

Supplementary digital content 7. Total counts (obstructive sleep apnea and control patients) for specific surgeries, stratified by type of surgery.

Cardiac surgeries*

Procedure	Count
3 vessel coronary artery bypass graft	459
Aortic valve replacement	80
Mitral valve replacement	34
5 vessel coronary artery bypass graft	32
4 vessel coronary artery bypass graft	29
1 vessel coronary artery bypass graft	25
2 vessel coronary artery bypass graft	25
Ascending aortic aneurysm repair	10
6 or more vessel coronary artery bypass graft	S [†]
Double cardiac valve replacement	S

*Cardiac surgeries are also categorized as major surgeries associated with a high risk of respiratory failure.

[†]Cell counts ≤ 5 are suppressed as a privacy requirement of using the administrative database.

Major surgeries associated with a high risk of respiratory failure.

Procedure	Count	Procedure	Count
Ventral/ incisional hernia repair	204	Femoral-tibial artery bypass graft	10
Massive ventral/ incisional hernia repair	137	Intracranial arterial venous malformation coiling	10
Partial colectomy	127	Suboccipital craniotomy for brain tumor	10
Carotid endarterectomy	94	Thyroid lobectomy	10
Anterior resection of colon	86	Craniotomy for evacuation of hematoma	9
Exploratory laparotomy	81	Ileostomy	9
Craniotomy for brain tumor	69	Pulmonary decortication	9
Abdominal aortic aneurysm repair	67	Recurrent ventral hernia (old)	9
Femoral popliteal artery bypass graft	49	Sterotactic surgery for intracranial biopsy	9
Small bowel resection	47	Colostomy	8
Initial revision and repair of epigastric hernia	39	Ventriculoperitoneal shunt insertion	8
Transabdominal hiatus hernia repair	35	Transjugular intrahepatic portosystemic shunt	7
Central nervous system unlisted or unusually complicated	29	Abdominal aortic aneurysm repair with aortofemoral graft	S*
Parathyroidectomy	29	Abdominal aortic aneurysm repair with aortoiliac graft	S
Repair of incarcerated hernia without bowel resection	24	Cholecystectomy with exploration of common bile duct	S
Wedge resection of lung	24	Closure of colostomy	S
Diagnostic laparoscopy followed by open abdominal operation	20	Closure of ileostomy by anastomosis	S
Lobectomy of lung	20	Debridement of sternum post cardiac surgery	S
Abdominoperineal resection	15	Transthoracic esophagectomy of lower third of esophagus	S
Colectomy, total, with or without anastomosis/ ostomy	15	Mediastinal tumor excision	S
Diaphragmatic hernia repair, not for gastric reflux	15	Mikulicz procedure (double barreled ostomy)	S
Subtotal thyroidectomy	15	Pneumonectomy	S
Total thyroidectomy	15	Radiofrequency ablation of single liver tumor	S
Unilateral aorto- femoral bypass graft with femoral endarterectomy	10	Recurrent epigastric hernia repair	S
Aortobifemoral bypass graft	10	Repair of peripheral artery with prosthetic graft	S
Breast reconstruction with transversus abdominis flap	10	Repair of peripheral artery with suture	S
Craniotomy for obliteration of aneurysm	10	Revision of ventriculoperitoneal shunt	S
Enterolysis in the absence of bowel obstruction	10	Small bowel fistula repair	S
Unilateral iliofemoral bypass graft	10	Subtotal gastrectomy	S
Thymectomy	10	Thoracotomy for postop bleeding	S
Exploratory thoracotomy	10	Tracheoplasty, intrathoracic	S
Femoral arteriotomy for removal of embolus	10	Unilateral pulmonary lavage	S

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Major surgeries associated with a low risk of respiratory failure.

