Modifying Risk in the ASC: Is There Really Any Risk to Anything We Do There?

Douglas Merrill, MD

You are the Medical Director of a busy ASC in which an ophthalmologist is performing a line-up of 15 cataracts today. At 11AM, the admitting RN tells you that a 75-year-old man is scheduled for the next cataract extraction and IOL under topical anesthesia with an RN in attendance for any needed sedation. In the preoperative interview, the patient revealed that he plays tennis 3 times per week and passed his annual physical with "flying colors" 6 months ago. Yesterday during his regular weekly tennis match he experienced chest pain with nausea and shortness of breath that caused him to stop playing. This resolved within in a few minutes of rest and has not recurred. He "looks and feels great" and is ready to go. She wants to know if they should proceed with the scheduled procedure. You provide her the correct answer based on your exact knowledge of the calculated risk of proceeding.
What did you tell her?
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Research characterizing the risk of perioperative mortality and morbidity has focused primarily upon high-risk surgery and patients with severe comorbidities, as well as global patient populations, but rarely upon ambulatory, "low-risk" surgical populations. Ironically, determining the risks of treatment in the latter group may actually be more needed. This is because humans tend to magnify risks when they are rare and discount or stoically accept them when well known,[1] meaning that exact delineation of risks in ambulatory patients may be more important to the informed consent process than it is for patients who already perceive their position as "high risk."[2] For example, you would not be delivering the news for the first time to a patient undergoing CABG if you broach the subject that they could die in the next 30 days (as high as a 6.6% chance, if over the age of 65[2]) or sustain a significant cardiac or cerebrovascular impairment (6 to 12%, depending upon the coexistence of peripheral vascular disease[3]). You almost assuredly would be the first to openly discuss intraoperative death with the parents of a patient about to undergo a myringotomy, but you would undoubtedly find that they have thought about it extensively and that they are worried about it as much or more so than are the family members of the CABG patient.[2]

It is sometimes useful to discuss *relative* risk with patients, when the risk of catastrophic events are lower for the perioperative period than some other very accepted activity ("instead of just staying home, you immediately doubled your chances of dying by getting into the car today; while you are with us, you

[1]For instance, we admonish loved ones to "fly safe" as they head off to the airport because we are briefly considering the rare but catastrophic chance of an airplane crash. However, we completely ignore the much more likely risk of death attendant to the taxi ride to the terminal.

[2]This discussion engenders the concept of 'acceptable' risk, which is dependent upon individual perception of risk vs. reward and informed choice. Most patients believe (correctly or not) the value of CABG to be to diminish the risk of death over the long-term and consequently will accept a higher risk of short-term failure in order to achieve that long-term safety. For them the risk is both *tolerable* (makes logical sense in view of the procedure's invasiveness and their own health) and is *acceptable* (they want the potential outcome to the extent that – for them - the risk is overbalanced by the benefit potential). On the other hand, parents of a child undergoing myringotomy understand its value "only" to be a decrease in ear infections and potentially improved learning and speech over the course of their child's life, and so would probably not consider a 1 in 20 risk of death as *acceptable* to achieve those potential goals (outcomes about which they have not received any guarantee), whereas if we could imagine that a situation existed such that a child was so critically ill that this 5% chance was an accurate risk assessment, an independent observer might consider that level of risk to be *tolerable*. In this way, risk of death is "acceptable" to the cardiac patient, meaning that this risk is understood to be necessarily a part of achieving the desired risks; it is also "tolerable" because there is no perceived alternative to its incursion. On the other hand, we have achieved such a safety record in the outpatient surgery setting (*tolerable* risk levels have dropped) that no risk is considered *acceptable*. In fact, in both the mind of the caregiver and the patient, the categorical separation of 'minor' negative outcomes (nausea) from "major" negative outcomes (stroke) is based upon the level of tolerance for the latter ("zero") vs. the former ("some"). Industrial engineering is more specific in regard to 'acceptable' and 'tolerable' risks, as well as the gray area of ALARP ("as low as reasonably practicable") risk, which presupposes that the operator has done everything possible to reduce risk by first assessing risk factors and then implementing means to decrease the impact or occurrence of such factors – efforts limited by practical constraints of cost. For further discussion, see Aven T. On the Ethical Justification for the Use of Risk Acceptance Criteria. Risk Anal, 2007;27:303–312.

