthcare demand, the goal is to increase capacity between 10% and 20%, although the target may vary based on specific circumstances.^{2,3} Financial demands have traditionally prompted hospitals to maintain a high inpatient census to meet tighter budgets. Naturally, this limits their ability to respond to a sudden large surge in demand over the typical occupancy of 90%–95%.⁴ This is particularly true for times of high occupancy during natural surge cycles as can be seen with the influenza or respiratory syncytial virus. These large (sometimes academic), nonprofit, and safety-net hospitals with level I trauma centers depend on the financial security of maintaining a high patient census and large surgical volumes. These sites will also be relied on for expertise in caring for nonsurgical patients with critical illness resulting from an emerging pathogen, in addition to the ongoing demands of high-level surgical services.

Adjustment of surgical services

Despite these conflicts, 1 strategy to free up capacity within a hospital system is through cancellation of nonessential surgical cases that most commonly occurs in an unstructured and decentralized manner.⁵ As seen previously, nonsystematic modifications of procedural schedules and adjusting admission and discharges were shown to reduce occupancy and demand of nonurgent hospital resources after the New York attacks in 2001 and after the severe acute respiratory syndrome Toronto outbreak in 2003 by 9% and 12%, respectively.⁶ In 2016, researchers reported a structured system of categorizing surgical procedures based on the potential impact on inpatient surge capacity if a procedure was to be canceled or delayed.⁵ Using chart review, all planned procedures over a 4-week period (n=2821) were categorized based on their impact on inpatient capacity and the safety of their delay into 1 of 4 groups: (A) procedures with no impact on inpatient capacity, (B) procedures that could be delayed indefinitely, (C) procedures that could be delayed by 1 week,

From the Departments of Obstetrics & Gynecology (Drs Weber LeBrun, Moawad, and Smulian), Medicine (Dr Rosenberg), Anesthesiology (Drs Morey and Davies), and Otolaryngology (Dr Collins), University of Florida College of Medicine, Gainesville, Florida.

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Corresponding author: Emily E. Weber LeBrun, MD, MS. eweber@ufl.edu

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and (D) procedures that could not be delayed. This strategy of delaying scheduled cases in categories B and C most effectively (especially on Mondays) led to a reduction of inpatient occupancy by 8% (65 beds). Although category A cases, such as outpatient procedures and same-day procedures, do not impact inpatient occupancy, they do require other equipment and staffing resources, thus limiting potential surge capacity during a healthcare crisis requiring intensive patient care.

An important element of managing surgical services in the setting of a healthcare emergency is planned coordination throughout the hospital system, including various surgical departments, anesthesia, and nursing services. In the current COVID-19 crisis, the American College of Surgeons issued the following recommendation: "Each health system and surgeon should thoughtfully review all scheduled elective procedures with a plan to minimize, postpone or cancel elective [cases] until we can be confident that our health care infrastructure can support [an increase] in critical patient care needs."⁷ A joint statement from leading societies in gynecologic surgery and the US Surgeon General encouraged hospitals to consider modifying surgical scheduling in areas where COVID-19 is prevalent.^{8,9} Effective rescheduling of surgeries should involve engagement of the entire hospital system with specific attention to the unique demands of the crisis at hand. Also of importance, many surgeries are performed in settings outside of hospital systems through either free-standing outpatient surgical centers or clinical offices. These entities are usually excluded from planning considerations since they are often removed, both operationally and financially, from the larger hospital systems. This creates a potential conflict of interest when making decisions about surgery reductions. Communication during a healthcare emergency is critical, and differences in the management of elective cases can interfere with consistent messaging across an institution and to the public. Community practices and nonaffiliated surgical facilities should be included in this process and have similar expectations for adjusting care. In the event of widespread COVID-19 infection, all resources may be severely strained and should be conserved to care for life-threatening infections rather than elective surgical procedures.

The wide spectrum of clinical manifestations seen in COVID-19 complicates predictions of the impact on healthcare. Therefore, it is difficult to anticipate when the epidemic will peak and introduce further difficulty in the detection of cases.¹⁰ Current data suggest that the risk for developing acute respiratory distress syndrome (ARDS, 17%–29%) and death (1%) are most commonly seen in the elderly (older than 70 years) and those with underlying respiratory illness.¹¹ Clinically recognized infection in children seems less frequent (2%), and limited data suggest that pregnant women are not particularly vulnerable to contracting the illness and have similar maternal complications to other populations.¹² There appears to be an increased risk for preterm birth, fetal distress, and cesarean delivery with infection.¹¹ Nevertheless, 1:1 obstetric and pediatric staffing and the resultant personal

protective equipment (PPE) needs offer additional strains on resources.

Gynecologic and obstetric surgery

Preparing for COVID-19 community spread requires emergency response planning as outlined by the WHO. Additional preparedness actions can be elucidated from the Italian experience, which provides guidance on forecasting ICU surge capacity and promoting containment measures once the outbreak has begun.¹³ However, there is little guidance for managing scheduled, elective surgical services while awaiting the onslaught of COVID-19 cases. While hospital leadership is engaged in logistical planning, the maintenance of some limited surgical services may provide a financial balance to hospitals and allow physicians and staff to remain focused on providing high-quality care. Utilizing the principles from Soremekun et al⁵, it is possible to develop specialty-specific case categories and establish a schedule for tiered, coordinated case cancellation/postponement.

Table 1 shows the staged reduction considerations for gynecologic and obstetric surgeries used at the University of Florida to guide decision making. Category I includes elective cases of any type performed on a patient at high risk of complications associated with COVID-19 infection. In the setting of COVID-19, category I was designed to identify all patients across all services whose mere presence in a densely populated hospital with COVID-19 community transmission would pose a greater risk to the patient than to postpone their surgery. For example, urogynecology largely serves older patients who are also at high risk of morbidity and mortality resulting from COVID-19 infection but whose surgical treatment can usually be delayed for patient protection.

