

Post Anesthesia Care (PACU) Guidelines

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Introduction

Medical errors are difficult to avoid and may increase patient morbidity and mortality rates.

The Israeli Ombudsman (The Commissioner for Public Complaints) has recently reported that each year 2000 patients die in Israel because of medical errors.

The purpose of risk management, quality assurance and improved safety measures in any clinical practice is to minimize the occurrence of medical errors and the ensuing damage to the patients. A corollary of this is a decrease in the number of law suits against treating physicians.

Implementation of risk management measures and adoption of safety measures is routine in the Israeli, US and other navies throughout the world. This approach significantly decreased the number of air crashes and fatalities in the last three decades (1,2). As implemented in the air force setting, these processes involve continuing proactive quality control based on preplanned guidelines and protocols (3). These guidelines and protocols can be adopted, in principle, by the medical profession.

For example, during the immediate postoperative period in the PACU, the patient is at risk for several complications, some attributable to medical mishaps including communication and judgment errors. Even the brief process of patient transfer from the OR to the PACU may endanger the patient if important medical information is not clearly and efficiently transferred to the PACU staff (4). In one survey, the quality of the handover between the anesthesia and PACU teams was found satisfactory in less than 50% of cases (5). This is actually not surprising when inter-departmental and inter-hospital transportation difficulties are considered (6-8).

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According to O'Connor et al. (9), the incidence of complications in the PACU may be as high as 25%, many of which could be attributed directly or indirectly to errors in medical judgment. It has been estimated that up to 14% of the patient complications in the PACU are attributable to poor inter-team communication and inadequate medical information transfer (10).

The purpose of this lecture is to familiarize the audience and the readers with the current PACU guidelines and to emphasize the importance of their implementation in clinical practice in general and in minimizing medical errors in particular.

Can we disregard guidelines in anesthesia or PACU practice?

Why do we need (PACU) guidelines/protocols?

In light of the drug administration and medical judgment errors so frequently committed in current clinical practice, it seems that guidelines are necessary. This is especially true for modern surgery and anesthesia, given that increasingly complex surgeries are performed in ever sicker patients with multiple comorbidities and postoperative complications. Today, we take more calculated (and sometimes uncalculated) risks than we took in the past. There is an increasing number of true ICU patient beds in the PACU due to the shortage of ICU beds and their rising costs. Also, the increased rate of fast-tracking in the PACU demands high efficiency with minimal errors.

Last year at this congress, Michal Horacek (11) stated: „Clinical practice guidelines can be useful in situations in which a sufficiently educated anesthesiologist does not have enough good information to make a qualified decision for the particular patient." I consider this statement as incomplete. An "uneducated" anesthesiologist (and his patients) will critically need guidelines. Guidelines are required to organize perioperative care plans. Additionally, guidelines may be indispensable in preventing some judgment and communication problems. Guidelines are also needed to remind practitioners about the key points of the standard of practice.

Drug administration and other errors and incidents

It seems obvious that avoiding errors saves lives. Although well staffed and well equipped, anesthesia departments, PACUs and ICUs are not spared from erroneous drug administrations.

In 2005, Paix et al. (12) found that 30% of all reported anesthetic incidents in Australia were drug errors, with a mortality rate of 1.25%. During 1998-2004 in the United States, Payne et al. (13) recorded that 354 institutions reported 2406 medication errors in the PACU, of which approxima-

tely 6% (146) were harmful. This harmful error rate is clinically significant, especially if we consider them as iatrogenic - occurring in otherwise healthy individuals undergoing elective surgery (12). The medication administration error rates are also high in the ICU. Van Den Bemt et al. (14) reported 33 critical drug errors in ICUs in the Netherlands, while in Germany, Bertsche et al. (15) observed a 7.2% rate of incompatible drugs in adult ICU patients.

Implementation of drug administration protocols is one way to avoid medical errors. For example, some drug errors can be avoided by correct labeling, keeping the drugs in special places, drawing only single doses, avoiding administration of many drugs through the same IV line, etc.