Address correspondence to: ●●●.

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have dropped those chances back to being 22 times safer than they were if you stayed at home."[4]). An extremely anxious patient is usually surprised and pleased to hear that the specific risks about which he or she is concerned are improbable. Thus, the ideal discussion with someone who is anxious would include the question, "What specifically are you concerned about occurring today?" Often it will not be death, but the famous "fate worse than death," such as not waking up from anesthesia or paralysis after spinal,[5] and your response would include the relative probabilities of those particular risks while at the ASC versus in everyday life. The problem is that we are not in a position to give an accurate assessment of many of those risks, due to the deficits in research mentioned above. That knowledge deficit becomes more clearly significant when you consider the following questions:

What if one of your patients does want to know the specific level of risk he or she is incurring today in your ASC for nausea, vomiting, malignant hyperthermia, seizures, intraoperative fire, aspiration, nightmares, insomnia, pain requiring admission to control, unrecognized cognitive dysfunction due to an intraoperative event, hypoxemia with resultant severe mental deficiency, medication error resulting in permanent harm, allergic reaction, inability to intubate? How many of these answers do we know? How closely do you monitor your own outcomes?

When is the last time an anesthesia provider said this to a patient, "Well, I want to assure you that it is unlikely you will die here today, but it is possible that the way I care for you here will increase the chances that you will die within the coming month, or might make it more likely that your cancer that we are taking out today will come back. In fact, I will be increasing the chances that one of these horrible things happen to you by_____%"?

This review will be unsatisfactory: we don't know enough about the risks of what we do to patients, or the risks of what our patients do to themselves. In addition to the need to study large populations to determine "real" risk, a significant issue that leads to the imprecision of our understanding of risk is our lack of clear definitions regarding what we all mean when we use terms referring to outcomes. This was well explicated by the recently published study regarding "intraoperative hypotension" and the accompanying editorial.[6,7] If we cannot agree on when a death had to occur before it can be partially or fully attributed to anesthesia/surgery, or what we exactly mean by "nausea," then our ability to study the incidence of these events is essentially ablated.

The aim of this lecture is to explicate as much as possible the relative risk of outpatient anesthesia and surgery, what factors increase that risk, how such risk can be ameliorated, and finally how to discuss the issue of risk with patients in an intelligent, informed and reassuring manner.

What Are the Important Aspects of Risk to Include in the Preoperative Discussion?

Significantly for preoperative discussions of risk, perceived risk is increased by lack of personal control over outcome and uncertainty of outcome.[8] Ideally, discussions of anesthesia risk would acknowledge the "naturalness" of concern about this loss of control and would serve to reiterate the relative certainty of anesthetic outcome.

Ethical principles and informed consent law both require the anesthesia provider to give a reasonably accurate picture of risk associated with the options available to the patient.[9] However, each of us has prejudices in this arena. We all tend to be guided by what has been called the "availability heuristic." that is, we choose to warn our patients about specific risks and to make therapeutic decisions based on what experience is available to us in our most recent memory.[10] For instance, if a practitioner has had recent experiences of prolonged recovery from spinal anesthesia, he or she won't offer it. Such prejudice can lead to inadvertent misrepresentation of the risk versus benefit choices provided to a patient and is best guarded against by providing the data from the literature and your own outcomes to help both the patient and anesthesia team determine the safest approach.

What Is the Value to Patients of the Risk Discussion?

Anesthesia consent discussions held immediately prior to the surgical event may be limited as a legal event, because patients have already made their decision to proceed with surgery and note overwhelmingly (94%) that the discussion of anesthesia risks has no bearing on that decision to proceed with surgery and anesthesia.[11] Nonetheless, many patients still value the risk discussion as a means of helping them to understand the likelihood of bad things occurring particularly of concern to them (nausea, death). Humans thrive on preparation and crave foreknowledge to avoid the exceedingly negative emotional consequence of unforeseen danger.

