

2019

Extended Stay Centers Guideline

Ambulatory Surgery Centers with Extended Stay
Centers: Appropriate Procedures and Patient
Characteristics



Oregon
Health
Authority
HEALTH EVIDENCE REVIEW COMMISSION

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Executive Summary

Extended stay centers (ESCs) are a new type of facility that will be licensed in Oregon according to the requirements of House Bill 4020 (2018). ESCs will operate in conjunction with (but as separate entities from) ambulatory surgery centers (ASCs). Patients may stay up to 48 hours (including time in the ASC), rather than the 24 hours currently allowed at an ASC.

HB 4020 also charged the Health Evidence Review Commission (HERC) with developing evidence-based guidelines regarding the patient characteristics and surgical procedures that may be appropriate for ambulatory surgical centers and extended stay centers and reporting a timeline and plan for implementing the guidelines to the Legislative Assembly during the 2019 regular session.

HB 4020 did not change the 24-hour limit on an ASC duration of stay. The requirements for ASC discharge status also have not changed. New Oregon Administrative Rules only require that the patient must be physiologically stable at the time of ESC admission and not in need of intensive monitoring or hospital-level care. The availability of ESCs should not have a major impact on the types of surgical procedures performed in the ASC setting, but ESCs may expand the range of patients eligible for ASC procedures.

The ESCs may be a useful option for patients who:

- Need extra time for managing pain or bodily functions,
- Do not have a caregiver at home, or
- May require extended travel time to return home after a surgical procedure.

Evidence Summary

Because of limited U.S. experience with ESCs or similar settings, no direct evidence exists regarding the effect these facilities may have on the safety and appropriateness of surgeries in an ambulatory setting. Existing data is either noncomparative or focused on patients and procedures that the authors consider appropriate for ambulatory surgery without ESCs or similar facilities.

Given these limitations of the published medical literature, HERC conducted searches on the safety of selected procedures performed in ASCs. The procedures included: knee replacement, hip replacement, mastectomy, bariatric surgery, spinal laminectomy, lumbar fusion, cholecystectomy, hysterectomy, transurethral resection of the prostate (TURP) and neck dissection. There was very low certainty evidence that these select surgical procedures can be safely performed in ASC settings and that ASC surgical outcomes may be similar to the same procedure when performed in a hospital outpatient setting (on the basis of historical controls). The evidence rating reflects a very high risk of bias in these studies related to patient selection and baseline differences in operative risk as well as incomplete methods for ascertaining outcomes. The generalizability of these findings is also limited because many of the studies reported single-center or single-operator experiences.

To develop evidence-based guidelines, more comparative outcome studies of ASC-based procedures vs. hospital-based procedures are needed for procedures that might be considered for ESC use, preferably with randomized assignment and standardized inclusion criteria. As ESCs are implemented, outcome studies comparing ASCs with and without ESCs with other settings would be the gold standard to

develop guidelines for appropriate procedures and patient characteristics. Although such research is unlikely to be funded, the Oregon Health Authority plans to resume collecting discharge data for ASCs and begin collecting discharge data on ESCs in the future. Analysis of these data, linked with other data to capture all outcomes related to patients seen in ESCs, could inform decisions about the need for more research on the impact of these facilities.

Surgical Risk Calculators

Using surgical risk calculators based primarily on hospital data, HERC reviewed hypothetical patient profiles for selected surgical procedures in an attempt to identify procedures and patient characteristics of acceptable risk, for which an ESC would potentially be beneficial in reducing rates of hospital transfer or the severity of complications. The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Surgical Risk Calculator, as well as several procedure-specific risk calculators, showed that complication rates, hospital readmission rates, and predicted lengths of stay tend to increase with patient age and the presence of medical conditions such as diabetes, hypertension, obesity, and congestive heart failure. It is possible that care for older or more complicated patients in an ESC could reduce hospitalization rates and provide a safe environment to address post-ASC complications. However, in the absence of data comparing ASC and hospital-based procedures, outputs generated from the surgical risk calculators do not allow us to quantify or predict these potential benefits, nor to predict any increased risk attributable to the ASC setting. The surgical risk calculators do not permit determination as to which complications (e.g., infection rates) might be reduced in rate or severity, or which patient conditions might benefit most from ESC availability. The surgical risk calculators appear to be useful for individual patient consultation and decision making (their intended use), but it is not possible to make specific policy decisions based on them.

Policies in Other States

Four other states license recovery care centers that are similar to Oregon ESCs, but no state monitoring or outcomes data was found to be publicly available for review. Accreditation standards for ASCs were reviewed, but there are no criteria specific for ESCs because this type of facility is new and not certified by the Centers for Medicare & Medicaid Services (CMS) for Medicare.

The Oregon Patient Safety Commission (OPSC) monitors adverse events through a voluntary reporting program that includes ASCs. The most common postsurgical adverse event reported for ASCs was unplanned hospital admission within 48 hours, followed by unplanned emergency department visit within 48 hours. The availability of ESCs may be beneficial in reducing these rates, and these rates can be monitored in the future. The current OPSC annual reports are not useful in developing guidelines for ASC-ESC use.

Conclusion

In summary, the evidence and supplemental resources currently available are indirect and insufficient to guide decisions on patient characteristics and surgical procedures that may be appropriate for ASCs and ESCs. HERC developed the following guideline:

In the presence of an ESC, the surgical services provided in an ASC should be for patients not requiring hospitalization and for whom the expected duration of services in the ASC would not

exceed 24 hours after an admission to the ASC. The presence of an ESC should not expand the surgical risk profile or the procedures permissible in an ASC. ESCs should be utilized for patients who need extra time for managing pain or bodily functions, who do not have a caregiver at home, or who may require extended travel time to return home after a surgical procedure.

Background

In 2018, House Bill 4020 was enacted into Oregon Revised Statutes. This bill provides for the licensing of ESCs, a new kind of facility that will be licensed in Oregon. ESCs will operate in conjunction with, but as separate entities from, ASCs. Patients could stay up to 48 hours (including time in an ASC), rather than the 24 hours maximum allowed at an ASC. Certain patients who would currently receive surgery in a hospital setting would have the option of receiving the surgery in an ASC. These patients might receive help with pain management, nausea, or other postsurgical symptoms that might be difficult or uncomfortable to receive in a home setting, but which would not require hospitalization.

House Bill 4020 requires the Health Evidence Review Commission (HERC) to develop “...evidence-based guidelines regarding the patient characteristics and surgical procedures that may be appropriate for ambulatory surgical centers and extended stay centers.” The effort to reduce costs and the improvement of surgical techniques led to the development of ASCs in the 1970s (Steinmann et al., 2018). ASCs are used for less complex surgeries where being without full access to the resources available in a hospital setting does not compromise patient safety (Steinmann et al., 2018). The first ASC opened in 1970 in Phoenix, AZ (Steinmann et al., 2018). Over the years, more types of surgeries have been allowed in ASCs because of improved anesthetic procedures and less invasive surgical techniques (California Orthopedic Association, 2017).

ASCs are only allowed to perform surgeries in cases when the patient is very likely to be discharged in less than 24 hours. Four states allow extended monitoring and pain management to occur in a recovery care center (RCC), which serves in a similar role to an ESC: Arizona, Colorado (licensed as convalescent centers), Connecticut, and Illinois. At least two other states have considered legislation to create RCCs, including Florida (Smernoff, 2017) and Washington (Washington State Senate Committee on Ways & Means, 2016).

Methodological Approach

Because of limited U.S. experience with ESCs or similar settings, no direct evidence exists regarding the effect these facilities may have on the safety and appropriateness of surgeries in such a setting. Existing data is either noncomparative or focused on patients and procedures the authors considered appropriate for ambulatory surgery without ESCs or similar facilities. In addition to reviewing these data, we used accepted surgical risk calculators to analyze surgeries and patient characteristics that could be considered in an ambulatory setting that wouldn't have been appropriate without an ESC.

A surgery would most likely be considered appropriate if risks for the patient are similar to the patients' risks described in observational data in ASCs or if the care available in an ASC-ESC combination would be sufficient to address these complications safely and without an emergency hospital transfer. By contrast, a surgery for a patient likely to experience severe complications that would be better addressed in a hospital would not be appropriate. In addition, if there is a significant risk that a stay beyond 48 hours will be needed, the surgery would not be appropriate for that patient in an ASC-ESC setting.

Evidence on Procedures Performed in Ambulatory Surgery Centers

We conducted searches on the safety of procedures performed in ASCs for knee and hip arthroplasty, mastectomy, bariatric surgery, spinal surgeries, cholecystectomy, hysterectomy, neck dissection, and transurethral resection of the prostate (TURP). Studies were included if the study compared outcomes in ASCs to other sites, or if the study assessed outcomes only in ASCs (noncomparative studies). Our search did not identify any studies of hysterectomy, neck dissection, or TURP performed in ASCs.

Across the procedures searched, there is very sparse evidence comparing ASCs to other sites of care. In addition, there is evidence from noncomparative studies (case series) reporting outcomes for surgeries occurring in ASCs; often these case series do not specify whether the surgery occurred in an ASC or an outpatient hospital. Case series are subject to selection bias.

Knee and Hip Arthroplasty

For knee and hip arthroplasty procedures, the search identified the following two studies that compared outcomes by site of care.