Categories II and IV are similar except for the postoperative hospital-care burden. Category II cases require overnight hospitalization or potential intensive care and can be postponed if the hospital resources are overstretched. In contrast, category IV cases occur in an off-site or independent ambulatory care center and therefore could continue without straining hospital-based resources (since some health systems do not maintain separate locations or surgical environments, categories II and IV may not be distinct for those centers). Although individuals in categories II and IV may be at lower risk for viral morbidity (such as most patients with benign and pediatric gynecology needs), consideration should be given to postponement if their surgery is nonessential and their potential exposure places the community at greater risk. In contrast, before the evidence of COVID-19 community spread, early completion of category IV cases will serve the low-risk population without expending significant resources and reduce additional hospital burden once the crisis resolves. Thus, both the specific community environment and COVID-19 risk must be considered.

Category III describes urgent procedures (or cases) that need to be performed within the next 7–14 days, but which can be scheduled strategically on the basis of hospital resources. In the COVID-19 setting, terminal cleaning of an

TABLE 1

General guidance to assist gynecologists and obstetricians with staged cancellation or postponement of surgical cases in response to the COVID-19 pandemic. Individual case-specific characteristics may modify category assignment for a given patient

Category:	I	II	III	IV	V
Trigger(s) to cancel or delay	- Community transmission	- Community transmission - Inpatient bed availability limited - PPE supply limited	- Community transmission - Inpatient bed availability limited - Case-by-case basis with team review	- Community transmission - PPE supply limited	Never canceled
COVID-19 morbidity and mortality risk	High Vulnerable population	Average	Average	Average	All risk levels
Urgency level	Low	Low	Moderate (can delay up to 14 d)	Low	High
Impact on bed capacity	Variable by procedure (possible inpatient)	Variable by procedure (possible inpatient)	Variable by procedure (possible inpatient)	No impact (same-day surgery)	High (inpatient, emergency department)
<i>Examples of patient characteristics and/or surgical case types</i>					
Benign gynecology	For all surgical groups - Immunocompromised - Elderly (older than 70 y) - Respiratory disease - Other comorbidities	- Excision of pelvic masses without high suspicion of malignancy - Hysterectomy for benign disease - Major minimally invasive surgery (excision of advanced endometriosis or adhesions)	- Excision of benign mass affecting health (causing ureteral obstruction) - Missed abortion	- Interval tubal ligation - Hysteroscopy - D&C - Minor adnexal surgery - Minor laparoscopy - Minor vaginal surgery	- Ectopic pregnancy - Ovarian torsion - Tuboovarian abscess requiring surgery - Uncontrollable uterine bleeding; no cancer - Incomplete abortion
Urogynecology		- Hysterectomy (with overnight stay) - Major pelvic floor repairs - Sacral colpopexy	- Mass resulting in urinary obstruction	- Minor pelvic floor repairs - Minimally invasive surgery - Hysterectomy (same-day discharge)	- Irreducible procidentia resulting in acute urinary retention

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Category:	I	II	III	IV	V
Gynecologic oncology		<ul style="list-style-type: none"> - Hysterectomy for complex benign disease - Prophylactic surgery heritable cancer risk - Cysts followed for long periods without change and negative serum markers (Benign Gyn or Gyn Onc) 	<ul style="list-style-type: none"> - Excision of malignant mass - Hysterectomy for early endometrial cancer 	<ul style="list-style-type: none"> - Surgery for preinvasive disease: EIN, VIN, VAIN, CIN 	<ul style="list-style-type: none"> - Bowel obstruction - Uncontrollable uterine bleeding from cancer - Pelvic mass causing severe symptoms
Reproductive endocrinology and infertility		<ul style="list-style-type: none"> - Abdominal myomectomy 	N/A	<ul style="list-style-type: none"> - Hysteroscopy, D&C - Septoplasty - Adnexal surgery - Minor laparoscopy - IVF retrievals and transfers - IUIs and office procedures 	<ul style="list-style-type: none"> - Ectopic pregnancy - Ovarian torsion - Treatment of ovarian hyperstimulation
Obstetrics	<ul style="list-style-type: none"> - Considered a vulnerable population and should only have indicated procedures to preserve maternal and fetal health 	<ul style="list-style-type: none"> - Delayed postpartum tubal ligation (separate anesthesia episode) - Ovarian cystectomy 	<ul style="list-style-type: none"> - Scheduled cesarean - Scheduled labor induction - History-indicated cerclage - Amniocentesis - Chorionic villous sampling 	N/A	<ul style="list-style-type: none"> - Emergent cesarean - Emergent cesarean hysterectomy - Rescue cerclage - Incarcerated uterus - Ovarian torsion - Intrauterine transfusion - Tubal ligation at cesarean or with delivery

CIN, cervical intraepithelial neoplasia; *COVID-19*, coronavirus disease 2019; *D&C*, dilation and curettage; *EIN*, endometrial intraepithelial neoplasia; *IUI*, intrauterine insemination; *IVF*, in vitro fertilization; *N/A*, not applicable; *PPE*, personal protective equipment; *VIN*, vulvar intraepithelial neoplasia; *VAIN*, vaginal intraepithelial neoplasia.