Patients worry about the quality of the incipient anesthesia (pain), vomiting, the unknown, and whether or not the surgery will be successful.[12,13] Notably, over 1 in. 10 are concerned that they will die in surgery and fully 20% are concerned about brain damage and coma as a result of anesthesia.[14] These are risks that we should be able to successfully portray as negligible for outpatients. Patients state that specific pre-operative explanations are reassuring, particularly if they emphasize the relative safety of the events that are about to occur.[15]

Indeed, informed consent rarely plays a role in malpractice litigation, cited in only 1% of cases,[16] so the discussion should focus less on the legal transaction and more on a review of the patient's concerns and the (low) probability of those fears becoming reality.

What Exactly Are the Risks of What We Do in the ASC?

Perioperative death. Perioperative death tends to occur in older and chronically ill patients undergoing emergency major surgery.[17] Although rare in elective outpatient surgery,[18] the risk of perioperative death is increased by advancing age, reaching as high as 50 per 100,000 patients in the outpatient hospital setting within 7 days of surgery in the Medicare population.[19]

Death due to anesthesia. Has been quoted as approximately 1 in. 250,000, with comparative probability of mortality due to automobile accidents at 41 per 250,000; accidental injury in the home at 22 in. 250,000 and 9 in. 250,000 from injuries at work.[20] More recently, one study of anesthesia-related deaths in a University hospital suggested the incidence was as high as 1.4 in. 10,000 patients and that 60% of those deaths were due to inadequate performance by the anesthesia provider(s), primarily inadequate fluid management and attention to oxygenation.[21]

Cardiac arrest. In all anesthetics, the risk for perioperative cardiac arrest appears to be 34.6: 10,000 with increased risk found in neonates, children under age one, elderly males, as well as ASA status 3 or higher; two thirds progress to death.[22] In children, death occurs 28% of the time after perioperative cardiac arrest and is associated with higher ASA status and emergency surgery.[23]

MI. After non-cardiac (but not ambulatory) surgery, the risk is between 4.8 and 9.0%.[24] The risk is highest at the time of emergence from general anesthesia and in the presence of tachycardia.[25] An assessed ASA status of III increases this and all perioperative morbidity risk by over two-fold.[26]

Stroke. After non-cardiac (but not ambulatory) surgery, it is between 1 and 4%.[27] Stroke occurs between 0.8 and 2.9% of general surgery patients, with the normal population incurring CVA at 0.1–0.2% annual incidence.[28]

Unexpected overnight stay required. Up to 1.5% of outpatients are admitted unexpectedly after surgery, most commonly for pain management.[29,30,31] That incidence is higher (21 admissions per 1,000 procedures within 7 days of surgery) in the Medicare population.[32,33]

ENT surgery is associated with a high rate, as much as 6.7 to 8.8% in some series, with septoplasty a significant risk.[34,35] ASA III status doubled the risk of admission in that series. Transurethral resection of bladder tumor carries a higher risk of readmission (4.9%).[36] Overnight admission incidence may be increased by obesity in children, increasing the rate by 10 times, from <0.2% in normal children to as high as 2% among the obese.[37,38]

Awareness under anesthesia. Although still requiring study to solve significant questions regarding the role of "anesthetic depth" measurement exact definitions of awareness, and elimination of bias by repeated questioning, the incidence overall seems to be very low (0.36%) and primarily associated with higher risk patients and surgery, less likely to be seen in the ambulatory setting.[39] However, risk factors for awareness potentially attendant to elective "minor" surgery may include the use of total IV anesthesia (TIVA) and concomitant neuromuscular paralysis, two very common combined techniques in ambulatory surgery.[40] Perhaps the safest approach would be to use techniques that include the elimination of neuromuscular paralysis when it is not required for the operative procedure (it is a relatively rare indication in ambulatory surgery) and the addition of inhaled anesthetics when such paralysis is used.

Nausea/vomiting. One third of surgery patients will have PONV if not pretreated, and three pretreatments (droperidol, dexamethasone, ondansetron) all effect an equivalent decrease of 26%, although droperidol was not effective in men.[41] Avoidance of nitrous oxide, volatile anesthetics and opioids will further decrease that incidence.[42]

Recurrence of cancer. use of general anesthesia during primary excision is associated with an almost 50% increase in recurrence of melanoma.[43] Use of paravertebral analgesia for breast cancer surgery is associated with a lower risk of recurrence and metastasis.[44]

Respiratory compromise. Highest rate is one report of 18% of patients under 36 months of age undergoing adenotonsillectomy.[45] Children with active or recent URIs have more adverse airway events, including "major" desaturation, laryngospasm and bronchospasm, all of which were also increased in those children who were intubated.[46] The risk in the absence of URI was between 2% and 4% for most events, but rose as high as 15.7% (desaturation <90%) and 25% (sore throat) in patients with ongoing URI and use of an ET tube.