Cody et al., 2018

The study by Cody et al. compared outcomes for unicompartmental knee arthroplasty (UKA) performed at either an ASC or as a hospital outpatient procedure (HOP). All patients undergoing this procedure with a single surgeon between 2012 and 2016 were included in the retrospective analysis. Medial and lateral unicompartmental procedures were included. The site of the procedure was determined by the patients' preferred date for surgery, operating room availability, and insurance coverage. Anesthesia and procedural characteristics were the same regardless of the site of care. In the overall analysis, there were 288 ASC procedures and 281 HOP procedures. Patient characteristics were similar at both sites; the mean age was 63 years, the mean BMI was around 30, and there were slightly more women than men. The overall 90-day complication rate was 5.3% and did not significantly differ between ASC (4.2%) and HOP (6.4%) ($p = 0.26$). There were no statistically significant differences in the rates of early deep infection, emergency department visits, or hospital admissions at 90 days. The authors concluded that UKA can be safely performed in both ASC and HOP settings.

Browne et al., 2008

The study by Browne et al. is a prospective cohort comparing patients undergoing a variety of procedures at one of six Independent Sector Treatment Centers (ISTCs) or a National Health Service (NHS) hospital in England between 2006 and 2007. The authors included 323 NHS and 187 ISTC knee replacements in their analysis. Patients who were treated at NHS hospitals were more likely to report fair or poor health, to have undergone previous similar surgery, have any comorbidity, and have higher deprivation scores compared to those treated in ISTCs. Overall, 85% of ISTC patients and 87% of NHS patients rated their surgery as successful; after adjusting for baseline differences, there remained no statistically significant difference in patient-reported outcomes for knee replacement at either site. However, the overall rate of complications was greater at NHS facilities compared to ISTCs even after adjustment for baseline risks (adjusted odds ratio [aOR] 0.43, 95% CI 0.27 to 0.69, $p < 0.001$); wound infections (aOR 0.50, 95% CI 0.28 to 0.90, $p = 0.02$), urinary problems (aOR 0.51, 95% CI 0.29 to 0.88,

p = 0.02), and adverse drug reactions (aOR 0.65, 95% CI 0.43 to 0.97, p = 0.02). All complications occurred less often in the ISTC group, but bleeding complications were not significantly different between sites (aOR 0.45, 95% CI 0.14 to 1.4, p = 0.2). The authors cautioned that their risk adjustment model had poor predictive power, and therefore was unlikely to fully account for baseline differences between the ISTC and NHS groups.

The study authors included 291 NHS and 184 ISTC hip replacements in their analysis. Patients who were treated at NHS hospitals were more likely to report fair or poor health, to have undergone previous similar surgery, have any comorbidity, and have higher deprivation scores compared to those treated in ISTCs. Overall, 98% of ISTC patients and 92% of NHS patients rated their surgery as successful. Patients treated in ISTCs had statistically significantly better patient-reported outcomes on the EQ-5D and Oxford hip scale, and these differences remained significant after adjusting for baseline differences. There was no statistically significant difference in the overall rate of complications between patients treated in an ISTC and those treated at an NHS facility (aOR 0.87, 95% CI 0.52 to 1.5), and none of the specific complications varied significantly between the groups.

Our search identified the following five noncomparative studies of knee and hip arthroplasty procedures.

Berend et al., 2018

This is a brief report of the outcomes of outpatient arthroplasty procedures performed at a single ASC in Indianapolis. No methods were described, but the study reported outcomes of 1,230 arthroplasty cases performed in a two-year period. The authors did not provide information on patient characteristics. The procedures were partial knee arthroplasty, total knee arthroplasty, total hip arthroplasty, and unspecified selected revision procedures, although the authors did not provide details on the number of procedures by type. They observed that the overall readmission rate among these patients was 2%, but did not describe any methods for ascertaining the outcome of readmission. The authors observed that patient satisfaction was high: 98% of respondents rated their experience as good or great. However, neither the patient satisfaction survey instrument nor the survey response rate were described.

Parcells et al., 2016

This is a retrospective case series of 51 consecutive patients undergoing total joint arthroplasty in an ASC between 2012 and 2014. All of the procedures were performed by one of three surgeons. Among the included cases, there were 22 total hip arthroplasties, 14 TKAs, and 14 UKAs. Across the three procedures, patients had a mean age ranging from 55 to 61 years, mean BMI of 29 to 32 kg/m², and mean American Society of Anesthesiologists (ASA) classification of 1.9 to 2.2. The mean follow-up period was 15 months. The authors stated that outcomes were ascertained using a uniform patient follow-up protocol, but did not provide additional details. The average operative time was about 130 minutes for all procedures. Average time from admission to discharge ranged from 371 minutes in the UKA group to 426 minutes in the TKA group. Adverse events were mild and predominantly related to nausea and vomiting (31% of patients). All but one of the patients were discharged to their homes within 24 hours of admission; one was discharged to a rehabilitation facility within 24 hours. There were no infections or cardiac or thromboembolic complications at up to 90 days of follow-up.

Berend et al., 2018

This is a retrospective case series describing outcomes for 1,279 patients who underwent 1,427 total hip arthroplasties at an ASC between June 2013 and December 2016. The mean age of the patients was 57 years old, the mean BMI was 30 kg/m², and 54% were men. Patients eligible for ASC procedures had to have “appropriate medical insurance” and had to be functionally independent. Patients with heart failure, chronic obstructive pulmonary disease (COPD), untreated obstructive sleep apnea, hemodialysis, anemia, cerebrovascular accident, or delirium were excluded if these conditions could not be optimized prior to the procedure. At baseline, 3.4% of patients had coronary disease, 14.8% had an arrhythmia, 1.9% had venous thromboembolism, 11.6% had OSA, 8.4% had COPD, 8% had asthma, and 14.7% had urinary frequency. Overall, 87 (5.9%) of patients required overnight 23-hour observation; in 39 cases this was for patient convenience, and the remaining overnight stays were for medical observation of urinary retention, OSA, nausea and vomiting, hypoxemia, or pain. Within 48 hours after the procedure, five patients (0.3%) had major complications, and three required transfer to a hospital (two cases of atrial fibrillation and one case of anemia requiring transfusion). Beyond 48 hours, six patients had unplanned care needs arise (one case each of ileus, urosepsis, diverticulitis, fall, urinary retention, and chest pain), and one additional patient died. At 90 days there were 21 surgical complications (11 wound revisions, 5 incision and drainage procedures, 4 periprosthetic fractures, and 1 dislocation). The authors calculated the overall complication rate per case as 2.2% (32/1,472). When analyzed by the comorbidities present at baseline, patients with coronary disease, COPD, asthma, or urinary frequency all had a statistically significant increase in the risk of requiring overnight observation; the presence of any comorbidity increased the risk of overnight observation (RR 2.34, 95% CI 1.3 to 4.1).

Toy et al., 2018

This is a retrospective case series describing outcomes for 125 consecutive patients undergoing 145 total hip arthroplasty procedures performed in a three-year period by a single surgeon at two ASCs. Patients were ineligible to have their procedure at an ASC if they were over the age of 70, had a BMI greater than 35 kg/m², a history of thromboembolic events, or had undergone cardiac stenting or bypass surgery in the prior six months. The average age of patients was 55 years and the average BMI was 29.7 kg/m². Outcomes were ascertained at follow-up visits at two weeks, six weeks, and three months after the procedure. Overall, 16 patients had overnight stays at the ASC, but 10 of these were preplanned. One patient required transfer to a hospital for blood transfusion. Other complications were also uncommon: there was one case of persistent drainage requiring debridement, one periprosthetic fracture, one superficial wound revision, and one prosthetic hip dislocation that was treated in the emergency department.

Klein et al., 2017

This is a retrospective case series describing 90-day outcomes for 549 consecutive patients undergoing mini-posterior total hip arthroplasty at an ASC between 2008 and 2014. The average age of the patients was 54.4 years and the majority (68%) were men. The average ASA score was 1.6 and the average BMI was 28 kg/m². None of the patients required an overnight ASC stay after their procedure, but three patients (0.5%) were transferred to a hospital (one for pain control, one for unstable hardware on x-ray, and one for an acute exacerbation of polyarticular arthralgias with hypotension and bradycardia). One additional patient was seen in an emergency department for excessive sedation from opioid medications. In addition, the following complications were reported at an average of 630 days of follow-

up: hematoma requiring incision and drainage (6%), infection (0.9%), dislocation (1%), and venous thrombosis (0.5%). The authors observed that the rate of hematoma declined after the first 100 procedures performed.

Mastectomy

For breast procedures, including mastectomy, we identified two studies comparing ASCs to other sites of care.

Trentman et al., 2010

The study by Trentman et al. in 2010 used a natural experiment to compare procedures performed at an ASC to hospital outpatient procedures. In 2005, the authors of the study closed their ASC and began performing procedures at a hospital. The authors compared 92 consecutive patients undergoing breast procedures at the ASC between 2004 and 2005 to 92 consecutive patients who had their procedures performed as hospital outpatients beginning in 2006. All of the patients underwent segmental mastectomy with or without radioactive seed localization, sentinel lymph node biopsy, or axillary dissection. Total mastectomies and bilateral procedures were excluded. All procedures were performed by one of two staff surgeons. The average age of the patients was around 65 years old. Cases performed at the ASC used higher doses of intraoperative fentanyl and were more likely to be managed with propofol and laryngeal mask airways than procedures performed at the hospital. Overall, the preoperative time interval was shorter at the ASC (75 minutes vs. 130 minutes, $p < 0.001$) and the total facility time was also shorter at the ASC (343 minutes vs. 412 minutes, $p < 0.001$). There were no serious perioperative complications in either group, and no patients required hospital admission.