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TABLE 2

Selected considerations important for guiding decisions surrounding a staged reduction in surgical services during the COVID-19 pandemic

Public health concerns	Patient concerns	Healthcare system concerns
<ul style="list-style-type: none"> • Extent of community transmission 	<ul style="list-style-type: none"> • Risk for mortality for nosocomial infection • Comorbidities confounding screening (eg, tracheostomy) • Urgency of surgical indication • Health impact(s) if procedure postponed/canceled 	<ul style="list-style-type: none"> • Availability of PPE, both general surgical masks and COVID-19-resistant air-purifying masks/head coverings • Availability of blood bank resources • Availability and health of surgical teams • Surgeon • Anesthesiologist • Specialty consultative clinicians • Surgical assistance • Nursing support • Custodial and sterile-processing staff • Room capacity • Operating suites with negative pressure capabilities • Preoperative areas • Postoperative areas • Inpatient rooms • Emergency department

COVID-19, coronavirus disease 2019; PPE, personal protection equipment.

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operating room, preparation of adequate PPE, or mobilization of staff may be prioritized to strategically delay a category III case. For example, surgical oncology cares for patients at the highest risk for contracting COVID-19 and, simultaneously, for experiencing devastating outcomes with a delay in cancer care. These cases best fit into category III, prompting a case review and individualized risk assessment. Finally, category V cases are emergent and should not be delayed for any reason. Emergent cases such as ovarian torsion and ectopic pregnancies fall into category V, for which a careful risk assessment is undertaken and the case performed urgently with mobilization of available resources.

This categorization strategy depends heavily on surgeons to fairly identify several key factors about the patient and the planned surgery, to weigh the relative impacts of those factors on the overall health of the patient, and to seek peer review when confounding factors are involved. When considering symptomatic or COVID-19-positive surgical patients, we suggest that a multidisciplinary team must balance the various risks and benefits to the patient and to the entire healthcare system.

There are a number of considerations for triggering a staged reduction in surgical services (Table 2). Nevertheless, for COVID-19, the emergence of local or regional community transmission is the most important. Because pregnancy care (antenatal, intrapartum, and postpartum) is not optional, it is particularly important to conserve and protect this highly specialized workforce and assigned PPE resources to safely ensure the ability to provide services during the outbreak. This may mean an earlier reduction of benign gynecologic surgeries than in other specialties.

Although each hospital or healthcare system must evaluate their own capabilities and surge capacity, this approach can be

applied across all surgical departments allowing for a consistent and measured management of resources. We have provided an expanded table with additional categorized examples from other procedural specialties that might be useful for guiding decisions including general surgery, pediatric surgery, neurosurgery, otolaryngology, and psychiatry (Appendix).

Summary

The widespread COVID-19 epidemic in China showed a high rate of infection in healthcare personnel, up to 63% in Wuhan (1080 of 1716), with 14.8% cases classified as severe or critical (247 of 1668) and 5 deaths.^{12,13} This can quickly overwhelm resources and make it very challenging to provide adequate care for ill COVID-19 patients. Minimizing all unnecessary patient contact through proactive systematic postponement of elective surgical cases and all nonessential outpatient visits is key to channeling all healthcare resources to overcoming this COVID-19 pandemic. ■

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ABSTRACT

Coronavirus disease 2019 pandemic: staged management of surgical services for gynecology and obstetrics

The coronavirus disease 2019 pandemic warrants an unprecedented global healthcare response requiring maintenance of existing hospital-based services while simultaneously preparing for high-acuity care for infected and sick individuals. Hospitals must protect patients and the diverse healthcare workforce by conserving personal protective equipment and redeployment of facility resources. While each hospital or health system must evaluate their own capabilities and surge capacity, we present principles of management of surgical services during a health emergency and provide specific guidance to help with decision making. We review the limited evidence from past hospital and community responses to various health emergencies and focus on systematic methods for adjusting surgical services to create

capacity, addressing the specific risks of coronavirus disease 2019. Successful strategies for tiered reduction of surgical cases involve multidisciplinary engagement of the entire healthcare system and use of a structured risk-assessment categorization scheme that can be applied across the institution. Our institution developed and operationalized this approach over 3 working days, indicating that immediate implementation is feasible in response to an unforeseen healthcare emergency.

Key words: case cancellations, coronavirus, COVID-19, emergency response, gynecology, obstetrics, SARS-CoV-2, staged management, surgery, surgical subspecialties

Appendix

SUPPLEMENTARY TABLE

General guidance to assist surgeons and hospital leaders with staged cancellation or postponement of surgical cases in response to the COVID-19 pandemic. Individual case-specific characteristics may modify category assignment for a given patient. The surgical services available at any individual health center will vary. This table is intended as a guide and could be expanded or modified for use in any individual hospital

Category	I	II	III	IV	V
Trigger(s) to cancel or delay	- Community transmission	- Community transmission - Inpatient bed availability limited - PPE supply limited	- Community transmission - Inpatient bed availability limited - Case-by-case basis with team review	- Community transmission - PPE supply limited	- Never canceled
COVID-19 morbidity and mortality risk	High	Average	Average	Average	All risk levels
Urgency level	Low	Low	Moderate (can delay up to 14 d)	Low	High
Impact on bed capacity	Variable by procedure (possible inpatient)	Variable by procedure (possible inpatient)	Variable by procedure (possible inpatient)	No impact (same-day surgery)	High (inpatient, emergency department)
<i>Examples of patient characteristics and/or surgical case types</i>					
General surgery	For all surgical groups - Immunocompromised - Elderly (older than 70 y) - Respiratory disease - Other comorbidities (as specifically listed)	- Excision of benign mass - Joint replacement - Cosmetic procedures	- Excision of malignant mass - Cardiac catheterization for stable angina - Fixation of closed orthopedic injury	- Day-stay surgeries - Surgical centers - Procedures on patients already admitted, allowing for immediate discharge	- Emergent trauma or acute abdomen (hemorrhage) - Required surgical intervention for infection - Spinal cord decompression - Transplants - Cardiac catheterization for acute myocardial infarction - Procedures on ICU patients (open abdomen, PEG, tracheostomy)

