Journal of Pharmaceutical Research International

33(51B): 253-261, 2021; Article no.JPRI.76735
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Post Anesthesia Care in Intensive Care Unit: A Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i51B33540
Editor(s):
(1) Dr. Giuseppe Murdaca, University of Genoa, Italy.
Reviewers:
(1) Marija Sholjakova, University "Ss, Cyril and Methodius", North Macedonia.
(2) Nemat Khansari, Medical University of Tehran, Iran.
Complete Peer review History, details of the editor(s), Reviewers and additional Reviewers are available here: https://www.sdiarticle5.com/review-history/76735

Review Article

Received 01 September 2021
Accepted 03 November 2021
Published 26 November 2021

ABSTRACT

The notion of inpatient treatment is possibly as ancient as medicine itself. It would have been sensible to place patients in such facilities such that those who were sicker were more visible to receive better care from the personnel. The first Intensive Care Units (ICUs) were established in

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Europe and around the world in the 1950, today intensive care units (ICUs) are a common sight in hospitals throughout the world. The PACU is designed to make some processes easier in order to provide better postoperative care. Invasive and noninvasive breathing, goal-directed hemodynamic control, invasive monitoring, and pain management are just a few of the options that can be provided. PACU helps reducing postoperative morbidity and consequently the duration of stay of patients.The costs of both establishing and operating a PACU are undeniable. however, by reducing postoperative morbidity and consequently the duration of stay of patients, overall expenses should be reduced. But with that being said many developing countries do not have the same luxury as developed ones when it come to having enough ICUs. That with other problems such as the differences in level of training and number of staff operating such units determine the overall result of health care process. In this article we will be discussingthe importance of PACU and various factors that affect it.

Keywords: Post anesthesia care; anesthesia; intensive care units.

1. INTRODUCTION

Noncardiac high-risk surgery accounts for just 12.5% of surgical operations but 83.3 percent of mortality. By offering postoperative high-dependency or intensive care, the postanaesthetic care unit (PACU) meets the demand for a higher degree of care for these patients (Level 2 or 3). The PACU's goal is to enhance the care structure for high-risk surgical patients. The likelihood of inferior 'out-of-hours' care is mitigated by keeping 24-hour coverage at the same personnel level. Evidence-based procedures may be devised to standardise the care offered in a PACU whose main purpose is postoperative care. The goal is to give 24 hours of postoperative optimal care, focusing on the time when these patients are most susceptible, in order to limit the likelihood of problems and diagnose them quickly if they do arise. [1].

The notion of inpatient treatment is possibly as ancient as medicine itself. Infirmaries and hospitals were built to provide better care for the sick and, in certain cases, to isolate and keep them away from the general public in order to safeguard the community. It would have been sensible to place patients in such facilities such that those who were sicker were more visible to receive better care from the personnel. Florence Nightingale, during the Crimean War in the mid-nineteenth century, positioned the more critically injured troops near the equivalent of today's "nurse station" so that they might receive "more extensive nursing treatment."In the early twentieth century, Johns Hopkins Hospital had one of the earliest postoperative critical care units for patients undergoing neurosurgery, which was staffed by professional nurses under the direction of surgeons. During WWII, this notion was further expanded and popularised, resulting to the formation of postoperative rehabilitation facilities. The first Intensive Care Units (ICUs) were established in Europe and around the world in the 1950s, following the Copenhagen polio epidemic, which left over 300 patients in need of round-the-clock respiratory support—provided heroically by hundreds of medical and dental students using rubber bags connected to tracheostomy tubes—officially ushering in a new age of critical care medicine. [2,3,4].

Fast forward 60 years, and intensive care units (ICUs) are a common sight in hospitals throughout the world—well, nearly everywhere. According to the World Health Organization (WHO), someone living in one of the least developed nations (as defined by the United Nations) has a share of $46 out of over $7.5 trillion in global health care spending in 2014, compared to $8,990 for someone lucky enough to live in North America. While more health spending does not always imply a better outcome, the inequality in health expenditures results in a stunning disparity in access to health care throughout the world. [2,5].

The PACU is designed to make some processes easier in order to provide better postoperative care. Invasive and noninvasive breathing, goal-directed haemodynamic control, invasive monitoring, and pain management are just a few of the options. It's not always easy to spot high-risk individuals who may benefit from PACU treatment.However, clinicians can use tools to enhance clinical assessments and basic investigations. Clinical prediction rules and cardiopulmonary exercise testing are two examples. The costs of both establishing and operating a PACU are undeniable. However, by reducing postoperative morbidity and

consequently the duration of stay of patients, overall expenses should be reduced. Improved surgical outcomes, reduced postoperative morbidity and mortality, and cost savings should all be considered when considering the benefits of a PACU. [1].

ICUs, being the pinnacle of inpatient care, are among the most expensive and difficult hospital units to establish and manage, making their availability even more difficult in developing countries and neglected areas, and contributing to the horrific "10/90 gap" in global health care. Although variances in how ICU beds are designated, staffing needs, and target admission criteria might further inflate these estimates, reports of availability range from fewer than 1 to more than 30 ICU beds per 100,000 people. It's important to remember that these figures are national averages, and access to critical care services in different parts of the country might vary much more.Even if a country has an ICU bed deficit, those few beds are often concentrated in big cities, leaving the rest of the country unable to care for the severely sick. [2,6,7].