Parikh et al., 2016

The study by Parikh et al. compared the risk of surgical site infection in breast procedures by facility type. The authors performed a retrospective cohort study using data on 110,987 outpatient breast procedures between 2010 and 2014 with complete data in the National Healthcare Safety Network database. This database, maintained by the Centers for Disease Control and Prevention, received records from 139 ASCs and 242 hospitals during the study timeframe. The procedures included in this analysis were mastectomy, lumpectomy, incisional biopsy, and mammoplasty. The primary outcome of interest was any type of surgical site infection within 90 days of the procedure. An unconditional multivariate logistic regression analysis was done to compare the risk of surgical site infection by facility type. The case mix between ASCs and hospitals was adjusted for age, use of anesthesia, ASA class, duration of procedure, gender, wound category, and the year the procedure was done. After adjustment, the age-stratified risk ratio for surgical site infection at ASCs was 0.36 (95% CI 0.25 to 0.50, $p < 0.0001$) for patients age 51 or under, and 0.32 (95% CI 0.21 to 0.49, $p < 0.0001$) for patients older than age 51. In addition to potential inadequate control for confounding, the authors noted that there could have been differential rates of outcome ascertainment based on the facility type.

Bariatric Surgery

Three noncomparative studies were identified for bariatric surgery performed in ASCs.

Billing et al., 2017

This is a retrospective case series describing outcomes for 120 “high acuity” patients undergoing sleeve gastrectomy in a freestanding ASC. These patients were deemed “high acuity” because of age greater than 65 years (n = 33), male patients with BMI greater than 55 kg/m² (n = 8), female patients with BMI greater than 60 kg/m², 72 patients with a history of previous bariatric surgery, and four patients with a history of prior fundoplication. Overall, the mean age of patients was 52 years and the mean BMI was 42.4 kg/m². The mean operative time was 91 minutes. Overall, there were seven complications within 30 days (two portal vein thromboses, two postoperative bleeds, one intra-abdominal abscess, one intraabdominal hematoma, and one infected hematoma). Five patients required readmission within 30 days (4.2%) and an additional patient was transferred from the ASC to a hospital for an active arterial bleed requiring emergent reoperation. All but one of the complications occurred in a patient undergoing conversion of a gastric band to sleeve gastrectomy. The authors observed that these complication rates are similar to those reported for low risk patients.

Sasse et al., 2009

This is a retrospective case series describing outcomes for 38 patients undergoing laparoscopic Roux-en-Y gastric bypass (RYGB) and 210 patients undergoing laparoscopic adjustable gastric banding (LAGB) at an ASC. All of the patients were described as “highly selected,” meaning that they were approved by the ASC surgeon, anesthetist, and medical director; had no history of pulmonary hypertension; were ASA class 1 to 3; and had no or well-controlled sleep apnea. In the RYGB group, the mean age was 46 years, 89% were women, and the mean BMI was 44.71 kg/m². In the LAGB group, the mean age was 46 years, 82% were women, and the mean BMI was 43.79 kg/m². The mean operative time was 112.8 minutes in the RYGB group and 72 minutes in the LAGB group. Mean length of stay was 22 hours and 45 minutes in the RYGB group and seven hours and 18 minutes in the LAGB group. The 30-day complication rate was 2.6% in the RYGB group (one case of small bowel obstruction) and 1.9% in the LAGB group (one case of infected port/band and three cases of gastric pouch outlet obstruction). There were no deaths within 30 days in either group.

Watkins et al., 2008

This is prospective case series of 2,411 patients undergoing LAGB, of whom 84% had their surgery performed at an ASC. Overall, the mean age was 44 years, 83% were women, and the mean BMI was 45.7 kg/m². There were 241 total complications (9.9%) including one death. The majority of complications were due to band slippage, port problems, or the need for pouch dilation; other complications included wound infections, pulmonary embolism, gastric edema, and need for band explanation. In reporting these complications, the authors did not separately report the rates of complications for the ASC compared to other sites.

Spinal Surgeries

We identified three comparative studies for spinal surgeries.

Chin et al., 2017

This is a retrospective cohort study comparing outcomes for 30 patients who underwent posterior lumbar fixation using cortical bone trajectory pedicle screws in an outpatient surgical center to 30 patients who underwent an inpatient lumbar fusion with traditional pedicle screws. The study methods

did not describe how the groups were assembled. All of the procedures were performed by a single surgeon. Patients were considered for surgery if they had greater than six months of lumbar pain despite conservative measures and the presence of disk herniation, degenerative disk disease, spinal stenosis, or chronic low back pain with or without radiculopathy or spondylolisthesis. Patients with trauma, fractures, malignancy, infection, unstable comorbidities, prior lumbar fusion, or BMI in excess of 42 kg/m² were excluded. Overall, the average age of patients was 58 years and the average BMI was 29 kg/m²; the average age was 48 in the outpatient group compared to 62 in the inpatient group, but the average BMI was similar in both groups. In the outpatient group at two-year follow-up, visual analog scale (VAS) back pain scores improved from 7.8 preoperatively to 2.5, VAS leg pain scores improved from 4.2 to 0.2, and Oswestry Disability Index (ODI) scores improved from 40.8 to 28.7 (all differences statistically significant at $p < 0.05$). In the inpatient group at two-year follow-up, VAS back pain scores improved from 7.2 preoperatively to 5.9, VAS leg pain scores improved from 5.0 to 1.9, and ODI scores improved from 44.6 to 32.5; in this group, ODI score improvement was the only statistically significant outcome. Complications were not specifically reported, but the mean estimated blood loss in the outpatient group was 152 mL compared to 319 mL in the inpatient group.

Chin et al., 2016

This is a retrospective cohort study comparing outcomes for 40 inpatients and 30 ASC outpatients undergoing lateral lumbar interbody fusion. All of the cases were performed by a single surgeon. Eligible patients had chronic low back pain due to degenerative disk disease or low-grade spondylolisthesis and had not responded to six months of conservative therapy. Patients were also required to have a BMI less than 42 kg/m², be ASA class 1 to 3, and have stable comorbid conditions. Patients with malignancy, infection, major acute trauma, history of pulmonary embolism, or prior lumbar surgery were excluded. The average age in the hospital group was 58 years compared to 60 years in the ASC group. The average BMI in the hospital group was 30.7 kg/m² compared to 28.4 kg/m² in the ASC group. In the ASC group at final follow-up (mean time not given), the VAS score improved from 7.3 to 4.1 ($p = 0.045$) and the ODI improved from 45.21 to 39.1 ($p = 0.368$). In the hospital group, the VAS score improved from 7.8 to 4.8 ($p = 0.004$) and the ODI increased (indicating worsened function) from 48.5 to 55.5 ($p = 0.398$). Operative time was lower in the ASC group (average difference 127 minutes), as was estimated blood loss (average difference 87 mL). The authors observed that complication rates were higher in the hospital group. For both groups, new onset dermatomal numbness was the most common complication, occurring in 20% of the hospital group and 7% of the ASC group; three patients in the hospital group also complained of weakness. The neurological complaints resolved more quickly in the ASC group (average of three months) than in the hospital group (average of six months).

Villavicencio et al., 2013

This is a retrospective cohort study comparing outcomes of transforaminal lumbar interbody fusion for 27 patients treated in an ASC and 25 patients treated in a hospital outpatient department. Patients were deemed eligible for outpatient surgery based on multiple factors including age, comorbid conditions, home support, travel distance, and personal preference. The mean follow-up time after the procedures was 25 months. The mean age of patients was 50 years and there were slightly more men than women. More patients in the hospital outpatient group had undergone previous spinal surgery (48%) than in the ASC group (26%). The surgical procedures also varied at the sites: 72% of hospital procedures used an open approach, and 81% of ASC procedures used a mini-open approach. The mean operative time was

146 minutes at the ASC and 196 minutes at the hospital; the estimated blood loss was 73 mL at the ASC and 179 mL at the hospital. The mean recovery time at the ASC was 4.4 hours compared to 21.5 hours at the hospital. The authors reported similar levels of pain relief and patient satisfaction in both groups. No ASC patients required hospital transfer. Four ASC patients (14%) had a complication (uncontrolled pain, wound infection, constipation, cerebrospinal fluid leak) within seven days of surgery compared to one hospital patient (4%) who had delirium tremens. Over the entire follow-up period, there were nine complications in the ASC group (33%) compared to three complications in the hospital group (12%). The average reimbursement to the ASC was \$18,420, but when implant and recombinant bone morphogenetic protein-2 were included, the average ASC reimbursement increased to \$29,983; the average reimbursement for hospital procedures was not reported.

Our search identified one systematic review and two individual noncomparative studies of spinal surgeries performed in ASCs.

Sivaganesan et al., 2018

This is a review of 39 studies examining the outcomes of various spine procedures performed at ASCs or outpatient surgery centers. The authors did not distinguish between these two sites of care in their analysis. The included studies were mainly retrospective cohort studies and case series. Quality assessment of the included studies was not reported.