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Category	I	II	III	IV	V
Burn surgery		- Release of burn scar contractures in cases without impending functional compromise from contracture	- Release of burn scar contractures in cases with impending functional compromise from contracture	- Laser-based fractional ablation of hypertrophic scars - Scar revision and release of burn scar contractures (when deemed feasible as an outpatient surgery)	- Excision/debridement, preparation, and coverage of burns or wound beds - Amputation - Tracheostomy for high-risk airways or to facilitate wound treatment
Breast, melanoma			- Lymph node dissection - Total thyroidectomy/ bilateral neck dissection - Mastectomy - Adrenalectomy	- Excision of benign mass - Partial mastectomy - Parathyroidectomy - Thyroid lobectomy	- Breast abscess - Sarcoma that has received radiation therapy
Colorectal	- AIN/condyloma cases (impacts N95 mask supply)	- Nonurgent benign anorectal cases requiring inpatient stay - Pelvic floor repair (rectal prolapse, etc)	- Intestinal resection for cancer, diverticulitis, and inflammatory bowel disease	- Nonurgent benign anorectal cases usually treated as outpatient (excluding AIN/condyloma) - Sacral nerve stimulator for incontinence - Colonoscopy	- Urgent/emergent intestinal surgery for perforation or obstruction - Urgent/emergent anorectal cases: abscess, incarcerated prolapse, and necrotizing infections of the perineum
Minimally invasive	- Antireflux procedures in lung transplant patients	- Elective incisional hernia repair - Antireflux procedures - Bariatric procedures	- Repair of symptomatic hernias - Cancer resection - Surgical procedures for severe nutritional depletion	- Groin hernia repair - Endoscopy	- Urgent/emergent intestinal surgery for perforation, obstruction
Pancreas, biliary	- Symptomatic incisional hernia	- Chronic pancreatitis	- Pancreas cancer - Liver metastasis - Symptomatic incisional hernia	- Biliary colic - Biliary pancreatitis	- Patients with cancer receiving neoadjuvant therapy where surgical timing is driven by radiation treatment

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Category	I	II	III	IV	V
Plastics		<ul style="list-style-type: none"> - Reconstruction of existent, nonfunctional conditions: delayed breast reconstruction, chronic wounds, and facial palsy free flaps 	<ul style="list-style-type: none"> - Cleft palate surgery - Craniosynostosis 	<ul style="list-style-type: none"> - Breast reduction - Aesthetic/cosmetic surgery - Hand/upper extremity outpatient surgery - Lipomas and other outpatient skin/soft tissue benign tumors - Migraine surgery 	<ul style="list-style-type: none"> - Acute traumatic reconstruction: facial fractures, long-bone fractures, and acute soft tissue reconstruction - Reconstruction for acutely created cancer defects - Aggressive cutaneous cancer resections (melanoma, Merkel cell)
Vascular	<ul style="list-style-type: none"> - Severe COPD 	<ul style="list-style-type: none"> - Elective venous cases interventions for claudication - Asymptomatic carotid procedures 	<ul style="list-style-type: none"> - <6 cm AAA 	<ul style="list-style-type: none"> - New hemodialysis access creation 	<ul style="list-style-type: none"> - CLI and ALI procedures >6 cm AAA or TAAA - Symptomatic carotid - Ruptured or infected procedures (vascular surgery emergencies) - Aortic dissections - Acute mesenteric ischemia
Cardiac			<ul style="list-style-type: none"> - CABG stable CADz - TAVR/valve nonurgent - TEVAR nonurgent - Aneurysm nonurgent - VAD 	N/A	<ul style="list-style-type: none"> - Acute aortic dissection - Transplants - Left main coronary artery disease/CABG - Post-MI VSD, Mitral
Thoracic	<ul style="list-style-type: none"> - Surgical lung biopsy 	<ul style="list-style-type: none"> - Diaphragmatic plication - Decortication for stable trapped lung 	<ul style="list-style-type: none"> - Lung cancer surgery - Esophageal cancer surgery - Mediastinal tumor - Lung transplant patients awaiting at home or floor - Empyema thoracoscopy 	N/A	<ul style="list-style-type: none"> - Lung transplant patients admitted to TVICU - ECMO cannulation and initiation - Thymectomy on patients with unstable myasthenia

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Category	I	II	III	IV	V
Congenital heart surgery	<ul style="list-style-type: none"> - Elective heart defects - Chronic heart defects with -ASD, sinus venous ASD with PAPVR - Elective VSD in older patients 		<ul style="list-style-type: none"> - Some single ventricular patients - Some patients with shunt lesions 		<ul style="list-style-type: none"> - Single ventricles that are hypoxemic - Transplants - VADs for sick patients with heart failure - Infected endocarditis - Kids with acute heart failure - Infections requiring urgent surgery
Congenital heart cath	<ul style="list-style-type: none"> - Transplant (surveillance cath) - Chronic lung disease - Trach/vent dependent - Other comorbidities involving CV/pulmonary system (mainly ACHD) 	<ul style="list-style-type: none"> - Elective device closures - Noncritical valve interventions and stents - Asymptomatic outpatient transcatheter valve implantation 	<ul style="list-style-type: none"> - Single ventricle cath patients - Transplant patients with concern for rejection - Symptomatic patients requiring valve intervention/implantation, stent placement, or device closure 	<ul style="list-style-type: none"> - Routine diagnostic cath without planned intervention 	<ul style="list-style-type: none"> - Inpatient requiring urgent diagnostic cath or therapeutic intervention - Transplant patients with concerns for acute rejection
Congenital Heart EP	<ul style="list-style-type: none"> - Transplant - Chronic lung disease - Trach/vent dependent - Other comorbidities involving CV/pulmonary systems (mainly ACHD) 	<ul style="list-style-type: none"> - Implantable loop recorder implant - Diagnostic EPS only 	<ul style="list-style-type: none"> - EPS/ablation of SVT - Pacemaker or ICD generator replacement - Device upgrade +/- extraction (elective) 	<ul style="list-style-type: none"> - EPS/ablation of VT - Pacemaker implant (new) - Primary prevention ICD implant 	<ul style="list-style-type: none"> - Ablation for unstable refractory arrhythmias - Infected device extraction - Secondary prevention ICD implant (postarrest)