Only 5% of patients undergoing noncardiac surgery in 28 European countries received a planned admission to critical care, according to the European Surgical Outcomes Study (EuSOS), while those who received an unscheduled admission to critical care had a higher death rate. In this study, 73 percent of the patients who died were not admitted to critical care at all. This shows that there is a systematic failure in Europe to offer critical care resources to people who require them during the perioperative period. [1]

1.1 How Postanesthetic Care Unit Help Enhancing the System of Care

1.1.1 High-intensity nursing and medical care

The PACU is staffed by adequately qualified nurses and provides Level 2 and 3 care for high-risk surgical patients. The surgical team and either an intensivist or an anaesthetist should share responsibility for each patient. Maintaining the same personnel level for 24-hour coverage helps to minimise variations in the quality of treatment and the risk of worse care being offered 'out of hours.' Patients admitted to normal wards following non-emergency surgery who have surgery on Friday had a greater death rate than those who have surgery between Monday and Wednesday.However, no significant difference in prognosis was detected in patients admitted to critical care after surgery. The greater ratio of nursing personnel to patients, as well as the more consistent provision of auxiliary services like physiotherapy, may lead to a higher level of care and, as a result, better results for these patients. According to one study, each additional patient per nurse resulted in a higher fatality rate. [1,8,9].

Failure to rescue, or death as a result of a complication, is a term that is getting momentum in surgical outcomes research. There is no substantial difference in complication rates amongst American facilities, but there is a wide variety of death rates, indicating that higher mortality hospitals have greater 'failure-to-rescue' rates. As a result, quick and adequate therapy of postoperative complications is critical for a better surgical outcome.Staff can be taught to focus on the challenges that confront this patient population, and so try to decrease the occurrence of 'failure to rescue' when complications emerge, with a unit devoted to providing care for postsurgical patients. [1,10-15].

1.2 Care Standardization

Institutional practise differs, as do the results, which differ between institutions and nations. Even after controlling for confounding variables, the EuSOS revealed that certain nations had unexplained higher rates of perioperative death. Practice may be brought in line with current best evidence in a PACU with procedures created and updated on a regular basis by medical professionals, with the goal of maximising surgical results.The installation of a surgical safety checklist resulted in a drop in mortality rate from 1.5 percent to 0.8 percent in eight hospitals throughout the world with a diversity of economic situations and various demographics, according to one research. This demonstrates that a small intervention targeted at standardising perioperative care measures can have a major influence on outcomes. Similar results were seen in a follow-up multicentre trial conducted primarily in a high-income context. [1,16-18].

An improved rehabilitation programme is an example of a structured, evidence-based package of treatment in which the PACU may

play a key role. The PACU's high nurse-to-patient ratio promotes many of the aspects necessary for improved recovery. Goal-directed hydration treatment, epidural analgesia, and early mobilisation are among them. The improved recovery programme asks for a "organised approach to immediate postoperative and perioperative (perioperative) treatment, including pain reduction," which the PACU is well equipped to provide. In colorectal surgery, such improved recovery programmes have been demonstrated to lower postoperative morbidity and hospital stay.There is also significant evidence for their usage in other surgical specialities, with one cohort research showing that patients receiving hip and knee replacements in an accelerated recovery programme had a lower death rate than those who received regular treatment. [1,19-23].

2. HAEMODYNAMIC MANAGEMENT

A vast body of research suggests that using goal-directed fluid treatment (using cardiac output measures to guide fluid and inotropic therapy) during surgery improves outcomes, decreasing both complication rates and hospital stay time. A recent comprehensive review and meta-analysis of these therapies in higher-risk surgical patients found that they reduce mortality and morbidity. This is thought to be owing to the positive effect of greater oxygen supply to tissue oxygen consumption matching.The PACU is a good postoperative location for this, since it has enough staff with adequate levels of expertise to give it.The National Institute for Clinical Excellence has released recommendations suggesting the use of the CardioQ-ODM oesophageal Doppler device in patients having major or high-risk surgery, as well as those surgical patients for whom invasive cardiovascular monitoring is considered. The PACU is an ideal location to maintain such surveillance throughout the postoperative period. Conscious patients do not tolerate the oesophageal Doppler well. Other devices, such as the LiDCO plus system, which relies on lithium dilution and pulse power analysis to produce cardiac output data, can be utilised for people who are extubated shortly postoperatively. [1,24-28].

2.1 Monitoring

Continuous electrocardiography is possible in the PACU, which is especially beneficial in high-risk patients who have pre-existing cardiac comorbidities or who have any intraoperative concerns regarding rhythm abnormalities or cardiac ischaemia. It also enables for continuous oxygen saturation monitoring, making titration of the inspired oxygen concentration for optimum oxygen administration easier. This is especially effective in patients who are at high risk of postoperative hypoxia due to the nature of the operation (for example, abdominal surgery), prescription medicines, or comorbidities such chronic obstructive pulmonary disease.