Aspiration pneumonia. Risk data range from approximately 1 in. 2,000 to 1 in. 7100, with almost half of adult patients developing pneumonitis, and 1 in. 8 requiring mechanical ventilation.[47,48] Emergency patients account for a significant percentage of these patients, however, so that ambulatory elective surgery patient risk should be much lower. All (elective and emergency) children are more likely to aspirate (1:1,000), yet less likely to develop pneumonitis.[49,50]

Difficult intubation. Incidence is around 2%–3% in normal patients and as high as 16%–22% in patients with obstructive sleep apnea, with an AHI >40 associated with an incidence of over 67%; BMI is not a risk factor.[51,52] Unfortunately, prediction of difficult intubation or mask fit is poorly accomplished when relying on typical airway evaluation measurements.[53]

Postoperative mental change. In major surgery, postoperative cognitive dysfunction (POCD) ranges in incidence from 26% at 1week to 10% at 3 months after surgery, compared to 3.4 and 2.8% in controls.[54] Age is a significant factor, so although it is probable that this incidence is lower in ambulatory surgery, it is not clear that this is so. Indeed, no difference in the

long-term dysfunction incidence exists between patients receiving general versus regional anesthesia, suggesting that prolonged exposure to general anesthetics is not the most critical factor. Indications are that there is no increase in anxiety or depression as a result of invasive surgery in most patients.[55]

Prolonged duration of procedure. Is associated with older age and greater physical status impairment[56] and is itself a risk factor for increased morbidity and mortality.

Failed spinal. Incidence has been estimated at 4% but varies associated with provider experience.[57]

Spinal headache. Incidence ranges from 4 to 8% and is increased by younger age, multiple attempts and needle type.[58]

Failure of surgery requiring re-operation. Hernia repair failure is more common with use of local anesthesia in comparison to regional or general anesthesia (between which there was no difference).[59]

Postoperative urinary retention. Risk is increased in patients undergoing rectal or inguinal surgery under spinal anesthesia but <2% of patients were unable to void after surgery prior to discharge, and only 10% of those required catheterization after discharge.[60]

Sore throat. Incidence ranges from over 45% in the presence of endotracheal intubation for ambulatory surgery, with higher risk associated with female gender and younger age. LMA and mask only airway management dropped the risk to between 3% and 10%.[61,62]

Dissatisfaction with care. One study portrayed a 1.1% risk that the ambulatory surgery patient will be dissatisfied with anesthesia care and a 2.5% risk that they will be dissatisfied with global care.[63] Much of the dissatisfaction stemmed from poor management of MAC (pain, poor communication, fear).

What Factors Raise or Lower Risk?

Comorbidity. In higher risk surgery, five comorbidities (ischemic heart disease, heart failure, cerebrovascular disease, renal insufficiency, and insulin-dependent diabetes mellitus) predict an increased likelihood of dire cardiac outcomes (MI, pulmonary edema, cardiac arrest, and cardiac death) in patients over 50 years of age undergoing non-cardiac, non-neurologic surgery as inpatients.[64] The Revised Cardiac Risk Index portrays that six factors determine risk of perioperative cardiac morbidity and mortality:[65]

1. High risk surgery (abdominal, thoracic, major vascular)
2. History of ischemic heart disease (MI, angina, use of nitroglycerin, positive stress test, Q waves, previous coronary revascularization)
3. History of CHF
4. History of stroke or TIA
5. Dependence on insulin
6. Pre-op serum creatinine >177 μmol/L