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Pediatric surgery	<ul style="list-style-type: none"> - Cystic fibrosis - Respiratory illness/vent dependent - Large burns (immune issues) 	<ul style="list-style-type: none"> - Stoma reversals - Outpatient gastrostomy tubes (with temporary tube in place) - Congenital lung lesions - Benign masses - Outpatient cholecystectomy - Interval appendectomy - Neck masses (eg, thyroid) - Small burns (outpatient) 	<ul style="list-style-type: none"> - Bowel resections (nonobstructive) - Symptomatic gallbladder disease - Need for feeding access (especially inpatients to facilitate discharge) - Some malignancy-associated procedures (central access, resections) 	<ul style="list-style-type: none"> - Inguinal hernia repair - Orchiopexy - Circumcision - Umbilical hernia - Integumentary surgery (skin lesions, nail lesions, etc) - EGD/colonoscopy - Breast masses - Neck masses (superficial) - Awaiting surgery for discharge (hernia, g-tube, etc) 	<ul style="list-style-type: none"> - All emergent procedures (eg, appendicitis, cholecystitis, trauma, burn debridement, bowel obstructions, GI bleeding) - Malignancies requiring biopsy or resection to start therapy - Empyema not responding to medical management - Newborn surgical procedures - ECMO - Incarcerated hernia - Esophageal/airway foreign bodies - Gonadal torsion (testicular, ovarian)
Abdominal transplant surgery	<ul style="list-style-type: none"> - Elderly (older than 70 y) – unless need for urgent dialysis access - Pancreas transplants 	<ul style="list-style-type: none"> - Excision of benign mass 	<ul style="list-style-type: none"> - Excision of some malignant masses - Living donor kidney transplants (being delayed until at least April 28, 2020, as of March, 17, 2020; will then be reassessed) 	<ul style="list-style-type: none"> - Day-stay surgeries - Procedures on patients already admitted, allowing for immediate discharge 	<ul style="list-style-type: none"> - Acute abdomen or surgical equivalent - Required surgical intervention for infection - Liver transplants MELD over 25 years old or ill - Detailed acceptance criteria for deceased donor kidney transplants created based on both recipient and donor graft risk criteria - Excision of some malignant masses
Neurosurgery Vascular	<ul style="list-style-type: none"> - Any open surgical or endovascular elective aneurysm, any open surgical or endovascular elective AVM 	<ul style="list-style-type: none"> - Open surgical elective aneurysm, open surgical elective AVM, open surgical carotid in patient of any age 	<ul style="list-style-type: none"> - Endovascular elective aneurysm, endovascular elective AVM, endovascular elective carotid in patient of any age 	<ul style="list-style-type: none"> - Diagnostic cerebral angiograms 	<ul style="list-style-type: none"> - Ruptured aneurysm, ruptured AVM, acute stroke, ICH

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Category	I	II	III	IV	V
Neurosurgery Spine	<ul style="list-style-type: none"> - Elective degenerative spine surgery without motor deficit, or stable motor deficit >3 mo 	<ul style="list-style-type: none"> - Resection of benign spinal mass, for example, meningioma, schwannoma without motor deficit or stable motor deficit >3 mo - Spinal instability that can be managed indefinitely with a brace - Elective spinal procedure requiring multilevel spinal instrumentation (cervical, thoracic, or lumbar) 	<ul style="list-style-type: none"> - Spinal condition with a stable motor deficit >72 h - Any spinal condition that is not emergent but requires inpatient management until definitively treated (eg, unstable thoracic fracture on bed rest until surgery) - Malignant primary or secondary spinal tumor - Progressive cervical or thoracic myelopathy, spine tumor without deficit but cord compression 	<ul style="list-style-type: none"> - Level 1 or 2 lumbar decompression - Level 1 anterior cervical surgery or level 1–2 posterior cervical decompression - Single level ACDF, microdiscectomy, single level laminectomy 	<ul style="list-style-type: none"> - Spinal cord/ nerve compression or spinal instability with <72 h motor deficit or progressive motor deficit within 72 h - Spine fracture, spine pathology with an acute severe neurologic deficit (ie, tumor, abscess/osteomyelitis, cauda equina)
Neurosurgery Stereotactic/radiosurgery/ brain tumors, trigeminal neuralgia	<ul style="list-style-type: none"> - Benign, minimally symptomatic tumor 	<ul style="list-style-type: none"> - Benign brain tumors, elective cervical/lumbar stenosis cases - Benign minimally symptomatic tumor of any age 	<ul style="list-style-type: none"> - MVD cases where patients are in a lot of pain, symptomatic benign posterior fossa lesions - Benign tumor of any age with moderate neurologic symptoms 	<ul style="list-style-type: none"> - Outpatient radiosurgery and RFL cases - Malignant brain tumor of any age 	<ul style="list-style-type: none"> - Intracranial bleeding, symptomatic large brain tumors, symptomatic spinal cord lesions, trauma - Hospitalized benign brain tumor patient with significant neurologic symptoms or hospitalized malignant brain tumor