- The authors identified 19 studies reporting on outcomes for anterior cervical discectomy and fusion:
 - 15 studies reported morbidity rates ranging from 0% to 5.2%
 - Five studies reported hospital transfer rates ranging from 0% to 6%
 - Nine studies reported readmission rates ranging from 0% to 5.4%
 - Four studies reported patient satisfaction rates ranging from 86% to 100%
- The authors identified 2 studies reporting on outcomes for anterior cervical arthroplasty:
 - Two studies reported morbidity rates ranging from 0% to 10.9%
 - Two studies reported hospital transfer rates of 0%
 - One study reported a readmission rate of 0%
 - One study reported a patient satisfaction rate of 100%
- The authors identified three studies reporting on outcomes for posterior cervical foraminotomy:
 - Three studies reported morbidity rates ranging from 0% to 2.2%
 - Three studies reported hospital transfer rates of 0%
 - One study reported a readmission rate of 0%
 - Three studies reported patient satisfaction rates of 90% to 94%
- The authors identified nine studies reporting on outcomes for lumbar laminectomy or microdiscectomy:
 - Nine studies reported morbidity rates ranging from 0% to 6.9%
 - Eight studies reported hospital transfer rates ranging from 0.6% to 6.6%
 - Two studies reported readmission rates ranging from 0% to 1%
- The authors identified seven studies reporting on outcomes for minimally invasive transforaminal lumbar interbody fusion and direct lateral lumbar fusion:
 - Seven studies reported morbidity rates ranging from 0.5% to 14%
 - Four studies reported hospital transfer rates ranging from 0% to 9.4%
 - Three studies reported readmission rates ranging from 0% to 5.7%

Smith et al., 2016

This is a retrospective case series describing outcomes for 72 consecutive patients undergoing lumbar interbody fusion procedures at a freestanding ASC. Of these patients, 54 had an extreme lateral interbody fusion (XLIF) and 18 had medicalized posterolateral fusion (PLF). The average age of the XLIF group was 50 years, 31% were women, the mean BMI was 28.8 kg/m², and 39% had undergone prior thoracic or lumbar spinal surgery. The average age in the PLF group was 53 years, 67% were women, the mean BMI was 28.2 kg/m², and 17% had undergone previous lumbar surgery. For the XLIF patients, the mean operative time was 86 minutes and the estimate blood loss was 71 mL; these figures were not reported for the PLF group. Two patients in the XLIF group required hospital transfer, one for urinary retention and one for uncontrolled pain. There were also two emergency department visits in the XLIF group, one for postoperative fever and one for testicular torsion. There were no reoperations in the XLIF group. In the PLF group, there were no complications observed and no transfers to the hospital.

Chin et al., 2015

This is a retrospective case series describing outcomes for 16 consecutive patients undergoing open single-level posterior lumbar interbody fusions at a freestanding ASC. Patients were eligible for inclusion if they had chronic disabling low back pain due to degenerative disc or facet disease or grade 1 spondylolisthesis with foraminal stenosis. ASA class 4 patients were excluded. In addition, eligible patients had to live within 30 minutes of a hospital, have a BMI less than 42 kg/m², and a responsible adult to provide care for up to two hours after the procedure. The mean age of included patients was 43 years, 56% were men, and the mean BMI was 28.95 kg/m². The mean operative time was 125 minutes and the mean estimated blood loss was 161 mL. At final follow-up (not specified), the mean VAS score improved from 8.4 to 4.96 ($p = 0.001$) and the mean ODI improved from 52.71 to 37.43 ($p = 0.04$). There was one postoperative complication of pain and incision site tenderness, possibly due to aseptic or infectious discitis.

Cholecystectomy

We identified two comparative studies of cholecystectomy.

Rosero et al., 2017

This is a linked database study that describes the incidence of readmission after ambulatory laparoscopic cholecystectomy. It relies on data from three states (California, Florida, and New York) that are submitted to the State Ambulatory Surgery and Services Database and the State Inpatient Database. Both databases are maintained by AHRQ. Outpatient laparoscopic cholecystectomy cases performed between January 1, 2009 and November 30, 2011 were included. The authors identified 230,745 encounters for ambulatory laparoscopic cholecystectomy across 890 ambulatory facilities (these were not necessarily specified to be ASCs). Patients were predominantly women (75%), middle-aged (approximately half were ages 40-64), and had few comorbidities (77% had a Charlson comorbidity index of zero). Roughly two-thirds of the patients had private insurance, but slightly more than 10% were covered by Medicaid. There were 127 patients (0.6 per 1000 discharges) who required transfer directly from the ambulatory facility to the hospital; these patients were more likely to have acute cholecystitis (15% vs. 9%, $p < 0.0001$). At 30 days postprocedure, 4,675 patients (20.2 per 1,000 discharges) were readmitted to a hospital; 11% of those readmissions occurred within 24 hours of discharge. Surgical complications, pain, nausea, and infection accounted for about two-thirds of the

readmissions. Reoperation was required for 147 patients (0.64 per 1,000 discharges), and endoscopic procedures to relieve bile duct obstruction were required for 903 patients (3.9 per 1,000 discharges). The incidence of inpatient mortality for readmitted patients was 8.5 per 1,000 hospitalizations. Characteristics associated with a greater likelihood of readmission were weekend procedures, older age, male sex, non-Hispanic white ethnicity, and the presence of comorbid conditions (hypertension, heart disease, diabetes, COPD, renal failure, cancer, or liver disease). The use of intraoperative cholangiography was associated with a reduced likelihood of readmission.

Paquette et al., 2008

This is a retrospective cohort study comparing outcomes for laparoscopic cholecystectomies performed at hospital outpatient facilities or ASCs. The authors identified 40,040 outpatient laparoscopic cholecystectomies performed in Florida between 2002 and 2003 using the AHRQ State Ambulatory Surgery Database. Of the 40,040 procedures identified, 38,544 were performed in hospital outpatient facilities and 1,496 were performed in ASCs. Compared to the hospital patients, ASC patients were younger, more likely to be Caucasian, and were less likely to have acute cholecystitis. ASC patients were also significantly less likely to have a history of coronary artery disease, hypertension, pulmonary disease, diabetes, or liver disease. Overall, 95.8% of ASC patients had a Charlson comorbidity index of zero compared to 85.2% of hospital patients. The rate of conversion to open cholecystectomy was not significantly different between the two groups (0.72% at ASCs vs. 0.95% at hospitals). Greater than 99% of patients in both groups were discharged home on the same day of the procedure, but 0.3% of hospital patients were admitted compared to 0% of the ASC patients. After controlling for case mix, the mean procedure charges were lower in ASCs (\$6,028) than in hospitals (\$10,876).

Four noncomparative studies were identified for cholecystectomy performed in ASCs.

Wenner et al., 2006

This is a retrospective case series describing outcomes for 338 patients undergoing laparoscopic cholecystectomy at a single ASC between 1999 and 2003. Most patients were women (80%) and the average age was roughly 44 years. Most patients were ASA class 2 (79%) or ASA class 1 (15%); the remaining patients were ASA class 3. The median operative time was 46 minutes. None of the cases were converted to open procedures. There were no cases of bile duct injury. There were three cases (0.9%) of postoperative bile leak. Six patients (1.78%) required hospital admission for various reasons including pleuritic chest pain, pancreatitis, subhepatic abscess, and three bile leaks. The authors observed that the cost of cholecystectomy at their ASC ranged between \$4,000 and \$6,000 compared to roughly \$16,000 in the local hospital.

Voyles et al., 1999

This is a retrospective case series describing outcomes for the first 100 patients undergoing cholecystectomy in a freestanding ASC. Patients were deemed to be ideal for ASC procedures if they presented for elective cholecystectomy with normal liver function tests, no common bile duct dilation, and age under 65, but these criteria were not strictly applied. All but one of the ASC procedures were successfully completed; one patient was transferred from the ASC to a hospital for an open cholecystectomy when the initial findings at laparoscopy suggested malignancy. The mean operative time was 29.1 minutes. The authors reported that there were no conversions to open procedures, no biliary or bowel complications, and no need for blood transfusions. Most patients (n = 74) were

discharged the same day, and the remaining patients were discharged the next morning. The authors observed that the cost for cholecystectomy at their ASC was \$2,990 compared to more than \$4,000 when performed at the hospital.

Farha et al., 1994

This is a retrospective case series describing outcomes for 55 patients undergoing laparoscopic cholecystectomy in a single freestanding ASC between 1992 and 1993. Patients were eligible if they were undergoing elective cholecystectomy for biliary colic. The mean age of patients was 42 years, and 82% were women. Four of the patients had additional procedures (mainly hernia repairs) done at the time of surgery. The mean operative time was 75 minutes. The mean recovery time was 252 minutes, excluding patients who had additional procedures. Four patients (7%) required overnight admission to a hospital for various reasons (myocardial infarction, need for intravenous antibiotics, bradycardia, and nausea). One additional patient was admitted one week after the procedure for right upper-quadrant pain, but was discharged after an unremarkable work-up. The authors observed that the cost for cholecystectomy at their ASC was \$2,300 compared to more than \$6,500 when performed at the hospital.

Reddick et al., 1992

This is a retrospective case series describing outcomes for 158 patients undergoing laparoscopic cholecystectomy at 24 freestanding surgical centers from June to November 1991. The procedures were performed by one of 36 general surgeons, and participating surgeons had to have performed at least 25 laparoscopic cholecystectomies prior to the beginning of the study. Patients with signs or symptoms of acute cholecystitis were excluded, as were those with previous abdominal surgery, age over 75 years, cardiac or pulmonary disease, or the use of chronic medications that would delay early discharge. Most patients (84%) were under age 55. The mean operative time was 90 minutes. There were no conversions to open procedures. Most patients (60%) were discharged on the day of the procedure; the remainder were discharged after an overnight stay in the ASC. No patients required hospital transfer and there were no readmissions.

Evidence Summary

The paucity of data directly comparing the outcomes of procedures performed at ASCs to procedures performed at hospital outpatient facilities makes it difficult to draw conclusions about the relative safety or efficacy of ASC-based surgical procedures. There is very low-certainty evidence, mainly from noncomparative studies of ASC outcomes, that several surgical procedures can be safely performed in ASC settings and that ASC surgical outcomes may be similar to those of the same procedure when performed in a hospital outpatient setting (on the basis of historical controls). The evidence rating reflects a very high risk of bias in these studies related to patient selection and baseline differences in operative risk, as well as incomplete methods for ascertaining outcomes. The generalizability of these findings is also limited because many of the studies reported single-center or single-operator experiences. Studies that compared hospital outpatient and inpatient procedures were more numerous, but such studies did not directly address the comparative outcomes associated with the use of ASCs and were not summarized for this evidence review.

