PREDICTIVE FACTORS FOR A PROLONGED STAY IN THE SURGICAL INTENSIVE CARE UNIT

Abstract :
The intensive care unit (ICU) is a place of acute care, where patients' vital prognosis, substitution techniques, and familyanxiety are intertwined. A prolonged ICU stayoften has a negative connotation, raisingnumerous questions about patient management, functionalprognosis, and the appropriateness of continuing intensive care. This studyaims to betterunderstand the characteristics and outcomes of patients withprolonged ICU stays and to identifyspecific management needs.
A retrospectiveanalyticalstudywasconducted in the anesthesia and surgical intensive care department of the Ibn Rochd University Hospital in Casablanca fromJanuary 2015 to December 2017. The studyincluded 184 patients aged ≥18 yearswith ICU stays ≥10 days. Data werecollectedfrom admission registers and medical records and analyzedusingstatistical tests to assessfactorsinfluencingprolonged ICU stay.
FromJanuary 2015 to December 2017, 2291 patients wereadmitted to the ICU at CHU Ibn Rochd. Of these, 184 (8.03%) hadextendedstays, with an averageage of 49.2 years and a predominance of males (55%). The main comorbiditieswerediabetes (30%) and hypertension (26%). Most patients wereadmitted via the emergency department (27%) for scheduled (48%) and emergency (19%) surgical conditions. On admission, 40% hada Glasgow score of 13-15, 89% wereafebrile, 83% had a normal respiratory rate, and 91% hadoxygen saturation >95%. Mechanical ventilation wasrequired for 80% of patients. The main reasons for admission wereneurologicaldistress (35%) and post-operative management (29%). Duringtheirstay, 109 patients died, primarily due to infectious complications (58%) and hemorrhage (17%). The mean APACHE II score was 20.79. The averagelength of staywas 20.59 days, rangingfrom 10 to 119 days. Factorsassociatedwithprolongedstayincludedage, chronicrenalfailure, and neurosurgical conditions.
Prolonged ICU stays have significanteconomic and physicalrepercussions, with high rates of nosocomial infections and other complications. The length of stayiscloselyassociatedwithincreasedmorbidity and mortality, necessitating optimal patient care to minimize duration. Neurosurgical pathologies were a major cause of prolongedstays, withdemographicfactors like age and sexalsoplaying a role.
The study highlights thatneurosurgical and traumaticreasons for admission, alongwith high APACHE II scores, significantly influence prolonged ICU stays. Efforts to reducestay duration shouldinclude setting up weaning or post-intensive care units, especially for neurosurgical patients, to maintainspecific care in a safeenvironment and reduce the economic impact of prolongedstays.

Key words: Long stay, Intensive care unit, Predictivefactors

Introduction

The intensive care unit isusuallyidentifiedas aplace of acute care, concentrated over a short period of time, where the patient's vital prognosis, substitution techniques and the anguish of families are oftenintertwined. For a number of reasons, a prolongedstay in intensive care often

has a pejorative connotation for the intensive care physician. It can in factbe the source of many questions for the intensive care teams, bothwithin the team and in relation to the patient and hisfamily[22,23,24]. These questions mayconcern, in particular, the management to beadopted in the face of a slow or even absent evolution, the patient'sfunctionalprognosisafterresuscitation, or the lawfulness or otherwise of continuingresuscitation care.

Our workis a retrospective, epidemiological and analytical longitudinal study of the prolongedstay in the surgical intensive care unit of the Ibn Rochd University Hospital in Casablanca over a period of threeyears.

In the light of the above, itisclearthat the aim of ourworkis to find out more about these patients and whathappened to them, which can certainlyprovide an important baseline. Wewillthereforeattempt to identifythisspecific group of patients whosestay in the ICU isprolonged, beforeconsidering the specificfeatures of their management.