The presence of 1, 2, 3, or more factors corresponds to a risk of a major cardiac event (MI, pulmonary edema, ventricular fibrillation, cardiac death) in the perioperative period at a rate of 0.4%, 0.9%, 7%, and 11%, respectively. These would be ideal data for all anesthesiologists to have committed to memory. What does this mean for patients undergoing elective surgery in the outpatient setting? It has been suggested that a good rule of thumb would be that *those with a score of greater than 2 should be studied using dobutamine stress echocardiography,* with a quoted predictive value of 38% positive and 100% negative.[66] Other factors that appear to increase the risk of death in the outpatient setting include postoperative myocardial ischemia (ischemia lasting more than 30 minutes is associated with a 2.6 times increase in long-term mortality rates, while episodes of greater than 1 hour are associated with almost a fourfold increase in mortality long term).[67] Chronic congestive heart failure increases the time of stay in PACU by 11%.[68]

Risk factors for pulmonary complications. The American College of Physicians (ACP) has created a risk assessment guideline for increased incidence of pulmonary complications after surgery.[69] Patient factors include (type A evidence) advanced age, ASA class of 2 or greater, CHF, poor functional capability, COPD, albumin level below 35g/L, and (type B evidence) weight loss, impaired sensorium, cigarette and alcohol use. While each of these has a discrete impact on risk of complications, the combination of one or more of them may well increase that risk, but we do not have that analysis. As well, the ACP documents that the impact of our interventions is significant and that events that occur even in ASCs have impact on risk, including upper abdominal surgery, prolonged surgery, emergency surgery ("add-ons"), and general anesthesia. All were induced a twofold increase in risk (the odds ratio for general anesthesia was only 1.83).

Smoking. Smoking decreases overall average stay in the PACU and although it has been suggested that cessation <2 months prior to surgery may not be useful,[70,71] some studies show that healing outcomes may be improved by any period of abstinence.[72] Smoking does not appear to consistently increase risk for major perioperative morbidity, but is associated with minor respiratory events in patients with reactive airway disease.[73,74] Smoking is associated with a more rapid discharge from the PACU.[75]

Age greater than 70 years. It is of note that general medical assessment has found that higher mortality among elderly patients is associated with a BMI <26 kg/m^2 and a family history of MI or CVA.[76] Although we pay great attention to obesity, it is likely that we should attend to low weight as well in assessing risk in the elderly. Advanced age is a significant risk factor for inpatient perioperative mortality.[77] Recently, a review of Medicare data showed that age is related to an increased risk in outpatients as well, with a risk of between 0.025% and 0.05% of death after outpatient

surgery in a hospital setting in the first 7 days after surgery.[78]

Age <36 months. The significance of this age demarcation is in regard to tonsillectomy, as the literature has suggested that patients younger than 36 months are at higher risk of complications after tonsillectomy and should be monitored overnight in the hospital.[79] Age <12 months has been associated with a higher risk of cardiac arrest in all surgery (without discrimination to determine if this association is true for outpatient surgery).[80]

Prematurity. Prematurity and an estimated gestational age below 60 weeks increases the likelihood of respiratory complications on site to as high as 37%,[81] but bronchopulmonary dysplasia (BPD) is not independently associated with an increased risk for postoperative pulmonary morbidity.[82]

Obstructive sleep apnea–pediatric. The most common situation to see OSA in children in the ASC is when they present for tonsillectomy and adenoidectomy. Stratification of the severity of OSA in children is still an uncertain diagnostic process for which history is not dependable, but children under 36 months usually undergo adenotonsillectomy due to disordered breathing, instead of chronic recurrent infection.[83] Thus, using young age as a surrogate for diagnosis of OSA, the literature shows that younger children (thus, children with OSA) incur a risk for complications after tonsillectomy at a rate as high as 20%.[84] Thus, professional societies guidelines call for them to be cared for as inpatients.[85,86,87]

Obstructive sleep apnea–adult. This diagnosis increases the likelihood of difficult intubation by up to10-fold,[88,89] but has not always been found to put patients at increased risk for postoperative admission due to complications.[90] However, the data is poor with regard to patient morbidity and mortality beyond 24 hours postoperatively, and much research is still needed to determine which patients can safely be treated at home and with what level of opioid intake.[91] Untreated OSA puts patients at risk for increased perioperative morbidity and mortality that should be decreased by preoperative treatment with CPAP or BIPAP if only for 2 to 6 weeks.[92]

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Malignant hyperthermia susceptibility. In a patient with known MH in the family, it has been suggested that there is a <1% risk of developing MH if a trigger-free technique is used.[93] Many authorities feel it is therefore safe to provide a trigger-free anesthetic to all MH susceptible patients and to discharge them after an extended period of observation (four hours).[94,95]

Obesity. In adults, one study showed no increase in perioperative morbidity in obese adult patients undergoing non-cardiac surgery,[96] although no study looked at ambulatory adult patients in this regard.