Surgical Risk Calculators

Currently available surgical risk calculators are based primarily on hospital data (i.e., they are not specific to procedures performed in ASCs), and the inputs do not include the possibility of care in an ESC.

Nevertheless, hypothetical patient profiles were reviewed for selected surgical procedures, including healthy individuals and those with various medical conditions, in an attempt to identify procedures and patient characteristics of excessive risk level, for which the ASC-ESC combination might not be appropriate. Alternatively, situations with acceptable risk might be identified in which an ESC would potentially be beneficial in reducing rates of hospital transfer or the severity of complications.

The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Surgical Risk Calculator <https://riskcalculator.facs.org/RiskCalculator/> was selected as having the most useful outputs, including predicted length of stay and rates of complications, hospital readmission, and return to the operating room. However, for purposes of developing Oregon ESC guidelines, our ability to draw conclusions from the ACS NSQIP calculator was limited by risk-scoring based on hospital procedure data, and by not accounting for geographic variation (e.g., East Coast lengths of stay are generally longer than West Coast). For example, “two days” is the risk calculator-predicted length of stay for healthy patients younger than 65 undergoing total knee or total hip arthroplasty, yet these procedures are now routinely performed in Oregon ASCs where the 24-hour limit applies.

For all of the surgical procedures that were reviewed, complication rates, hospital readmission rates, and predicted lengths of stay tended to increase with patient age and with the presence of medical conditions such as diabetes, hypertension, obesity, and congestive heart failure. It is possible that care for older and sicker patients in an ESC could reduce hospitalization rates and provide a safe environment to address post-ASC complications. For example, in situations where the predicted length of stay is 1.5 days, an ESC admission might appropriately reduce the need for inpatient hospitalization. However, in the absence of data comparing ASC and hospital-based procedures, outputs generated from the surgical risk calculators do not allow us to quantify or predict these potential benefits. Risk calculator results do not allow us to draw conclusions as to which procedures might be safer with ESC care, which complications might be reduced (e.g., infection rates), or which patient conditions might benefit most from ESC availability. Older patients with multiple comorbid conditions are likely not appropriate candidates for ASC procedures, with or without the presence of an ESC. We are unable to develop specific ASC-ESC guidelines based on the use of available surgical risk calculators.

Procedure-specific surgical risk calculators show trends that are similar to those demonstrated in the more general ACS risk calculator. Using the SpineSage calculator for spinal surgeries, for example, as patient age and complexity of medical status increase, and as the “surgical invasiveness” of the procedure increases, the rates of complications (including infections and dural tears) also increase. But these risk calculators do not compare ASC rates with hospital-based rates, and they do not permit determination as to any benefit versus increased risk attributable to the ASC setting. In addition, they do not provide help in deciding whether or not the presence of an ESC would be beneficial in reducing the rate or severity of complications. The surgical risk calculators appear to be useful for individual patient consultation and decision-making (their intended use), but it is not possible to make specific policy decisions based on them.

Table 1 presents the characteristics of five selected general surgical risk calculators:

- American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Surgical Risk Calculator - <https://riskcalculator.facs.org/RiskCalculator/>
- National Confidential Enquiry into Patient Outcome and Death (NCEPOD) Surgical Outcome Risk Tool - <http://www.sortsurgery.com/>
- Revised Cardiac Risk Index for Pre-Operative Risk - <https://www.mdcalc.com/revise-cardiac-risk-index-pre-operative-risk>
- Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity (POSSUM) - <https://www.mdcalc.com/possum-operative-morbidity-mortality-risk>
- Surgical Apgar Score for postoperative risk - <https://www.mdcalc.com/surgical-apgar-score-sas-post-operative-risk>

Appendix B contains output from the ACS NSQIP calculator for hypothetical patients undergoing the procedures selected for the evidence review.

Table 1. General Surgical Risk Calculators

Risk Calculator	Intended Use	Inputs	Outputs
ACS NSQIP Surgical Risk Calculator	General preoperative risk prediction	Procedure Age Sex Functional status Procedure urgency ASA class Chronic steroid use Ascites in past 30 days Sepsis within 48 hours Ventilator dependence Disseminated cancer Diabetes Hypertension requiring medications Congestive heart failure (CHF) in past 30 days Dyspnea Smoking within 1 year Severe COPD Dialysis Acute renal failure BMI	Serious complication Any complication Pneumonia Cardiac complication Surgical site infection Urinary tract infection Venous thromboembolism Renal failure Readmission Return to operating room Death Discharge to nursing or rehab facility Predicted length of stay
NCEPOD Surgical Outcome Risk Tool	Preoperative risk prediction for adult inpatients undergoing non-neurological and non-cardiac surgery	Procedure ASA class Procedure urgency Thoracic, gastrointestinal, or vascular surgery Cancer Age	Risk of death within 30 days of surgery
Revised Cardiac Risk Index	Preoperative assessment of cardiac risk	High-risk surgery Ischemic heart disease CHF Cerebrovascular disease Insulin use Creatinine > 2 mg/dL	Risk of major cardiac event (myocardial infarction [MI], pulmonary edema, ventricular fibrillation [VF], cardiac arrest, or complete heart block)
POSSUM for Operative Morbidity and Mortality	Risk estimate for general surgery patients based on history, findings, and intraoperative events	Age Cardiac conditions Respiratory conditions Systolic blood pressure Heart rate Glasgow coma scale Hemoglobin White blood cell count	Predicted morbidity Predicted mortality

Risk Calculator	Intended Use	Inputs	Outputs
		Blood urea nitrogen Sodium Potassium EKG findings Operative severity Number of procedures Estimated blood loss Peritoneal soiling Presence of malignancy Procedure urgency	
Surgical Apgar Score	Postoperative risk assessment for major general or vascular surgery based on intraoperative findings	Estimated blood loss Lowest mean arterial pressure Lowest heart rate	Mortality rate Risk of major complications Postoperative intensive care unit admission

Table 2 presents four surgical risk calculators specific to total hip or knee arthroplasty, bariatric surgery, and spinal procedures.

Table 2. Procedure-Specific Risk Calculators

Risk Calculator	Intended Use	Inputs	Outputs
American Joint Replacement Registry Total Joint Replacement Risk Calculator	Risk prediction for patients over age 65 undergoing total hip or total knee arthroplasty	Height Weight Age Sex Race Buy-in status Alcohol abuse Anemia (preoperative) Cardiac arrhythmia Cerebrovascular disease Chronic liver disease Chronic pulmonary disease Coagulopathy Congestive heart failure Dementia Depression Diabetes Drug abuse Electrolyte disorder Hemiplegia/Paraplegia HIV disease Hypercholesterolemia	Mortality within 90 days Periprosthetic joint infection within 2 years

Risk Calculator	Intended Use	Inputs	Outputs
		Hypertension Hypothyroidism Ischemic heart disease Lymphoma Malignancy Metastatic tumor Obesity* Peptic ulcer disease Peripheral vascular disease Psychoses Pulmonary circulation disease Renal disease Rheumatologic disease Urinary tract infection Valvular disease Weight loss	
Obesity Surgery Mortality Risk Score	Mortality risk prediction for bariatric surgery	BMI Sex Hypertension Risk for pulmonary embolism Age	Perioperative mortality
Bariatric Surgery Mortality Risk Calculator	Mortality risk prediction for bariatric surgery	Age BMI Dyspnea Chronic steroid use Peripheral vascular disease Previous percutaneous coronary intervention Type of bariatric procedure	Risk of mortality at 30 days
SpineSage	Risk for serious complications for various spinal procedures	Age Sex Cerebrovascular disease COPD Asthma Hypertension Rheumatoid arthritis Renal disease Preexisting cancer Syncope or seizure Anemia	Likelihood of major complications, all complications, infection, or dural tear with results stratified by level of surgical invasiveness

Risk Calculator	Intended Use	Inputs	Outputs
		Bleeding disorder Diabetes CHF Revision status Previous cardiac complications BMI Level of surgery Surgical approach	

Policies in Other States

The descriptions below outline some of the requirements for RCCs in the laws and regulations of the four states that license RCCs.

Arizona

Patient Admission

RCCs are for postsurgical and postdiagnostic patients for whom it is reasonable to expect an uncomplicated recovery and not expect intensive care services, coronary care services, or critical care services. RCCs must have written admission and discharge policies that are consistent with this definition.

Staffing

Minimum onsite staffing is one registered nurse and one other nursing staff member when there are patients in the facility. The director of nursing must be a registered nurse who is on site at least 40 hours each week when patients are in the facility.

Facility

RCCs cannot have more than two beds per room.

Length of Stay

The regulations do not address length of stay in RCCs.

Other Requirements

RCCs must adopt a quality management program and evaluate the effectiveness of the quality management program every 12 months.

Sources

Arizona Revised Statutes, Title 36 - Public Health and Safety, Chapter 1 State and Local Boards and Departments of Health, Article 9 Recovery Care Centers, § 36-448. Retrieved from <https://www.azleg.gov/viewdocument/?docName=https%3A%2F%2Fwww.azleg.gov%2Fars%2F36%2F00448-51.htm>

Arizona Administrative Code, Title 9. Health Services, Chapter 10. Department Of Health Services - Health Care Institutions: Licensing, Article 5. Recovery Care Centers. Retrieved from https://apps.azsos.gov/public_services/Title_09/9-10.pdf

Colorado

Patient Admission

Convalescent centers provide postsurgical, postprocedural, and postdiagnostic medical and nursing services to patients when an uncomplicated recovery is anticipated and acute hospitalization is not required. Surgical procedures are limited to those in which the expected combined operating and recovery time does not exceed 24 hours from the time of admission.

Staffing

One registered nurse must be in the center whenever a patient is present.

Facility

The regulations do not address facility requirements.