In addition to drug administration errors, other reintubation errors are frequently seen in the PACU. Reintubation within one hour after surgery may be caused by premature extubation (partial curarization, opioid depressant effects, airway edema etc). The overall incidence of reintubation from all causes in the PACU was 33.9 per 10,000 cases of general anesthesia (16). Factors that predicted reintubation were ASA physical status >II, age > 60 yr, obesity, male gender, administration of sedatives preoperatively, total fentanyl dose > 2 µg/kg/h - especially in intracranial, thoracic and upper abdominal procedures and in operations lasting longer than 5 hours. It appears that the majority of early reintubations in the PACU may be avoidable. Are guidelines & protocols useful in avoiding too early extubations? The answer is probably yes, by applying strict extubation criteria.

In 2002, the Australian database (10) reported 419 critical incidents in the PACU including: respiratory/airway issues - 43%, cardiovascular problems - 24% and drug errors - 11%. Approximately 29% of the cases led to major physiological disturbances. Contributing factors included errors of judgment - 18%; communication failure - 14%; and inadequate pre-operative preparation - 7%. This implies that at least 39% of the complications were preventable. The authors conclude that quality assurance programs and written protocols are necessary to minimize the occurrence of such avoidable mishaps. Both factors contributing to critical incidents in the PACU - namely, judgment error and communication failure - are contributed to by human limitations that may be mitigated by adequately implemented protocols.

Are guidelines effective in minimizing errors? It is difficult to answer this question due to the variety of factors contributing to error. While the answer may be yes, there is not enough evidence to support this yet. Nevertheless, Runcinan et al. (17) have suggested that a properly implemented algorithm during the course of an anesthetic would prevent the occurrence of many drug related incidents.

Categories of PACU guidelines

Guidelines and protocols are not uniform and may require adaptations for local patient populations, demands and financial resources. I recommend creating local guidelines based on four categories of PACU guidelines:

- International (ASA, AHA – ACLS, etc.)
- Issued by the National Society of Anesthesiologists
- Issued by the Ministry of Health
- Internal (local) guidelines:
 - Issued by hospital management
 - Issued by the Department of Anesthesia

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Guidelines issued by the Ministry of Health and hospital management may be compulsory. In my department, we usually add the international guidelines to the regulatory ones.

The National/International PACU guidelines that we consulted while building our departmental PACU protocols and guidelines are presented in Table 1. Guidelines in different countries are quite similar, though some (USA, British) are more detailed. For a summary of the key points of these guidelines please see Tab. 2.

Clinical implementation of the guidelines

Selection of appropriate guidelines (evidence based), their implementation and follow-up are the key for optimal employment of guidelines. To reiterate, selection of the most appropriate guidelines should always be based on scientific evidence if available. Also important is the follow-up (quality assurance) on how these protocols are implemented in current practice.

Are these guidelines implemented in current practice? Results of a recent Israeli study may provide a partial answer. Kadri, Ezri, and Berkenstadt (24) designed a study to evaluate the efficacy of pro-active quality assurance in implementing protocols of patient transfer from the OR to PACU. Two Israeli University - affiliated Medical Centers took part in the study, in which 200 OR to PACU transfer observations were performed, and 60 anesthesiologists and PACU nurses were interviewed at the end of the study. Results of the study can be summarized as follows:

- Upon arrival in the PACU, 88% of the anesthesiologists had informed the PACU nurse/physician about the patient's medical history.
- 66% gave information regarding a history of allergies (positive or negative).
- 23% reported on intraoperative hypo/hypertension, hypoxemia and ta-

chy/bradycardia episodes.

- 39% and 10% gave orders for pain treatment and PONV respectively.
- 96.5% patients were identified by hand ID badge.
- Consciousness of the patient upon transfer was checked in 96.5%.
- HR, BP and SpO₂ were checked in all cases.

Despite these disappointing findings, the questionnaires completed by nurses and doctors indicated an acute awareness of the need for implementation of PACU guidelines.

The following questions were raised by this study:

- Is the lack of PACU guideline implementation confined to Israel?
- What is the situation in Romania?
- Although the team was aware of the guidelines, they failed to implement them.

The authors concluded that pro-active quality-assurance measures could help improve the implementation of PACU guidelines.