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Category	I	II	III	IV	V
Pediatric neurosurgery	<ul style="list-style-type: none"> - Respiratory illness/vent dependent 	<ul style="list-style-type: none"> - Chiari decompression (most) - Cranioplasty for skull dehiscence or contour - Craniotomy for epilepsy focus, nontumor - Vagus nerve stimulator new implant - Baclofen pump new implant - Dorsal rhizotomy - Stereo EEG - Scoliosis or other spinal deformity repair (1- to 3-mo delay) 	<ul style="list-style-type: none"> - Cranioplasty after decompressive craniectomy - Craniosynostosis (most) - Spinal cord detethering (most) - Cranial/spinal tumor biopsies/resections (most) - Discectomy/laminectomy without acute neurodeficit - Pseudomeningocele repair (most) - Moyamoya bypass - Baclofen pump replacement 	<ul style="list-style-type: none"> - Scalp dermoid - Cranial spring removal - Muscle/nerve biopsy - Vagus nerve stimulator battery replacement 	<ul style="list-style-type: none"> - Shunt placement/revision - Spinal instability/trauma - Endoscopic hydrocephalus surgery - Evacuation of intracranial/intraspinal hematoma or empyema - Myelomeningocele closure - Congenital encephalocele repair - CSF leak repair - Discectomy/laminectomy with acute neurodeficit - Decompressive craniectomy - Repair of open or depressed skull fracture - Other urgent or emergent cases as dictated by patient status
Neurosurgery, epilepsy surgery, pituitary tumors	<ul style="list-style-type: none"> - Any elective epilepsy or pituitary case in patient aged 70 y or older or with pulmonary disease 	<ul style="list-style-type: none"> - RNS for epilepsy, transsphenoidal surgery for pituitary tumor, stereo EEG for epilepsy, anterior temporal lobectomy for epilepsy 	<ul style="list-style-type: none"> - VP shunt for pseudotumor pituitary tumor with visual field defect 	<ul style="list-style-type: none"> - Sural nerve biopsy - VNS placement and VNS generator change 	<ul style="list-style-type: none"> - Transsphenoidal surgery for pituitary apoplexy
Neurosurgery, DBS	Any elective DBS or battery change procedure in patient 70 years or older, immunocompromised, or with respiratory disease	Elective DBS surgery in patients <70 years old		Battery change procedures in patients <70 years old	Infected DBS or infected battery

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Category	I	II	III	IV	V
Otolaryngology	<ul style="list-style-type: none"> - Immunocompromised - Elderly (older than 70 y) - Chronic respiratory disease - Cystic fibrosis - Elective aerosol-generating procedures, such as endoscopy, bronchoscopy - Tracheotomy dependent 	<ul style="list-style-type: none"> - Most tonsil/adenoid removals - Benign thyroid and parotid masses - Tympanoplasties and mastoidectomies - Cochlear implants - Chronic inflammatory sinus surgery - Septorhinoplasty 	<ul style="list-style-type: none"> - Malignancy of upper aerodigestive tract or salivary glands - CSF leaks - Sinonasal tumors - Facial trauma - Laryngotracheal stenosis, especially if not tracheostomized <p>* <i>These cases could wait a short duration, but not >3–4 wk</i></p>	Cases occurred at an ambulatory surgical center	<ul style="list-style-type: none"> - Emergent airway - Neck abscesses - Orbital or intracranial complications of otitis media or sinusitis - Invasive fungal sinusitis
Psychiatry, ECT	<ul style="list-style-type: none"> - Immunocompromised - Elderly (older than 70 y) - Respiratory disease - Cardiac disease - Other comorbidity 	<ul style="list-style-type: none"> - Maintenance ECT for prevention of relapse 	<ul style="list-style-type: none"> - Post-ECT taper - Nonsuicidal in ECT treatment series 	High acuity in mid-ECT series	<ul style="list-style-type: none"> - Catatonia with severe malnourishment - Suicidal inpatients in mid-ECT series
Trauma orthopedics	-	<ul style="list-style-type: none"> - Malunion - Some nonunion with intact hardware - Posttraumatic fusion/arthroplasty 	<ul style="list-style-type: none"> - Some fractures 	<ul style="list-style-type: none"> - Minor hardware removal - Manipulation under anesthesia - Some fractures 	<ul style="list-style-type: none"> - Acute fractures - Infection - Polytrauma
Foot and ankle	-	<ul style="list-style-type: none"> - Mostly elective - Below-knee amputation - Most Charcot reconstruction - Ankle replacements or similar reconstruction 	<ul style="list-style-type: none"> - Some elective partial foot amputation - Some elective below-knee amputation 	<ul style="list-style-type: none"> - Mostly elective sports, arthritis, outpatient trauma, reconstructive foot and ankle surgery - All digit amputations 	<ul style="list-style-type: none"> - Acute or acute on chronic infections - Polytrauma with foot fracture as main orthopedic injury
Orthopedic, spine	<ul style="list-style-type: none"> - Elective degenerative spine surgery without motor deficit, or stable motor deficit >3 mo 	<ul style="list-style-type: none"> - Resection of benign spinal mass without motor deficit or stable motor deficit >3 mo - Spinal instability that can be managed indefinitely with a brace. 	<ul style="list-style-type: none"> - Spinal condition with a stable motor deficit >72 h - Malignant primary or secondary spinal tumor - Any spinal condition that is not emergent but requires inpatient management until definitively treated (eg, unstable thoracic fracture) 	<ul style="list-style-type: none"> - Level 1 or 2 lumbar decompression or microdiscectomy - Level 1 anterior cervical surgery - Level 1–2 posterior cervical decompression 	<ul style="list-style-type: none"> - Spinal cord/nerve compression or spinal instability with <72 h motor deficit or progressive motor deficit within 72 h