Procedure*	Count	Procedure	Count
Knee arthroplasty	617	Temporomandibular joint arthrectomy	25
Hip arthroplasty	337	Ankle Arthrodesis	20
Total hysterectomy	285	ORIF radius and ulna	20
Total knee arthroplasty	259	ORIF tibia fibula	20
Appendectomy		Staging pelvic lymphadenectomy for prostate cancer	20
Shoulder arthroplasty	193	Submaxillary salivary gland tumor or gland excision	20
	147	Subtotal radical hysterectomy, pelvic lymphadenectomy	19
Total hip arthroplasty	107	Above knee amputation	17
Caesarean section	104	Appendectomy for perforated appendix	15
Laminectomy	95	Knee hemiarthroplasty	15
ORIF femur	84	ORIF ankle, trimalleolar	15
Radical nephrectomy	66		15
	58	ORIF tibia	15
Radical prostatectomy	58	Revision hip arthroplasty	15
Revision knee arthroplasty	57	Superficial parotid tumor resection	15
Suprapubic urethral suspension (Marshall Marschetti)	50		15
Vaginal hysterectomy		Laminotomy, removal of intervertebral discs, thoracic	14
	49	Revision total hip arthroplasty	14
Tracheostomy	46	Bone graft to face for reconstruction maxilla, unilateral	10
ORIF bimalleolar ankle fracture	45	Excisional biopsy of femur, humerus, pelvis, radius, skull, tibia or vertebrae	10
	43	Laminectomy for lesion of spinal cord or meninges	10
Below knee amputation		ORIF distal humerus	10
	43	ORIF tibial shaft	10
Hip arthroplasty, revision of one prosthesis only	43	Peritonsillar abscess drainage	10
Knee arthroplasty revision	43	Radical bone resection for tumor NOT maxilla, femur, humerus, pelvis, scapula or tibia	10
Posterior fusion of spine	43	Shoulder hemiarthroplasty	10
ORIF radius head or neck	39	Tibial osteotomy	10
ORIF talus		Total parotidectomy with facial nerve dissection	10
	34	Tympanoplasty with mastoidectomy	10
Renal transplant	34	Unicondylar knee arthroplasty	10
ORIF humerus	32	Total or unipolar hip arthroplasty	8
Oophorectomy unilateral or bilateral, complete or partial	30		8
Radical prostatectomy with staging lymphadenectomy	30	Radical hysterectomy with pelvic lymphadenectomy	7
ORIF shaft or supracondylar femur	29	Rejection transplant nephrectomy	7
Salpingectomy +/- oophorectomy, one or both sides, not for sterilization	29	ORIF radial shaft	6
Non-burn dressing changes	27		
	27		
Discectomy at more than one level	25		
Nephrectomy	25		

Major surgeries associated with a low risk of respiratory failure (continued).

Procedure	Count	Procedure	Count
Retroperitoneal lymph node resection	6	Multiple arthrodesis or tendon transfer for claw foot	S
Adrenalectomy, unilateral	S [†]	Open reduction of acromioclavicular dislocation	S
Amputation of hand through metacarpal bones	S	Open reduction of ankle dislocation	S
Anterior instrumentation 2 cervical vertebrae	S	Oral abscess drainage	S
Appendectomy with drainage of abscess	S	ORIF humeral condyles (elbow)	S
Bone graft femur, humerus, mandible, radius and ulna, tibia	S	ORIF medial malleolus	S
Bone graft to face for reconstruction maxilla, bilateral	S	Ovarian cystectomy unilateral or bilateral	S
Bronchoscopy with drainage of lung abscess or cavity	S	Partial amputation of penis	S
Cervical laminotomy	S	Percutaneous endoscopic gastrostomy	S
Cervical laminotomy, fusion and removal of intervert disc	S	Peritoneo-venous shunt placement	S
Cervico-thoracic-lumbar fusion of 2 vertebrae	S	Pharyngeal diverticulum resection +/-or cricopharyngeal myotomy	S
Complete amputation of penis	S	Prostatectomy retropubic, radical	S
Cross femoral prosthetic bypass graft	S	Prostatectomy, perineal subtotal	S
Cystorraphy for bladder injury or rupture	S	Radical bone resection for tumor of maxilla, femur, humerus, pelvis, scapula, tibia	S
Epistaxis control by anterior packing	S	Radical unilateral lymph node dissection	S
Esophagomyotomy for achalasia (Heller procedure)	S	Small bowel obstruction, non resective management	S
Excision of radial head	S	Suboccipital craniotomy for brain tumor	S
Femoral endarterectomy, unilateral	S	Superficial parotid lobectomy with nerve dissection	S
Frontal trephine sinusotomy	S	Thymectomy	S
Gastric bypass for morbid obesity	S	Thyroidectomy with neck dissection	S
Laminectomy for implantation of neurostimulator	S	Total cystectomy	S
Laparotomy for ectopic pregnancy	S	Total hip arthroplasty with removal of previous plates	S
Ligatn of ant ethmoid artery by Caldwell-Luc approach	S	Ulnar osteotomy	S
Lumbar subarachnoid-peritoneal-ureteral shunt	S	Unilateral iliofemoral bypass graft	S
Mastoidectomy, radical	S	Uterine suspension	S

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Minor surgeries associated with a high risk of respiratory failure.