Conclusions

Although we have lack of evidence-based data, we can conclude that guidelines are valuable for the management of patients in the PACU. The decision of which guideline to implement may be difficult. It is inadequate to be merely aware of them - guidelines must be implemented in clinical practice.

To summarize, we need PACU and other guidelines for better integration of four knowledge, communication skills, judgment and common sense and their practical application.

Tab. 1. Important National/International guidelines

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| <ul style="list-style-type: none"> • Canadian Guidelines to the practice of anesthesia – revised edition 2007 (18) • UK – Immediate Postanesthesia Recovery – The Association of Anaesthetists of Great Britain and Ireland September 2002 (19) • USA – Practice Guidelines for Postanesthetic Care – A Report by the American Society of Anesthesiologists Task Force on Postanesthetic Care (20) • USA Standards for Postanesthesia Care (Approved by House of Delegates on October 12, 1988 and last amended on October 27, 2004) (21) Israel Ministry of Health PACU guidelines (Hebrew) – 1995 (22) • Eidelman, Pizov, Ivry, Ezri: Israel Society of Anesthesiologists (PACU) practice guidelines 2008 (Hebrew) (in print) (23). |
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Tab. 2. Summary key points of the National/International guidelines

- PACU is required after general or regional anesthesia and sometimes after local anesthesia all performed in any location.
- The standard of care should be similar in all the PACUs regardless their location.
- The ratio of beds to operating theatres should not be less than 1.5 -2.
- At least two staff members should work in the PACU in the presence of a critically ill patient.
- Pipelines for suction, oxygen and air and UPS systems should be available.
- Lighting should be appropriate.
- Communication with operating rooms, families, computerized laboratory and X-ray systems and an emergency call system should be available.
- Monitoring and equipment should be suitable for managing routine cases and of the full range of critical conditions (including equipment for CPR, external pacer, etc).
- Results of laboratory analyses should be obtainable within minutes when required.
- There should be a specially designated area for the recovery of children.
- There should be an anesthesiologist immediately available for the recovery room.
- There should be a PACU protocol manual.
- The anesthesiologist should transfer necessary information to the PACU staff and write appropriate orders.
- All treatment plans are coordinated by a senior anesthesiologist who is responsible for the PACU overall activity.
- An accurate PACU record shall be maintained, including regular follow-ups for critically-ill patients.

Tab. 3. Basic PACU monitoring

- Mental status
- Respiratory rate and pattern
- Airway
- Oxygen saturation
- Pulse rate
- Electrocardiogram
- Blood pressure
- Neuromuscular status
- Temperature
- Pain
- Nausea and vomiting (PONV)
- Urine output and voiding
- Wound, bleeding
- Others

Tab. 4. Basic PACU Treatment Requirements

<ul style="list-style-type: none"> ○ Supplemental oxygen ○ Postoperative analgesia: <ul style="list-style-type: none"> - neuraxial, regional, local, interpleural, infiltration, etc - systemic (mainly IV): opioids, tramadol, paracetamol, dipyrrone, NSAID, etc ○ Prophylaxis and treatment of PONV (5-HT3 antagonists, dexamethasone, or metoclopramide) ○ Fluid administration ○ Normalizing patient temperature: convection, forced - air warming systems ○ Pethidine (demerol, meperidine) is recommended for the reduction of shivering ○ Antagonists for reversal of opioids (naloxone) & benzodiazepines (flumazenil) effects should be available. ○ Specific antagonists for reversal of residual neuromuscular blockade if necessary. ○ Others
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Tab. 5. Postanaesthesia Modified Discharge Scoring System (MPADSS) from outpatient PACU

Variable	Score
1. Vital signs	
Within 20% of preoperative value	2
20–40% of preoperative value	1
40% of preoperative value	0
2. Ambulation	
Steady gait/no dizziness	2
With assistance	1
None/dizziness	0
3. Nausea/vomiting	
Minimal	2
Moderate	1

Variable	Score
Severe	0
4. Pain	
Minimal	2
Moderate	1
Severe	0
5. Surgical bleeding	
Minimal	2
Moderate	1
Severe	0

Voiding is not mandatory anymore.

The qualifications for discharge include a postoperative discharge score of 9 or more and the presence of a competent adult to accompany the patient home.

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