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Category	I	II	III	IV	V
Orthopedic oncology		<ul style="list-style-type: none"> - Benign bone - Benign soft tissue - Hardware removal - Hardware revision 	<ul style="list-style-type: none"> - Malignant bone - Soft tissue 	<ul style="list-style-type: none"> - Rare - Benign soft tissue or bone 	<ul style="list-style-type: none"> - Acute fractures - Infection - Pathologic fractures - Malignant tumors with window for care (eg, RT, chemotherapy)
Pediatric orthopedics		<ul style="list-style-type: none"> - Elective spine deformity - Hip/LE surgery for CP, neuromuscular - LE osteotomies - Clubfoot revisions 	<ul style="list-style-type: none"> - Some fractures can be delayed 7–10 d 	<ul style="list-style-type: none"> - Elective LE and foot deformity surgery (ambulatory surgery only) - Arthroscopy/peds sports - Clubfoot tenotomy 	<ul style="list-style-type: none"> - SCFE from ED - Fracture fixation or casting - Septic arthritis/osteomyelitis/abscess - Spine trauma requiring fixation
Orthopedic sports med		<ul style="list-style-type: none"> - Knee - Arthroscopic meniscectomy, debridement, microfracture, plica excision - ACL reconstruction - Shoulder - Arthroscopic debridement, degenerative rotator cuff repair, biceps tenodesis/tenotomy, slap repair, subacromial decompression, distal clavicle excision - Hip - Arthroscopic hip surgery - Elbow - Arthroscopic and open elbow surgery (excluding fracture/dislocation) 	<ul style="list-style-type: none"> - Should be done within 7–14 d: - Acute shoulder instability - Patella instability with osteochondral fragment - Acute displaced/unstable chondral fragment - Closed fracture fixation - Subacute/chronic periprosthetic joint infection without systemic symptoms (ie, sepsis) - Acute rotator cuff tear - Surgery that would result in loss of athletic season if not performed - Major tendon/ligament tear - Pectoralis - Biceps - Achilles - Quad/patella - Hamstring - Triceps - Collateral ligament repair - ACL repair 	<ul style="list-style-type: none"> - Elective LE and foot deformity surgery (ambulatory surgery only) - Arthroscopy/peds sports - Clubfoot tenotomy 	<ul style="list-style-type: none"> - Irreducible dislocations/unstable dislocations - Native or prosthetic - Septic joint - Infection - Native or surgical site - Open fracture - ACL with bucket handle meniscal tear - Displaced bucket handle meniscal tear - Periprosthetic fracture fixation - Acute periprosthetic joint infection - Subacute/chronic periprosthetic joint infection with systemic symptoms, ie, sepsis - Fractures with neurovascular compromise - Locked elbow or knee - Current matched fresh allografts

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Arthroplasty	- SNF bound	- Elective inpatient - Primary and revision	- Same as level 2 except for severe limitation, pain, or immobility	- Outpatient healthy total joint arthroplasty	- Fractures, acute prosthetic joint infection - Dislocations of a joint - Other emergent, urgent
Urology	- Reconstructive surgery for transplant clearance	- PCNL for asymptomatic stone without tubes - Pelvic floor repairs - Fistula case - Benign urinary diversion - Bladder diverticulum - Outlet reduction procedure - Penile prosthesis - AUS - Penile plication - Hidden penis repair - TURP/PVP - Excision of benign adrenal tumor - Bladder and bowel reconstruction: bladder augment, bladder catheterizable channel, cecal catheterizable channel, ureteral reimplant	- Excision of malignant mass (prostate, kidney, bladder, testis, and penis) - Excision of benign mass affecting health - PCNL for symptomatic stones or drainage tubes in place - Ureteroscopy for symptomatic stones or drainage tubes in place - Pyeloplasty - Urethroplasty - Ileal ureter - Ureterolysis - Pediatric benign nephrectomy	- Inguinal orchiectomy - TURBT - Ureteroscopy for asymptomatic stone without tubes - Ureteral stent change - Minor pelvic floor repairs - Anti-incontinence procedures - Sacral neuromodulation - Cysto/RUG/SPT - ProAct placement - Male sling placement - DVIU/urethral dilation - Excision/ablation condyloma - UroLift - Penile abnormality surgery (circumcision, penile adhesion, hypospadias) - Inguinal hernia - Undescended testis	- Testicular torsion - Urinary tract infections associated with obstruction - Acute urinary tract obstruction associated with decline in renal function - Priapism - Fournier's gangrene - Cystoscopy with clot evacuation - Explant infected prosthetic device - Pediatric malignancy not testis
Pain medicine				- Minimally invasive pain procedures, implants, and percutaneous interventions - Elderly (older than 75 y) - Steroid injections for patients with comorbidities (postpulmonary/cardiac transplant, COPD with O ₂ dependency, uncontrolled diabetes)	-Hospitalized patients: percutaneous pain interventions/minimally invasive pain procedures/implants to facility hospital discharge. - Outpatient: emergency/ complications (eg, infection) of implant