Obesity in children. Unlike adults, there is an increased incidence of difficult airway management, prolonged stay, nausea and upper airway obstruction in the PACU with obese children.[97]

ASA classification. In patients undergoing a wide range of non-cardiac surgery, there is a direct correlation between advancing ASA physical status classification and the incidence of perioperative morbidity and mortality, as well as long-term post-operative functional impairment.[98,99] Of note, multivariate analysis showed that the importance of moving from ASA I to II entailed a risks odds ratio (ROR) of <1.6 even in the presence of major surgery, but that an ASA III classification had a calculated ROR of 2.25, which *exceeded that for the class of operation*. Thus, it would appear that patients with an ASA Class III are at significant increased risk for perioperative morbidity and mortality - over double that of ASA I patients – irrespective of how "minor" a surgical procedure is planned.

Hypertrophic cardiomyopathy. HCM increases the odds of death by 61% and of MI sevenfold in non-cardiac surgery, including non-major surgery.[100] In fact, this impact was more pronounced in minor than in moderate risk surgery. This is a good argument that these patients deserve at least one night of overnight monitoring after even minor surgery.

Renal disease. Even mild renal dysfunction is an independent risk factor for morbidity and mortality associated with major surgery[101] and as noted above, an elevated creatinine is a risk factor for the occurrence of perioperative cardiac events. However, creatinine is a poor (non-specific) indicator of renal dysfunction and it is estimated that almost 8% of adults have some degree of chronic renal disease, such that we see these patients probably more frequently than we realize.[102] Nonetheless, no studies delineate the precise risks of chronic renal disease specific to the outpatient surgical setting.

Neuromuscular blockade. as noted above, the presence of induced paralysis (NMB) is a risk factor for awareness under anesthesia and is in most cases unnecessary for optimal surgical field conditions. Reversal may be associated with increased risk of PONV, and therefore it is ideal to eliminate the use of NMB when possible.

The surgeon. There is a wide variety in skill visible in action on the other side of the drape. This factor has been documented and appears to be unrelated to years of experience.[103]

What Can We Do to Decrease Risk?

Preoperative cardiac evaluation. See the comments above regarding indications for dobutamine stress echocardiography. A recent small study of asymptomatic diabetic patients with high risk for cardiac disease indicates that the ACC/AHA guidelines may overstate the need to evaluate and treat such patients prior to elective surgery.[104] Nonetheless, cardiac complications after non-cardiac surgery in patients with diabetes or hypertension *quadruple* the risk of death in the

five years after surgery.[105] In the setting of elective outpatient surgery, such an increase in risk mandates a conservative approach to pre-operative evaluation.

Statin therapy. There is promising evidence that use of statins preoperatively in vascular and cardiac surgical populations reduces post-operative morbidity and mortality.[106] However, data is insufficient to support the value of statins in the outpatient surgery setting.[107]

Beta-blockade. Beta-blockade given preoperatively to diminish cardiac risk has become controversial. The most recent ACC/AHA guidelines call for their use in patients who are already receiving them or for those patients having vascular surgery whose risk has been defined by ischemia documented on a stress test. The guidelines cite insufficient data to make a recommendation in the presence of low-risk surgery.[108] It should also be noted that not all β-blockers are equally effective.[109]

Coronary revascularization, balloon angioplasty, or coronary stenting. Although each has intrinsic value, when chosen as a method to improve perioperative morbidity risk, none of these have been shown to clearly be of value in comparison to medical therapy. Additionally, plain metal stents should be in place for at least 6 weeks and anti-platelet therapy complete prior to elective surgery[110] and drug-eluting stents appear to require prolonged platelet therapy (at least 6 months) to decrease risk of thrombosis. Consequently, if interventional coronary revascularization were considered necessary prior to surgery, balloon angioplasty at least two weeks prior to surgery would be the best course.[111]