Procedure*	Count
Cholecystectomy	831
Umbilical hernia	387
Diagnostic laparoscopy	100
Suspension micro-laryngoscopy	60
Permanent pacemaker implantation	59
Bronchoscopy	40
Direct diagnostic laryngoscopy	32
Implanted cardiac defibrillator implantation	30
Mediastinoscopy +/- bronchoscopy/ esophagoscopy/ gastroscopy	30
Stripping of long and short saphenous veins	30
Long or short saphenous vein stripping	20
Quadroscopy	18
Laryngoscopy and biopsy	15
Removal of peritoneal dialysis catheter	15
Axillary lymph node biopsy	10
Axillary dissection alone post breast surgery	10
Cervical lymph node biopsy	10
Implanted cardiac defibrillator testing	9
Pacemaker insertion	9
Anterior scalene lymph node dissection	S [†]
Biopsy of temporal or other artery	S
Bronchoscopy with lung biopsy	S
Bronchoscopy with removal of foreign body	S
Finger amputation proximal	S
Implanted cardiac defibrillator replacement	S
Laryngoscopy with foreign body removal	S
Mediastinoscopy	S
Removal anal condylomata	S
Removal extensive anal condylomata	S
Sinusotomy, maxillary	S
Complete varicose vein stripping	S
Varicose vein surgery	S

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Minor surgeries associated with a low risk of respiratory failure.

Procedure*	Count	Procedure	Count
Cataract extraction	2259	Dental procedure	75
Knee meniscectomy	1064	Tendon sheath ganglion	75
Carpal tunnel release	680	Nephrolithotomy (kidney stone removal)	73
Uterine dilatation and curettage	424	Anal fistula resection	65
Knee arthrotomy (Foreign body, osteochondritis)	424	Nasal polyp excision	60
Inguinal hernia repair	404	Ureterocele resection	60
Knee, hip or ankle arthroscopy	286	Modified radical mastectomy	59
Cystoscopy	247	Esophagogastroduodenoscopy	58
Hysteroscopy	215	Lumbar discectomy	57
Colonoscopy	214	Tubal ligation abdominal approach	55
Removal of vitreous body	190	Tympanoplasty	55
Transurethral resection of prostate	186	cystoscopy and urethroscopy	55
Ureteroscopy and stone manipulation	170	Incision and drainage of ischiorectal abscess	54
Reduction mammoplasty	159	Tendon release for tenosynovitis	50
Ureteroscopy	140	Ureteral stent insertion	50
Transurethral resection of bladder tumor	138	Excision of bone cyst, chondroma, exostosis	47
Cardioversion	120	NOT long bones	47
Breast biopsy	113	External ethmoidectomy	45
Shoulder arthrotomy (Foreign body, osteochondritis)	112	Strabismus surgery	45
Hardware removal	106	Subcutaneous mastectomy	45
Retinal reattachment	105	Laceration repair	40
Shoulder rotator cuff repair	105	Cystoscopy and transurethral resection of small bladder tumor < 0.5cm	38
Removal of skin/ subcutaneous lesion	103	Tunnelled catheter insertion	38
Vasectomy	100	Abdominal lipectomy	37
Circumcision	95	Incision and drainage perianal abscess	37
Urethral sling repair, vaginal approach	94	Insertion of permanent catheter for dialysis	37
Hemorrhoidectomy	93	Hydraulically operated erectile prosthesis, insertion	35
Hysteroscopic endometrial ablation	90	Ruptured quadriceps insertion repair	35
Transurethral resection of small bladder tumor	88	Tendon ganglion/ lesion excision, digits only	34
Anal fissurectomy	85	Suture/ excision of neuroma/ neurolysis digital or cutaneous nerve	33
Ulnar nerve transplantation	82	Keratoplasty, corneal transplant	32
Breast lumpectomy	80	Trabeculectomy for glaucoma	32
Dupuytren's contracture release	80	Uterine dilatation and curettage for spontaneous abortion	30
Myringotomy +/- Tympanostomy-tubes	79	Knee manipulation under anesthesia	30
		Pilonidal cyst or sinus excision, packing or primary closure	30

Minor surgeries associated with a low risk of respiratory failure (continued).