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Category	I	II	III	IV	V
Interventional radiology	Visceral <ul style="list-style-type: none"> - Varicose veins - Hydrocele sclerotherapy - TIPS revision: ascites - Vertebral augmentation - Embo: gonadal vein - Nerve injections - Embo: fibroid - IVC filter removal - CVL/port removal (completion of therapy) - Feeding tube exchange (routine) Peds <ul style="list-style-type: none"> - VCUGs - Renograms - Barium GI series for chronic conditions MSK <ul style="list-style-type: none"> - Imaging-guided soft tissue (trigger point) injection Neuro/spine <ul style="list-style-type: none"> - Sclerotherapy and Botox injections 	Visceral <ul style="list-style-type: none"> - Embo: fibroid 	Visceral <ul style="list-style-type: none"> - Transjugular liver biopsy - PTHD (low acuity) - PCN: new (low acuity) - TIPS placement: ascites (possibly >14 d) - Percutaneous ablation (possibly >14 d) - Embo: pulmonary AVM (possibly >14 d) - TIPS revision: bleeding Body <ul style="list-style-type: none"> - Native kidney biopsy - Lung mass biopsy - Abdominal mass high-risk biopsy Neuro/spine <ul style="list-style-type: none"> - Multilevel blood patch - Multistaged sclerotherapy 	Visceral <ul style="list-style-type: none"> - Embo: gonadal vein, liver — tumor (TAE/TARE) - Dialysis procedures - Varicose veins - Hydrocele sclerotherapy - IVC filter placement/removal - Cholangiogram - Feeding tube placement/change - Tunneled ascites catheter - Catheter/CVL exchange or removal (any) - Port/tunneled CVL placement - Vertebral augmentation, nerve injections - TIPS revision: ascites Body <ul style="list-style-type: none"> - Breast mass biopsy - Thyroid FNA - Lymph node biopsy - Paracentesis/thora - Seroma/superficial abscess drainage - Low-risk abdominal mass or soft tissue biopsy Neuro/spine <ul style="list-style-type: none"> - LPs/Myelograms - FNA/biopsies of head, neck, or spine - Sclerotherapy and Botox injections MSK <ul style="list-style-type: none"> - Arthrocentesis - Imaging-guided biopsy - Imaging-guided soft tissue (trigger point) injection 	Visceral <ul style="list-style-type: none"> - PTHD (high acuity) - PCN: new (high acuity) - Embo—any hemorrhage - Thrombolysis - TIPS placement: history of bleeding Body <ul style="list-style-type: none"> - Abdominal/pelvic abscess drainage - Empyema Peds <ul style="list-style-type: none"> - Intussusception reduction - Barium study for malrotation

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Ophthalmology			<ul style="list-style-type: none"> - Cataracts that impact legal driving standards - Conjunctival or corneal neoplasm - Pediatric cataracts - Advanced TRD in monocular patient 	<ul style="list-style-type: none"> - Cataracts >12 year old - Blepharoplasty - Chalazion - Ectropion/entropion repair - Nasal lacrimal duct probing - Macular hole - PPV/ERM peel - Strabismus >10 year old - Mild/moderate glaucoma with >135 degrees of binocular field - PTK/Lasik/PRK - Routine transplants - Pterygium surgery 	<ul style="list-style-type: none"> - Globe rupture - Endophthalmitis - Bilateral vitreous hemorrhage - Emergency transplant - Perforated ulcer - Eyelid malignancy excision/repair - Vitreous biopsy/FNA of choroidal mass - Rhegmatogenous RD - Advanced or neovascular glaucoma - Hyphema with high IOP - ROP - Phacomorphic angle closure - Intraocular foreign body - Intraocular tumor

AAA, abdominal aortic aneurysm; ACDF, anterior cervical discectomy and fusion; ACHD, adult congenital heart disease; ACL, anterior cruciate ligament; AIN, anal intraepithelial neoplasia; ASD, atrial septal defect; AUS, artificial urinary sphincter; AVM, arteriovenous malformation; CABG, coronary artery bypass graft; CAD, coronary artery disease; COPD, chronic obstructive pulmonary disease; COVID-19, 2019 novel coronavirus; CP, cerebral palsy; CSF, cerebral spinal fluid; CV, cardiovascular; CVL, central venous line; DBS, deep brain stimulation; DVIU, direct vision internal urethrotomy; ECMO, extracorporeal membrane oxygenation; ECT, electroconvulsive therapy; EEG, electroencephalogram; EGD, esophagogastroduodenoscopy; EP, electrophysiology; EPS, electrophysiology studies; ERM, epiretinal membrane; FNA, fine needle aspiration; GI, gastrointestinal; ICD, implantable cardioverter defibrillator; ICH, intracerebral hemorrhage; ICU, intensive care unit; IOP, intraocular pressure; IVC, inferior vena cava; LE, lower extremity; LP, lumbar puncture; MELD, model for end-stage liver disease; MI, myocardial infarction; MSK, musculoskeletal; MVD, microvascular decompression; N/A, not applicable; PAPVR, partial anomalous pulmonary venous return; PCN, percutaneous nephrostomy; PCNL, percutaneous nephrolithotomy; PEG, percutaneous endoscopic gastrostomy; PPE, personal protective equipment; PPV, pars plana vitrectomy; PRK, photorefractive keratectomy; PTHD, percutaneous transhepatic biliary drainage; PTK, phototherapeutic keratectomy; PVP, photo-vaporization of prostate; RD, retinal detachment; RNS, responsive neurostimulation for seizures; ROP, retinopathy of prematurity; RT, radiation therapy; SNF, skilled nursing facility; SPT, suprapubic tube; SVT, supraventricular tachycardia; TAAAA, thoracoabdominal aortic aneurysm; TAVR, transcatheter aortic valve replacement; TEVAR, thoracic endovascular aortic repair; TIPS, transjugular intrahepatic portosystemic shunt; TRD, tractional retinal detachment; TURBT, transurethral resection of bladder tumor; TURP, transurethral resection of prostate; TICU, thoracic/vascular intensive care unit; VAD, ventricular assist device; VCUG, voiding cystourethrogram; VP, ventriculoperitoneal; VSD, ventriculoseptal defect.

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