Chest radiographs. in the absence of undiagnosed symptoms, preoperative chest radiographs are of no apparent value in diminishing risk of negative perioperative outcomes.[112]

Choice of anesthetic. controversy still exists regarding the value of anesthetic choice in diminishing risk of perioperative morbidity and mortality. Use of intraoperative or postoperative epidural analgesia was determined not to be of value in decreasing pulmonary complications after surgery by the American College of Surgeons,[113] yet it is probable that the mixture of lumbar epidurals with thoracic epidurals in many of the studies reviewed by meta-analyses has potentially diluted the positive impact on specific types of morbidity achieved by the use of appropriately targeted blocks in specific types of surgery.[114] General anesthesia is associated with more post-outpatient surgery admissions in elderly patients than is regional, with general anesthesia increasing the odds by over 6 times.[115] One of the more disturbing findings is that of the association of the use of general anesthesia and higher rates of tumor return, as high as 50% in one study.[116]

PONV. can be reduced by use of dexamethasone and ondansetron if the former is given early in the procedure and also can be reduced in women by using droperidol.[117] Avoidance of opioids, nitrous oxide, and volatile anesthetics can reduce risk, but the role of neostigmine is controversial as a risk for PONV.[118,119]

CONCLUSION

What Should Your Informed Consent Discussion Mention in Regard to Perioperative Risk?

No single approach to explaining risk will work for all patients, as humans do not use a rational thought process in assessing risk, with fear playing a significant role for many people in their consideration of risk when planning their own behavior.[120] This has been shown to be true in regard to regional anesthesia, where one study showed that 27% of patients were "very concerned" about paralysis when considering a spinal for knee surgery.[121]

The use of comparative probabilities is a useful approach in view of our inability to precisely characterize probability or risk attendant to our care. In general, humans accept a risk of death of 10^{-6} but not as high 10^{-4} per year.[122] Most data would support the concept that the risk of death associated with outpatient anesthesia and surgery is within this range of acceptable risk.

Yet it must be noted that patient understanding of the most straightforward delineation of risk is widely variable, including the use of numerical figures to describe likelihood.[123] So, in your pre-anesthesia discussion, I think you can correctly tell your outpatients the following (assuming they are not undergoing vascular surgery, have <2 cardiac risk factors, have a functional capacity of greater than 4 Mets and an able caregiver to take them home and stay with them there):

"Statistically, your chance of a catastrophic event occurring to you today or in the next month, like death, a stroke, a coma or paralysis is not increased by having surgery here today."

Further guide the discussion, when you have presented the information that you consider to be important, by adding the question, "What specifically are you concerned about occurring today?"

Finally, it is clear from this discussion of risk and our lack of knowledge that it is important for each ASC and practitioner to track their own outcomes, to be able to quote your own data when the literature cannot help. It is of inestimable value to be able to tell your patient that the nausea rate at your center is under 4% for all patients, rather than "studies have shown that up to a third of patients can have nausea after surgery but we'll try to decrease your risk with the use of medication." Not only will the data reassure the patient that he or she is in adept hands, but also that you care enough about the risk to measure it – that inspires confidence! Simple use of spreadsheets and clerical data input will provide you fodder for improvement in your center as well as a means to

reassure your patients of the high quality of care that you provide there.

What about our tennis player with the new chest pain ready for his cataract surgery? Of course, that patient's entry into your surgery center should be viewed as serendipitous for his outcome and the first step into the process of urgent cardiac evaluation. He should not undergo cataract surgery, but should have his unstable angina evaluated this morning, with definitive therapy guided by the cardiologist's findings.[124] You have no idea what his coronary status is, but his risk of death in he next 30 days, *even if treated*, is potentially as high as 1 in. 10, and as high as 15% in the next year.[125] His lens will have to wait!

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What our patients are concerned about?

- For general anesthesia:**
  - 17-19% very concerned about brain damage, intra-operative awareness and memory loss
  - 14% concerned about loss of control
  - 12 % about intra-op death
  - 12% worried about PONV
  - 9% worried about post-op pain

We know our patients are concerned about regional, too…

- For regional anesthesia, over 25% are concerned about permanent nerve damage and paralysis*
- So **1/5 to 1/4 of your patients are worried about permanent, really bad things happening today**
- And these were Canadians!

tthey PW.RAPM 2004;29:96-101 **Matthey PW. Can. J Anesth 2001; 48:333-339

Perioperative Death

This is probably what many of your patients are interested in

it is no more likely to happen in the ASC - and probably less - than if they had stayed at home.