Procedure	Count	Procedure	Count
Closure of defect up to 6cm ² on ears, eyelids, lips and nose	28	Shoulder capsulorrhaphy for recurrent dislocation	20
Percutaneous Nephrostomy and stone manipulation	28	Split skin grafts up to 100cm ² , arms, legs, scalp, trunk	20
Incision and drainage of superficial localized infection, including pilonidal abscess	26	Toe amputation	20
Puncture aspiration of abscess or hematoma, cutaneous	26	Urethral stricture dilation, male, initial	20
Achilles tendon repair	25	cystocele repair	20
Fistulization of lacrimal sac into nasal cavity	25	urethroscopy with urethrotomy	20
Hallux rigidus arthroectomy	25	uterine myomectomy, vaginal approach	20
Breast lumpectomy/ partial mastectomy for malignancy	25	Anal sphincterectomy	19
Spermatocele excision	25	Toe arthroplasty	18
Toe arthrodesis	25	Excision/ Closure of lesion <5cm on head, neck, gen, hands, feet	17
Arthroscopy large joint followed by arthrotomy	24	Local excision penile skin lesion	17
Colonoscopy and polypectomy	24	Muscle biopsy	17
Rhinophyma excision	24	Cystoscopy and urethral dilation male	16
Suture/ excision neuroma/ neurolysis of major nerve	24	Ankle arthrotomy	15
Transurethral sphincterotomy male	23	Bilateral ethmoidectomy and polypectomy	15
Hydraulic urinary sphincter for incontinence, insertion	21	Excision of prepatellar bursa	15
Repair extensor tendon distal to wrist or ankle	21	Finger arthroplasty (1 joint)	15
Acromionectomy	20	Flexor tendon repair, single	15
Cystocele and rectocele repair	20	Hydrocele excision	15
Cystoscopy and needle biopsy of prostate	20	ORIF metacarpal	15
Cystoscopy and stone removal	20	Obliteration of sinuses intranasal	15
Diagnostic cystoscopy, subsequent	20	Partial excision of clavicle	15
Excision and repair of lesion on trunk, arms, legs	20	Tunneled central line	15
Excision of olecranon bursa	20	Endoscopic ureteric stent removal	14
Excision tunica vaginalis	20	Local flap repair axilla, face, feet, gen, hands, neck 6-19cm ²	14
Fasciotomy, radical, of hand	20	ORIF patella	14
Hydrocele repair	20	Penis prosthesis for hypospadias	14
Inguinal hernia repair with excision of hydrocele or orchiectomy	20	Removal of pin or wire (closed)	14
Ingrown nail removal	20	Linear closure laceration <2cm eyelid, ear, lip, nose	12
Insertion of secondary intraocular lens	20	Repair wound dehiscence	12
Knee synovectomy	20	Subcutaneous fasciotomy palm or sole	12
ORIF phalanges	20	Excision skin or subcutaneous lesion unusually complicated	11
Recurrent inguinal hernia repair	20	Simple wound repair	11

Minor surgeries associated with a low risk of respiratory failure (continued).

Procedure	Count	Procedure	Count
Anterior vitrectomy as a secondary procedure	10	Oral antral fistula closure by Caldwell-Luc sinusotomy	7
Cruciate ligament suture repair knee	10	Reduction mammoplasty unilateral	7
Cruciate or collateral ligament reconstruction knee	10	Autogenous arteriovenous fistula for dialysis	7
Cystoscopy and biopsy	10	Epididymectomy, unilateral	7
Elbow arthrotomy for drainage or removal of loose body	10	Hip arthrotomy for drainage or removal of loose body	7
Endometrial biopsy	10	Local flap repair trunk up to 6cm ²	7
Excision of lesion and closure eyelid, ear, lip nose 2-4cm ²	10	Vulvar biopsy	7
Excision of skin and subcutaneous tissue for suppurative hydradenitis	10	Abdominal lipectomy massive (>30cm vertical skin resection)	S [†]
Femoral hernia repair	10	Anal condylomata resection, subsequent	S
Finger amputation	10	Anal stenosis/ stricture dilation	S
Flexible sigmoidoscopy	10	Arthrography	S
Full thickness skin graft ear, eyelid, lip, nose	10	Arthroplasty 4 fingers	S
Hemodialysis arteriovenous bypass graft	10	Arthrotomy small joint upper extr for AV bypass for hemodialysis	S
Hyperhidrosis excision with extensive undermining	10		S
Inguinal superficial lymphadenectomy	10	Balancing breast surgery	S
Lumpectomy and axillary node dissection	10	Biopsy nasopharynx	S
ORIF metatarsal	10	Biopsy of skin/ subcut tissue	S
Percutaneous nephrostomy and stone manipulation	10	Biopsy oropharynx	S
Percutaneous nephrostomy and stone removal	10	Bladder tumor resection	S
Prepuce dorsal or lateral split	10	Capsulorrhaphy patella for dislocation	S
Rectocele repair	10	Carotid angiogram	S
Removal breast tissue expander and insertion of prosthesis	10	Cervix brachytherapy, initial	S
Revision of breast mound	10	Cervix conization with or without dilatation and curettage	S
Sentinel lymph node biopsy for breast neoplasm	10	Closed reduction femoral neck	S
Sentinel lymph node biopsy in melanoma	10	Closed reduction metacarpal	S
Simple complete mastectomy	10	Closed reduction of ankle dislocation	S
Tendon reconstruction with fascial graft	10	Closed reduction radial head or neck	S
Wrist arthroplasty	10	Closed reduction radial head or neck	S
Cervical brachytherapy, subsequent	9	Closed reduction radius and ulna	S
Metatarsal excision partial	9	Correction of penile curvature	S
Epididymis exploration	8	Cystoscopy and bladder dilation	S
Hip closed reduction	8	Debridement of small bones for osteomyelitis	S
Wrist fusion	8	Destruction of 25% of cervix for cancer	S