2.2 Ventilation

After elective major abdominal surgery, there is evidence that sustaining continuous positive airway pressure (CPAP) is beneficial. Patients with postoperative hypoxemia who underwent CPAP had a lower risk of reintubation and pneumonia, as well as shorter stays in critical care, according to a study. The PACU is an excellent place for this, with enough suitably qualified professionals to provide CPAP to patients who require it. Clinical experience has shown us that doing so safely on a general surgical ward is often challenging. [1]

2.3 Management of Pain

For perioperative pain control, many patients undergoing major surgery are equipped with an epidural catheter. The PACU is a great location for managing such devices, with nurses who are familiar with their use and anaesthetists on hand to address any issues that may emerge.The MASTER experiment found that employing a combination of epidural and general anaesthesia does not improve most postoperative morbidity. However, because of the improved analgesia and reduced respiratory failure, it is likely that many high-risk patients undergoing major intra-abdominal surgery will benefit significantly from combined general and epidural anaesthesia intraoperatively, with continued epidural analgesia postoperatively. These are the patients who are most likely to require PACU treatment and, as a result, will benefit from the superior epidural care provided in the PACU. [1,29]

2.4 Critical Care in the Global Context

Care for critically ill patients is one of the most expensive components of health-care systems in affluent nations, yet little is known about worldwide variances in the provision of intensive care. Critical care services account for up to 1% of GDP in North America, and they also account

for the majority of clinical expenditures in other countries. Critical care resources differ greatly around the globe in terms of global health. This is demonstrated by fivefold or more disparities in the number of critical care unit beds among Western European nations, as well as 100-fold variances between Western Europe and various South American areas. [6,30-36].

In the least developed nations, providing critical care has two primary problems. First, there is insufficient infrastructure to provide health care in general, let alone undertake capacity observational research. The World Health Organization does not keep track of worldwide ICU bed availability or critical-care capacity. Critical care may be poorly structured in less developed countries, with intensive care units (ICUs) typically serving as ad hoc locations inside hospitals. Intensivists with specialised training are uncommon. Doctors and nurses are in low supply and underpaid, therefore many of them flee to more industrialised nations.Electrical power outages or surges may make it impossible to utilise a lot of medical equipment, and a lack of infrastructure and technical assistance for repairs reduces the equipment's lifespan. The diagnostic radiology department is small, and computed tomography scanners are few. Oxygen may not be accessible, or if it is, it is only provided in restricted quantities via oxygen bottles and concentrators, and only rarely via evaporators. Transportation is frequently unavailable or risky, preventing critically sick patients from receiving care in the few specialist centres that do exist. [6,37-39].

2.5 ICU-bed Availability

The availability of intensive care unit (ICU) beds varies greatly throughout the world and within specific nations, including France. The demand for ICU beds is predicted to rise as the population grows and ages, as long-term survival of patients with chronic conditions linked with severe illness improves, and views of the patient profile most likely to benefit from ICU admission shift. The optimum ICU bed/population ratio is one that allows all patients who are likely to benefit from critical care to be admitted to the ICU while maintaining a high level of bed occupancy, as empty beds suffer expenditures for little benefit.The set of criteria used by intensivists to triage patients to ICU admission, which should guarantee that patients who are too healthy or sick to benefit from critical care are not hospitalised, is one factor that may impact this ratio. In everyday practise, however, compliance with ICU triage recommendations is minimal. The issue isn't just one of supply and demand; the criteria used to determine demand differ between ICUs and over time within ICUs. Triage was impacted by factors unrelated to the patients, such as bed availability, according to many studies. [40-52].

So far, research in this subject has concentrated on the impact of bed scarcity on triage choices, finding that bed scarcity is linked to fewer admissions and a higher severity of acute illness in admitted patients. Furthermore, patients hospitalisedduring periods of bed scarcity had shorter stays, were sicker at release, and may have a higher risk of early readmission than patients in during times of greater bed availability. ICU bed shortage was linked to increased refusal rates among patients deemed too sick to benefit or in need of palliative care, as well as a higher frequency of life-sustaining treatment decisions. [40,53-56].

3. CONCLUSION

High postoperative morbidity and death are common in high-risk patients, putting a strain on hospital resources. The PACU's goal is to enhance the structure and accelerate the processes that are necessary for providing high-quality, evidence-based postoperative care. Identifying high-risk patients who could benefit from this type of therapy is challenging, and thus prober clinical evaluation is a key to properly refer patients for postoperative intensive care unit.

The need for intensive care units is increasing specially with pandemics like Covid-19, however some developing countries still suffer from major shortages in health care tools and staff making mortality rates are even higher in such countries.

Standardization of procedures and also maintaining the same level of training for health care professions and numbers help overall increase the health care efficiency and reduce mortality rate. Overall, there’s no doubt that PACU enhance the quality of patient care by lowering the burden of postoperative morbidity on both individual patients and the institutions that care for them. We hope that more and more units are being available worldwide.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/76735