Length of Stay

The regulations do not specify a maximum length of stay.

Other Requirements

Convalescent centers can only be operated in conjunction with a licensed ASC. The ASC must have a transfer agreement with a local hospital.

Sources

Code of Colorado Regulations. 6 CCR 1011-1 Chap 20. Retrieved from <https://www.sos.state.co.us/CCR/GenerateRulePdf.do?ruleVersionId=7061&fileName=6%20CCR%201011-1%20Chapter%2020>

Connecticut

Patient Admission

RCCs care for patients after an acute event as a result of illness, injury, or exacerbated disease process and who are in need of a high degree of medical direction, but for whom acute hospitalization is not required. Patients must be expected to have an uncomplicated recovery, and cannot need intensive care services, coronary care services, or critical care services. Patients must fall within one of these categories:

- Emergency department procedures that do not require hospitalization
- Diagnostic or surgical procedures that do not routinely require hospitalization
- Medical, chemical, or radiological treatments that are performed on an outpatient basis
- Medically stable hospitalized patients who require continued health care services to meet the hospital's discharge criteria (Intensity, Severity, and Discharge (ISD-A) Severity of Illness, Intensity of Service Criteria)

- Patients requiring postsurgical care who have had outpatient surgical procedures performed and who need or desire continued care

Staffing

RCCs must have two registered nurses on duty from 7 a.m. to 11 p.m. every day, and one registered nurse and one other patient care staff member at other times.

Facility

RCCs can be attached to or on the grounds of a licensed hospital, or a freestanding facility not on hospital grounds. The maximum size of a nursing unit is 45 beds, and the nurses' station must be less than 150 feet from each patient's door.

Length of Stay

Patients admitted from an ASC are limited to an expected three-day stay. Patients exceeding a three-day period require a progress note written by the attending physician that justifies the extended length of stay, with the maximum total length of stay not exceeding 21 days.

Other Requirements

RCCs must have a transfer agreement with at least one hospital, such that patients are ensured of timely admission to the hospital when a transfer is medically appropriate as determined by a physician. RCCs must have a quality assurance program to evaluate the quality and appropriateness of patient care, measure patient outcomes, and implement improvements to patient care.

Sources

Regulations of Connecticut State Agencies. Sec. 19a-495-571. Retrieved from <https://eregulations.ct.gov/eRegsPortal/Browse/RCSA?id=Title%2019a|19a-495|19a-495-571|19a-495-571>

Illinois

Patient Admission

Postsurgical recovery care centers provide recovery care for patients undergoing surgical procedures that potentially require overnight nursing care, pain control, or observation that would otherwise be provided in a hospital setting. Each RCC must specify the types of surgical procedures that RCC patients can be recovering from when admitted to the RCC. This must include documentation that the expected postoperative stay is less than 48 hours and that the postoperative complication rate is minimal.

Staffing

Minimum staffing is one registered nurse and one licensed nurse. All nursing staff must be certified for cardiopulmonary resuscitation within the first month of employment and have a minimum of two years of experience in the postanesthesia recovery unit or medical/surgical unit of an ASC or acute care hospital.

Facility

The maximum capacity is 20 beds and RCCs are either freestanding or a defined unit of a hospital or ASC.

Length of Stay

The maximum length of stay is 48 hours, although the physician can request an extension from the RCC's medical director for a total stay of 72 hours. If the patient requires additional care after the 72-hour limit, then the patient must be transferred to an appropriate facility.

Other Requirements

RCCs must maintain a contractual relationship with a general acute care hospital, including a transfer agreement. RCCs must be within 15-minutes of travel time from the general acute care hospital. RCCs must develop and implement a quality assessment and improvement program.

Sources

Illinois Compiled Statutes 210 ILCS 3/35. Retrieved from <http://www.ilga.gov/legislation/ilcs/fulltext.asp?DocName=021000030K35>

Illinois Administrative Code. Title 77: Public Health, Chapter I: Department of Public Health, Subchapter B: Hospitals and Ambulatory Care Facilities, Part 210 Postsurgical Recovery Care Center Demonstration Program Code. Retrieved from <ftp://www.ilga.gov/jcar/admincode/077/07700210sections.html>

Accreditation Standards

Accreditation standards for ASCs are summarized below from the Joint Commission, the Accreditation Association for Ambulatory Health Care and the American Association for Accreditation of Ambulatory Surgery Facilities. The accreditation standards are freely available for only the AAAASF.

Joint Commission

The Joint Commission accredits a wide variety of healthcare facilities, including ASCs. The Joint Commission's [website](#) for ASCs seeking accreditation outlines the process for obtaining accreditation, which includes an onsite survey. The Joint Commission's standards for accreditation include infection prevention, medication management, processes for staffing, and performance improvement. A list of ambulatory care facilities accredited by the Joint Commission can be found using their [online database](#).

Accreditation Association for Ambulatory Health Care

According to its [website](#), the Accreditation Association for Ambulatory Health Care (AAAHC) has more than 6,100 organizations accredited, including ASCs and other outpatient settings. It holds Medicare-deemed status from the Centers for Medicare & Medicaid Services (CMS). According to the AAAHC, the standards for accreditation correspond closely to the CMS Conditions for Coverage for ASCs. These do not require specific patient selection or discharge criteria, but do require that certain policies, processes, procedures and programs be documented and implemented in ASCs. Standards address governance, quality management and improvement, infection prevention, anesthesia care services, surgical and related services, overnight care and services, as well as emergency services.

American Association for Accreditation of Ambulatory Surgery Facilities

The American Association for Accreditation of Ambulatory Surgery Facilities (AAAASF) has a process for granting accreditation to ambulatory surgery facilities. The AAAASF standards are described in the

[Regular Standards and Checklist for Accreditation of Ambulatory Surgery](#) (last revised in March 2017) and the [Procedural Standards and Checklist for Accreditation of Ambulatory Facilities](#) (last revised January 2018). To receive accreditation, a facility must meet every standard, and facilities are surveyed by AAAASF every three years. In years when surveying by AAAASF is not required, the facility director conducts a self-evaluation survey and submits the survey to the AAAASF.

Many of the AAAASF standards are related to the facility environment and available equipment. There are a variety of standards related to cleanliness and sterilization. Available equipment must include an EKG monitor with pulse readout, standard defibrillator or an automated external defibrillator, pulse oximeter, and positive pressure ventilation device. A transportable “crash” cart must be immediately available, independent of other operating room equipment, and must contain medications and devices for suction, positive pressure ventilation, maintaining an airway, and intravenous access. The operating room and recovery room must have an emergency power source.

A physician must be present when anesthesia, other than local anesthesia, is being administered. Recovering patients must be observed by trained medical personnel in the recovery area. In addition, a physician, certified registered nurse anesthetist (CRNA), physician assistant (PA), or registered nurse (RN) with advanced cardiac life support certification must be immediately available until the patient has met discharge criteria. At least one staff member who is certified in the Pediatric Advanced Life Support Course must be present in the facility when there are pediatric patients recovering from anesthesia.

There must be a written transfer agreement with an accredited or licensed acute care hospital within 30 minutes that is approved by the facility’s medical staff, or the operating surgeon has privileges to admit patients to such a hospital. Every physician, podiatrist, and oral and maxillofacial surgeon must demonstrate that they have held unrestricted hospital privileges in their specialty at an accredited or licensed acute care hospital within 30 minutes of the facility. If the physician, podiatrist, or oral and maxillofacial surgeon does not currently hold admitting privileges at a local hospital, there must be a signed document from a person in the same specialty who has admitting privileges in a hospital within 30 minutes of the facility that indicates their willingness to admit the patient to the hospital.

An accredited facility must have a quality improvement program and peer review process. Any death occurring within 30 days of a surgical procedure performed in an accredited facility must be reported to the AAAASF.

Patient Safety Reporting

The Oregon Patient Safety Commission (OPSC) publishes annual reports on aggregated data submitted for the Patient Safety Reporting Program, and the most recent report summarizes data from 2017 (OPSC, 2018). The OPSC is a non-regulatory, semi-independent state agency. Health care organizations voluntarily submit data on adverse events to the Patient Safety Reporting Program and the OPSC can provide confidential consultation to these health care organizations to review adverse events in order to make improvements to patient safety. Adverse events are defined as an event resulting in unintended harm or creating the potential for harm that is related to any aspect of a patient's care.

The Patient Safety Reporting Program receives data from ASCs, hospitals, nursing facilities, and community pharmacies. Although reporting is voluntary, health care organizations that agree to participate must report all serious adverse events that occur in their facility. Information submitted on

adverse events includes when, how, and why patient harm occurred, as well as strategies for preventing similar events in the future.

In 2017, there were 88 ASCs in Oregon and 63 (72%) were enrolled in the Patient Safety Reporting Program. The number of enrolled ASCs has increased steadily from less than 50 in 2009. A total of 438 adverse events were voluntarily reported in 2017; 126 of these reports were from ASCs. The number of reports from ASCs has remained relatively steady in the past five years. From 2009 to 2017, an average of one death was reported each year, and no deaths were reported in 2017.

Table 3 shows the types of events reported for ASCs in 2017. The most common surgical event was unplanned admission to a hospital within 48 hours of discharge, followed by unplanned emergency department admission within 48 hours, laceration, perforation, puncture or nick, and unanticipated blood transfusion. The health care-associated infections were mostly surgical site infections, although two of the 12 events (17%) involved sepsis. The most common medication errors were incorrect medication followed by incorrect dose. The most frequent stages of origin for medication errors were prescribing/ordering and dispensing. About half of the device or medical/surgical supply errors were from use error, and one-third were from device or supply failure. More than one-half of falls occurred during dressing or undressing, and the others occurred during walking, patient transfer (e.g., chair to bed), or toileting.