Close

Number of deaths in a year/ one person's odds of occurrence this year (1 in...)

• Inhalation of gastric contents,	377	778,931
• Inhalation and ingestion of food causing obstruction of respiratory tract,	878	334,461
• Car occupant	15,282	19,216
• Death from antihistamines		35,714*
• Complications of medical & surgical care & sequelae	2,883	101,858

www.nsc.org/lrs/statinfo/odds.htm

*Cohen JT Hlth Affrs 2007;26:636-646

Deaths from anesthesia? ...

Death due to anesthesia vs...

- Quoted at 1:250,000*
  - Also quoted as 19:250,000**
  - And 1.4:10K or 35:250,000***
- From taking antihistamine 7:250,000
- Injury at work 9:250,000
- Injury in the home 22:250,000
- Car accident 41:250,000

*Voelker R. JAMA 1995;273:445-6.

**http://www.asahq.org/Newsletters/2007/10-07/roy1007.html
Roy, Callicott (Quoted as 1:13,000)

*** Arbous M. Anaesthesia 2001;56:1141-55.

But...

PONV within 24 hours

- Incidence over 33% in general, but > 50% if no pre-treatment used AND OPIOID GIVEN to susceptible patients
- Droperidol (women), dexamethasone, ondansetron each decrease the incidence by 26%
- Propofol and no nitrous drop it 19% and 12% respectively
- TIVA is equivalent to dexamethasone, ondansetron or droperidol, so use the cheapest
- Adding them together decreases incidence further (0,1,2,3 measures = PONV incidence at 52, 31,28,22% respectively)

Apfel C. NEJM, 2004; 350:2441-2451.

Recurrence of cancer

- 50% higher in melanoma if GA used
- Paravertebral block may reduce recurrence of breast cancer
- Perhaps related to effects on the immune system of stress, wind-up…

Difficult intubation

- 2-3 % of 'normal' patients
- 16-22% of OSA patients
  - AHI > 40 = over 67% incidence of difficult intubation*
- BMI NOT a risk factor.

*another reason not to care for these patients as outpatients?

Post-operative mental change

- Major surgery
  - Post-op cognitive dysfunction in up to 26% at 7 days
  - 10% after 3 months
- Minor surgery
  - 3.4% at 7 days
  - 2.8% at 3 months
- No difference RA vs. GA
- Older age increases risk

Nerve injury after spinal or epidural

- Cranial nerves 4 and 6 after SAB = 1:400-1:6000; usually temporary
- Paraplegia 1:220,000 for SAB, 1:150,000 for epidural
  - Hypotension, age, osteoporosis, arthritis, sp. stenosis, atherosclerotic vascular disease, multiple attempts, anti-coagulation all increase the risk

Urinary retention

- Spinal anesthesia (long-acting) plus inguinal hernia repair or rectal surgery increases incidence
- Less than 2% unable to void prior to discharge
- Less than 10% of those required a catheter post discharge
- Therefore, no reason to keep low-risk patients until they void.
  - Mulroy. Anesth 2002;97:315-9.

Sore throats

- Up to 45% of patients who are intubated will have one (so we warn them all)
- The risk is dropped to 3-10% by using LMA and mask-only

Obstructive Sleep Apnea

- Pediatric: most young children undergoing T and A have OSA; 36 months of age or less is a surrogate for 'severe' OSA: overnight observation
- Adult:
  - difficult intubation;
  - if untreated, risk is increased for bleeding and peri-op cardiopulmonary morbidity;
  - If opioid use will be high, probably best to observe overnight

Obesity

- Pediatric: increased risk of difficult airway, PONV, and prolonged stay in PACU
- Adults: no association with difficult airway management or other increase in peri-op morbidity (no specific ambulatory studies, however)

ASA physical status - an excellent correlation with risk

- ASA class III doubles the risk for perioperative morbidity and mortality above that for a patient of ASA class I
- ASA class III is more important than the type of surgery in determining level of risk.
- It is accurate to say that there is no `minor surgery' for an ASA class III patient.