Patients and methods

A retrospectiveanalyticalstudywasconducted in Pavilion 17 of the anaesthesia and surgical intensive care department of the Ibn Rochd University Hospital in Casablanca over threeyears, fromJanuary 2015 to December 2017. It included 184 patients whostayed ≥ 10 days, aged ≥ 18 years. Data werecollectedfrom admission registers and medical records, thenanalysed to assessfactorsinfluencingprolongedlength of stay, usingstatistical tests such as Student's T-test for quantitative variables and Fisher's test or chi-square test for qualitative variables.

Results

FromJanuary 2015 to 2017, 2291 patients wereadmitted to the Surgical Intensive Care Unit (Pavilion 17) at CHU Ibn Rochd in Casablanca. Of these, 184 had an extendedstay, representing an incidence of 8.03% of all admissions. The averageage of the patients was 49.2 years, with a notable distribution in the 41-60 age group. Theywerepredominantly male (55%). The main comorbiditieswerediabetes (30%) and arterial hypertension (26%).

The majority of patients wereadmitted via the emergency department (27%), mainly for scheduled (48%) and emergency (19%) surgical conditions. On admission, 40% of patients hada Glasgow score between 13 and 15, and mostwereafebrile (89%). Around 83% had a normal respiratory rate, while 91% had an oxygen saturation of >95%.

Regardinghaemodynamic constants, 86% had a normal heart rate, but 24% had a meanarterial pressure < 70 mm Hg.

Of the 184 patients, 80% requiredmechanical ventilation. The main reasons for admission wereneurologicaldistress (35%) and post-operative management (29%).

109 patients diedduringtheirstay, mainly due to infectious complications (58%) and haemorrhage (17%). The mean Apache II score was 20.79, withsignificant variation in scores over the yearsstudied. The averagelength of staywas 20.59 days, with a range from 10 to 119 days.

Factorsassociatedwith a prolongedstayincludedage, certain medical histories such as chronicrenalfailure, and specificreasons for admission such as neurosurgical pathologies.

Discussion:

Prolongedstayappears to have major economic as well as physicalrepercussions. Weobservedvery high rates of nosocomial infections and trophic and thromboembolicdisorders in patients withprolongedstays.

The length of stay in intensive care is an important tool in the development of the quality of care and activity in an intensive care unit. For the practitioner, ensuring optimal patient care on a daily basis with the shortest possible length of stayis an essential challenge, given the close association between longer length of stay and increasedmorbidity and mortality in the intensive care unit [1], because the longer the stay in the ICU, the greater the risk of iatrogenic complications, especiallyinfectious complications [2], due to the use of invasive techniques and the lack of patient immunity[3].Among patient-relatedfactors, ageissignificantlyassociatedwith a long stay in intensive care[4].

It can besaidthat a prolongedstaymaybeassociatedwith a more or lessadvancedage, but thismaybeexplained by the frequency of comorbidities at thisperiod of life.

Numerousstudies haveshownthatlength of staydiffersaccording to the source of admission of patients [5].

In ourstudy, usingbivariateanalysis, wefoundthattherewas a statisticallysignificant association between the length of stay and the length of stay of patients admittedfromneurosurgery (35%). This resultmaybeattributed to the factthatneurosurgical patients oftenpresentwith more severe pathologies and benefitfrom more prolonged and specialisedprocedures. As a result, theyrequire longer periods of monitoring, unlikeother post-operative patients who have shorter lengths of stay[6].

Our studyclearly highlights the seriousness of the traumaticpathology: 19% of prolongedstays, represented by head trauma associated or not withpolytrauma (80%), whichisreproducible in mostseriesshowing a high length of stay in head trauma patients [7].

Scheduledsurgeriesaccounted for the highest rate of prolongedstays (48%) in ourstudy. This resultcontrastswith the study by DvirFroylich and colleagues[8], whichexamined 4296 patients whounderwentbariatricsurgery. Of these, 124 (2.8%) wereadmitted to the ICU: 19 (15.3%) hadscheduled admissions, and 105 (84.7%) wereadmitted due to complications (respiratorydistress 31.4%, hemorrhages 25.7%, and anastomoticleak 19%). In the scheduled admissions group, the averagelength of staywas 5.7 ± 9.7 (1-42) days, whereas, in the unscheduled admissions group, itwas 12.5 ± 2.6 (4-75) days. This study shows a significantly longer length of stay in the unscheduledsurgery group compared to the scheduledsurgery group.