Table 3. Number and Percentage of Adverse Events Reported by ASCs by Category

Adverse Event	Number	Percentage
Surgical or other invasive procedure	59	47%
Health care-associated infection	12	10%
Aspiration	11	9%
Medication or other substance	9	7%
Device or supply	9	7%
Fall	9	7%
Care delay	6	5%
Anesthesia	4	3%
Retained object	3	2%
Deep vein thrombosis	3	2%
Other event	1	1%
Total	126	100%

Horizon Scan

We reviewed the last six months of Becker’s ASC Review (<https://www.beckersasc.com/print-issues/past-issues.html>) to gain insight into procedures or trends that could influence the ASC/ESC landscape in the next few years. No rigorous inclusion methodology was applied, but we identified the following items as potentially salient:

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- ASCs are increasingly using long-acting local anesthetics (e.g., Exparel) to reduce the need for opioid analgesics
- Many ASCs are investing in robotic surgery systems, particularly for joint replacement procedures
- Gastroesophageal reflux disease procedures (fundoplication, endoluminal fundoplication, magnetic sphincter augmentation) are increasingly being offered at ASCs
- Cardiovascular ASCs are offering peripheral vascular procedures (e.g., vein treatments), and many will begin to provide cardiac catheterization procedures now that this is allowed by CMS
- Private equity investment in ASCs is expected to increase, and a trend toward ASC consolidation under larger management structures is also expected
- Some ASCs are making price transparency (including posting prices on their websites) a feature of their marketing, and some ASCs are using this as a way to encourage direct or cash payments from patients who might otherwise have high out-of-pocket costs through their insurance
- One article highlighted the findings of VMG Health’s Intellimarker Ambulatory Surgical Centers Financial & Operational Benchmarking Study in 2018
 - Case volume mix as a percentage of total cases:
 - Gastroenterology: 34%
 - Ophthalmology: 26%
 - Orthopedics: 21%
 - Pain management: 21%
 - Otolaryngology: 12%
 - General surgery: 9%
 - Oral surgery: 9%
 - Urology: 8%
 - Obstetrics and gynecology: 6%
 - Plastic surgery: 5%
 - Podiatry: 6%
 - Net revenue per case:
 - Orthopedics: \$3,458
 - Otolaryngology: \$2,543
 - Podiatry: \$2,688
 - Urology: \$2,483
 - Obstetrics and gynecology: \$2,933
 - General surgery: \$2,235
 - Plastic surgery: \$2,010
 - Ophthalmology: \$1,442
 - Oral surgery: \$950
 - Pain management: \$1,245

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Appendix A. Search Strategies

Knee Arthroplasty

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/
- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp Arthroplasty, Replacement, Knee/
- 9 exp Knee Prosthesis/
- 10 (knee* adj5 (replace* or prosth* or arthroplast* or artificial*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 11 8 or 9 or 10
- 12 6 and 11
- 13 exp Hospitals/
- 14 exp Hospital Units/
- 15 exp Personnel, Hospital/
- 16 exp HOSPITALIZATION/
- 17 13 or 14 or 15 or 16
- 18 11 and 17
- 19 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 20 (7 or 19) and 11 and 18
- 21 12 or 20

Hip Arthroplasty

- 1 exp Ambulatory Surgical Procedures/

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- 2 exp SURGICENTERS/
- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp Arthroplasty, Replacement, hip/
- 9 exp Hip Prosthesis/
- 10 ((hip or hips or acetabul* or ((femoral* or femur*) adj2 (head* or neck*))) adj5 (replace* or prosth* or arthroplast* or artificial*)).mp.
- 11 8 or 9 or 10
- 12 6 and 11
- 13 exp Hospitals/
- 14 exp Hospital Units/
- 15 exp Personnel, Hospital/
- 16 exp HOSPITALIZATION/
- 17 13 or 14 or 15 or 16
- 18 11 and 17
- 19 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 20 (7 or 19) and 11 and 18
- 21 12 or 20

Mastectomy

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/
- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp mastectomy/
- 9 (mastectom* or ((breast* or mammary) adj5 (resect* or remov* or excis*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 10 8 or 9
- 11 7 and 10
- 12 exp Hospitals/
- 13 exp Hospital Units/
- 14 exp Personnel, Hospital/
- 15 exp HOSPITALIZATION/
- 16 12 or 13 or 14 or 15
- 17 10 and 16
- 18 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 19 (7 or 18) and 10 and 17
- 20 11 or 19

Bariatric Surgery

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/
- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp bariatric surgery/
- 9 (((stomach* or gastr* or intestin* or iliojejun* or jejunoil*) adj3 (bypass* or ((band* or stapl* or sleev* or reduc*) adj3 (surg* or operat* or procedur*)))) or gastroplast* or liposuct* or lipectom* or lipolysis).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 10 8 or 9
- 11 6 and 10
- 12 exp Hospitals/
- 13 exp Hospital Units/
- 14 exp Personnel, Hospital/
- 15 exp HOSPITALIZATION/
- 16 12 or 13 or 14 or 15
- 17 10 and 16
- 18 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 19 10 and 17 and (7 or 18)
- 20 11 or 19

Spinal Laminectomy

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/

- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp laminectomy/
- 9 ((laminectom* or foraminectom* or (remov* or excis* or (cut* adj (out or away)))) adj7 lamina*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 10 8 or 9
- 11 6 and 10
- 12 exp Hospitals/
- 13 exp Hospital Units/
- 14 exp Personnel, Hospital/
- 15 exp HOSPITALIZATION/
- 16 12 or 13 or 14 or 15
- 17 10 and 16
- 18 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 19 (7 or 18) and 10 and 17
- 20 11 or 19

Lumbar Fusion

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/
- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp spinal fusion/
- 9 exp spinal diseases/su or exp back injuries/su
- 10 (fuse* or fusion or fusing or fixat*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 11 9 and 10
- 12 8 or 11
- 13 exp lumbar vertebrae/
- 14 exp lumbosacral region/
- 15 13 or 14
- 16 12 and 15
- 17 ((lumbar* or lumbosacr*) adj5 (fuse or fusing or fusion*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 18 16 or 17
- 19 6 and 18
- 20 exp Hospitals/
- 21 exp Hospital Units/
- 22 exp Personnel, Hospital/
- 23 exp HOSPITALIZATION/
- 24 20 or 21 or 22 or 23
- 25 18 and 24

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26 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

27 (7 or 26) and 18 and 25

28 19 or 27

Cholecystectomy

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/
- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp Cholecystectomy/
- 9 (cholecystectom* or ((remov* or excis* or ((tak* or cut*) adj2 out)) adj2 (gallbladder* or gall bladder*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 10 8 or 9
- 11 6 and 10
- 12 exp Hospitals/
- 13 exp Hospital Units/
- 14 exp Personnel, Hospital/
- 15 exp HOSPITALIZATION/
- 16 12 or 13 or 14 or 15
- 17 10 and 16
- 18 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 19 (7 or 18) and 10 and 17
- 20 11 or 19

Hysterectomy

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/
- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp hysterectomy/
- 9 (hysterectom* or ((uterin* or uterus*) adj5 (resect* or remov* or excis*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 10 8 or 9
- 11 6 and 10
- 12 exp Hospitals/
- 13 exp Hospital Units/
- 14 exp Personnel, Hospital/
- 15 exp HOSPITALIZATION/
- 16 12 or 13 or 14 or 15
- 17 10 and 16
- 18 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 19 (7 or 18) and 10 and 17
- 20 11 or 19

Neck Dissection

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/

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- 3 1 or 2
- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp Neck Dissection/
- 9 exp Lymph Node Dissection/
- 10 exp "Head and Neck Neoplasms"/ or exp neck/
- 11 9 and 10
- 12 ((neck* or cervical*) adj3 (dissect* or ((remov* or excis* or ((tak* or cut*) adj2 out)) adj2 (lymph* adj nod*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 13 8 or 11 or 12
- 14 6 and 13
- 15 exp Hospitals/
- 16 exp Hospital Units/
- 17 exp Personnel, Hospital/
- 18 exp HOSPITALIZATION/
- 19 15 or 16 or 17 or 18
- 20 13 and 19
- 21 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 22 (7 or 21) and 13 and 20
- 23 14 or 22

Transurethral Resection of the Prostate

- 1 exp Ambulatory Surgical Procedures/
- 2 exp SURGICENTERS/
- 3 1 or 2

- 4 (ambulator* adj3 (surgic* or surger* or operat* or procedur*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 5 surgicenter*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 6 4 or 5
- 7 3 or 6
- 8 exp Transurethral Resection of Prostate/
- 9 (prostatect* or turp or (prostat* adj5 (resect* or remov* or excis* or transuretha* or urethra*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 10 8 or 9
- 11 6 and 10
- 12 exp Hospitals/
- 13 exp Hospital Units/
- 14 exp Personnel, Hospital/
- 15 exp HOSPITALIZATION/
- 16 12 or 13 or 14 or 15
- 17 10 and 16
- 18 ((compar* or vs or versus) adj7 (surgicent* or (ambulator* adj3 (locat* or facil* or center* or servic*))).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
- 19 (7 or 18) and 10 and 17
- 20 11 or 19