Minor surgeries associated with a low risk of respiratory failure (continued).

Procedure	Count	Procedure	Count
Drainage of breast abscess	S	Osteotomy lesser bones (fibula metatarsals etc.)	S
Drainage of infected bursa	S	Postpartum sterilization by any method	S
Elbow flexor plasty tendon repair	S	Proctosigmoidoscopy	S
Elbow synovectomy	S	Proctosigmoidoscopy and biopsy	S
Ethmoidectomy and antrotomy, bilateral	S	Partially buried catheter removal	S
Excision and repair head, neck, gen, hands, feet 5-10cm	S	Partially buried catheter revision	S
Excision lumbar intervertebral disc, with spinal fusion	S	Pectoralis to biceps tendon transfer (Clark's operation)	S
Excision of Baker's cyst	S	Percutaneous bile duct drainage	S
Excision of bursa upper extremity for tenosynovitis	S	Percutaneous thermocoagulation of trigeminal nerve, unilateral	S
Excision of complicated skin/subcutaneous lesions on face	S	Pilonidal cyst marsupialization	S
External ear exostoses excision multiple	S	Pilonidal sinus excision and plastic closure	S
External ear exostoses excision single	S	Polypectomy and antrotomy, unilateral	S
Extra corporeal shock wave lithotripsy	S	Posterior tympanotomy with ear reconstruction	S
Finger arthrodesis	S	Postpartum sterilization by any method	S
Foreign body subcutaneous tissue removal	S	Proctosigmoidoscopy	S
Full thickness skin graft to axilla, face, feet, gen, hands, mouth , neck	S	Proctosigmoidoscopy and biopsy	S
Gastroscopy	S	Prostate biopsy, needle	S
Hydrocele aspiration	S	Prostate brachytherapy seed implantation	S
Incisional biopsy of testis	S	Prostate brachytherapy unusually complicated	S
Internal urethrotomy	S	Pterygium excision	S
Keratotomy of cornea, any type	S	Radical mastectomy	S
Laceration repair face, scalp, neck genitalia, hands, feet < 5cm	S	Reconstruction mammoplasty with permanent prosthesis	S
Lacrimal duct and sac incision	S	Removal of hardware two incisions	S
Linear closure laceration 5-10cm trunk, arms legs	S	Removal of intraocular implant, unilateral	S
Local flap ears, eyelid, lip, nose 6-19cm ²	S	Removal of subareolar button male	S
Local flap repair arms, legs, scalp up to 6cm ²	S	Repeat fascial sling for incontinence with fascia	S
Lymph node biopsy NOT scalene, cervical or axilla	S	Repositioning of intraocular lenses	S
Marsupilaization/ drainage of liver cyst	S	Resection branchial cleft cyst or sinus, subcutaneous	S
Nose biopsy	S	Retinal reattachment subsequent operation	S
Orchiectomy, simple unilateral	S	Rhinoplasty complete	S

Minor surgeries associated with a low risk of respiratory failure (continued).

Procedure	Count	Procedure	Count
Scrotum unusually complicated	S	Tympanotomy, exploratory for deafness	S
Scrotum, drainage of abscess	S	Umbilical hernia	S
Skin and subcutaneous free flap	S	Urehtrotomy, external anterior	S
Stapedectomy with prosthesis, fenestration of oval window	S	Ureterolithotomy	S
Split thickness skin graft ears, face, feet gen, hands digits, neck up to 100cm ²	S	Ureteroscopy and stent insertion	S
Suture of sclera for wound or injury	S	Urethral stricture dilation, initial	S
Tendon lengthening or shortening	S	Varicocele excision, unilateral	S
Tendon sheath incision and drainage for tenosynovitis upper extremity	S	Vulva abscess incision and drainage	S
Tenotomy of hip adductors	S	Wrist arthrotomy for drainage or removal of loose body	S
Thyroglossal duct cyst excision	S		

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