Appendix B. Surgical Risk Calculations

Case #	Procedure (CPT)	Age group	Sex	Functional status	ASA class	Steroid chronic	Diabetes	Hyper-tension requiring meds	CHF (30 days prior)	Dyspnea	Smoke w/in 1 year	BMI	Risk of serious complications*	Re-admission risk	Risk of return to OR	Predicted LOS (days)
1	Total knee arthroplasty (27447)	<65	F	Independent	I-Healthy	No	No	No	No	No	No	22.6	1.4	1.1%	0.5%	2
2		<65	M	Independent	II-Mild sys. disease	No	Oral	Yes	No	No	No	30.7	2.8	2.3%	0.8%	2.5
3		65-74	M	Partially dependent	II	No	Oral	Yes	No	No	No	28.1	4.2	3.0%	0.9%	3
4		65-74	F	Independent	II	No	Oral	Yes	No	No	No	30.7	3.0	2.3%	0.7%	2.5
5		65-74	F	Independent	II	No	No	No	Yes	Mild exertion	No	22.6	4.0	3.1%	0.8%	3
7	Cervical laminectomy, one level (63020)	<65	F	Independent	I	No	No	No	No	No	No	23.3	1.8	2.2%	0.9%	1
8		<65	M	Independent	I	No	Oral	Yes	No	No	No	30.7	1.7	1.7%	1.0%	1
9		65-74	M	Independent	II	No	Oral	Yes	No	No	No	30.7	2.9	2.7%	1.2%	1.5
10		65-74	M	Partially dependent	II	No	Oral	Yes	No	No	No	21.6	3.8	4.0%	1.4%	1.5
11		75-84	F	Independent	II	No	No	No	No	No	No	24.0	2.6	2.7%	1.0%	1.5
12		75-84	M	Independent	II	No	No	Yes	Yes	w/mod. Exertion	No	20.7	5.7	6.1%	1.8%	2
13		<65	M	Independent	II	No	Oral	Yes	No	No	Yes	30.7	2.9	2.9%	1.5%	1.5
14		<65	M	Independent	II	Yes	Oral	Yes	No	No	No	30.7	3.3	4.0%	1.6%	1.5
15	Vaginal hysterectomy with tube(s), ovary(s) (58262)	<65	F	Independent	I	No	No	No	No	No	No	22.6	3.4	1.2%	1.0%	1
16		<65	F	Independent	II	No	Oral	Yes	No	No	No	37.1	6.0	2.5%	1.4%	1
17		75-84	F	Independent	I	No	No	No	No	No	No	22.6	4.4	1.5%	0.9%	1
18		75-84	F	Partially dependent	II	No	No	Yes	No	No	No	22.6	9.0	3.9%	1.5%	1.5
19		<65	F	Independent	II	Yes	Oral	Yes	No	No	No	37.1	9.7	5.0%	2.0%	1.5

Case #	Procedure (CPT)	Age group	Sex	Functional status	ASA class	Steroid chronic	Diabetes	Hyper-tension requiring meds	CHF (30 days prior)	Dyspnea	Smoke w/in 1 year	BMI	Risk of serious complications*	Re-admission risk	Risk of return to OR	Predicted LOS (days)
20	Total abdominal hysterectomy (58150)	3.3<65	F	Independent	I	No	No	No	No	No	No	22.6	3.3	2.4%	1.2%	2
21		<65	F	Independent	II	No	Oral	Yes	No	No	No	30.9	5.5	4.2%	1.6%	2.5
22	Laparoscopic hysterectomy with tubes, ovaries (58571)	<65	F	Independent	I	No	No	No	No	No	No	22.6	2.1	1.3%	0.6%	0.5
23		<65	F	Independent	II	No	Oral	Yes	No	No	No	30.9	3.8	2.5%	0.8%	1
24		65-74	F	Independent	II	No	Oral	Yes	No	No	No	30.9	4.3	2.6%	0.8%	1
25		65-74	F	Partially dependent	II	No	Oral	Yes	No	No	No	30.9	5.7	3.4%	0.9%	1
26		65-74	F	Independent	II	Yes	Oral	Yes	No	No	No	37.1	5.7	3.8%	1.1%	1
27	Lumbar laminectomy, one level (63030)	<65	F	Independent	I	No	No	No	No	No	No	23.3	1.5	1.4%	1.2%	1
28		<65	M	Independent	I	No	Oral	Yes	No	No	No	30.7	1.9	1.7%	1.4%	1
29		75-84	M	Independent	II	No	No	Yes	Yes	Mod exertion	No	20.7	5.6	5.4%	2.0%	1.5
30		65-74	M	Partially dependent	II	No	Oral	Yes	No	No	No	30.7	4.5	3.9%	1.9%	1.5
31	Lumbar fusion (one level) (posterior or posterolateral technique) (22612)	<65	M	Independent	I	No	No	No	No	No	No	21.6	3.5	2.5%	2.2%	2.5
32		<65	M	Independent	II	No	Oral	Yes	No	No	Yes	30.7	6.6	5.0%	3.4%	3
33	Lumbar fusion, posterior interbody technique (IP only) (22630)	<65	M	Independent	I	No	No	No	No	No	No	21.6	2.9	2.0%	1.9%	2.5
34	Cervical lymphadenectomy, complete (neck dissection) (38720)	<65	F	Independent	I	No	No	No	No	No	No	23.3	4.9	2.4%	3.0%	2
35		65-74	F	Independent	II	No	Oral	Yes	No	No	No	30.9	8.7	4.3%	3.9%	2.5

Case #	Procedure (CPT)	Age group	Sex	Functional status	ASA class	Steroid chronic	Diabetes	Hyper-tension requiring meds	CHF (30 days prior)	Dyspnea	Smoke w/in 1 year	BMI	Risk of serious complications*	Re-admission risk	Risk of return to OR	Predicted LOS (days)
36	Modified radical neck dissection (38724)	65-74	F	Independent	II	No	Oral	Yes	No	No	No	30.9	6.0%	2.9%	2.9%	2.5
37	Total hip arthroplasty (27130)	<65	M	Independent	I	No	No	No	No	No	No	21.6	1.7%	1.4%	1.2%	2
38		<65	F	Independent	II	No	Oral	Yes	No	No	No	30.9	2.9%	2.6%	1.4%	2.5
39		65-74	M	Independent	II	Yes	Oral	Yes	No	No	No	30.7	4.5%	3.9%	1.8%	2.5
40	Lap cholecystectomy with common duct exploration (47564)	<65	M	Independent	I	No	No	No	No	No	No	21.6	2.7%	2.7%	1.1%	1.5
41		65-74	M	Independent	II	No	Oral	Yes	No	No	No	30.7	5.3%	5.3%	1.4%	1.5
42		75-84	M	Independent	II	No	No	Yes	Yes	w/mod exertion	No	21.6	8.7%	9.4%	1.7%	2.5
43		<65	F	Partially dependent	II	No	Oral	Yes	No	No	No	30.9	6.0%	7.0%	1.5%	2
44	Sleeve gastrectomy (Bariatric surgery)-43775	<65	F	Independent	II	No	No	No	No	No	No	36.6	1.4%	1.9%	0.6%	1.5
45		<65	M	Independent	III	No	No	No	No	No	No	43.0	2.6%	3.0%	1.0%	2
46		<65	M	Independent	III	No	Oral	Yes	No	No	No	43.0	3.1%	3.8%	1.1%	2
47		<65	F	Independent	III	No	Insulin	Yes	No	No	No	42.9	3.5%	4.8%	1.1%	2
48		<65	M	Partially dependent	III	No	Oral	Yes	No	No	No	43.0	4.3%	5.3%	1.3%	2.5
49	Roux-en-Y gastric bypass (43644)	<65	F	Independent	II	No	No	No	No	No	No	36.6	2.9%	3.6%	1.6%	1.5
50		<65	M	Independent	III	No	No	No	No	No	No	43.0	5.1%	6.0%	2.7%	2
51		<65	M	Independent	III	No	Oral	Yes	No	No	No	43.0	5.8%	7.1%	3.0%	2.5
52		<65	F	Independent	III	No	Insulin	Yes	No	No	No	42.9	6.4%	8.5%	2.8%	2.5
53		<65	M	Partially dependent	III	No	Oral	Yes	No	No	No	43.0	7.6%	9.2%	3.4%	3
54		<65	M	Independent	I	No	No	No	No	No	No	21.6	2.6%	2.1%	1.1%	1
55		<65	M	Independent	II	No	Oral	Yes	No	No	No	30.7	4.5%	3.7%	1.5%	1

Case #	Procedure (CPT)	Age group	Sex	Functional status	ASA class	Steroid chronic	Diabetes	Hyper-tension requiring meds	CHF (30 days prior)	Dyspnea	Smoke w/in 1 year	BMI	Risk of serious complications*	Re-admission risk	Risk of return to OR	Predicted LOS (days)
56	Transurethral resection of prostate-52601	65-74	M	Partially dependent	II	No	Oral	Yes	No	No	No	30.7	6.7%	5.3%	1.7%	1.5
57		75-84	M	Independent	II	No	No	Yes	Yes	w/mod exertion	No	21.6	8.3%	7.4%	1.8%	1.5
58		65-74	M	Independent	II	No	Oral	Yes	No	No	Yes	30.7	5.7%	4.4%	1.7%	1
59	Partial mastectomy with axillary lymphadenectomy-19302	<65	F	Independent	I	No	No	No	No	No	No	22.6	1.5%	0.9%	1.1%	0.5
60		<65	F	Independent	II	No	Oral	Yes	No	No	No	30.9	2.7%	2.0%	1.4%	0.5
61		65-74	F	Partially dependent	II	No	Oral	Yes	No	No	No	30.9	4.2%	2.7%	1.6%	0.5
62		65-74	F	Partially dependent	II	No	No	Yes	Yes	w/mod exertion	No	22.6	6.2%	4.7%	1.9%	1
63		<65	F	Partially dependent	II	No	Insulin	Yes	No	No	No	22.6	4.3%	3.7%	1.8%	0.5
64		65-74	F	Independent	II	Yes	Oral	Yes	No	No	No	3.9	3.9%	2.8%	1.7%	0.5



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