Anotherstudy by Rubano and colleagues[9] at Stony Brook University Hospital in the USA, conductedbetween 2007 and 2013, showedthat the averagelength of stay in the unscheduledhospitalization group was 15 days, compared to 9 days in the scheduledhospitalization group. Additionally, thisstudyfoundthatneurosurgicalpathology and abdominal surgerywere the mostfrequent causes of unscheduled admissions.

Numerousgeneralist scores have been developed, but only a limitednumber are usedroutinely, in addition to visceralfailure scores, which are more useful for daily monitoring of a patient than for predicting the final prognosis[10].

In ourstudy, weweremainlyinterested in the APACHE (Acute Physiologic and ChronicHealth Evaluation) score. The high value of APACHE II had a significantrelationshipwith the incidence of prolongedstay ($p>0.05$) and the mean APACHE II is 20.79.

In the literature, severity scores at admission such as APACHE II have been reported to behigher in patients exposed to a prolongedstay, but theyremain at an intermediatelevel. This isbecause the interpretation of severity scores must considerthat patients with the highestseverity scores often die beforereaching the definition of a prolongedstay[4,11,12]. This APACHE II-mortality association has already been studiedwithin the Surgical Intensive Care Unit at the Mohammed V MilitaryTeaching Hospital in Rabat by EL MAIMOUNI [13]in 2015. The studyconcludedthat the APACHE II score wassignificantlyhigher in deceased patients (16.62 ± 6.36 versus 7.38 ± 4.53, $p < 0.0001$), with an average APACHE II of 10.22.
Length of stayis one of the indicatorsused to measure the performance of intensive care units. The pathologies responsible for prolongedstay are often multiple and interrelated in the same patient, makingitdifficult to interpret the imputability of a particular factor.
Severalauthors have studied the specificprognosticfactors for a particularpathology[8,9,14].in ourstudy, neurosurgicalpathology, whethertraumatic or not, was the main cause of prolongedstay 35%.
Neurosurgical patients oftenpresentwith more severe pathologies and benefitfrom more prolonged and specialisedprocedures. As a result, theyrequire longer periods of monitoring, unlikeother post-operative patients who have shorter lengths of stay[11].
From all the studiesit can bededucedthatneurosurgicalpathology, whethertraumatic or not, remains a major cause of long stays, whatever the efforts made or the economic or personalresourcesdeployed. Similarly, the incidence of long stays in neurosurgical patients is all the greaterif the damage is more severe (low GCS, mass effect on the CT scan, presence of HTIC, etc.). Somedemographicfactors, namelyage and sex, have also been incriminated, but this association can beexplained by the frequency of comorbidities and the complexity of patients at an advancedage on the one hand and the frequency of traumaticpathology in males on the other[10,15–17],
In ourstudy, despite the long length of stay, the mortality rate was 58%. In the literature, regardless of the study, mortality rates in intensive care and in hospital for thisspecific patient population are found to besignificantlyhigher, varyingfrom 15 to 44% for mortality in intensive care and from 25 to 49% for in-hospitalmortality[18].
In ourstudy, nosocomial infection wasconsidered to be an almost "inevitable" complication of prolongedstay, and werecorded a rate of 58% of nosocomial infections complicatingprolongedstay. This remains a very high rate.

Conclusion

Intensive care patients are a heterogeneous group withsevereillnessesmostoftenassociatedwithseveralcomorbidities, whichmeansthat the length of stay varies from one patient to another. This studyprovided a detailedassessment of the length of stay in the surgical intensive care unit.
The rate of prolongedstay (>10 days) in thisdepartmentis of the order of 8.03%, and isinfluencedessentially by the neurosurgical and traumaticreasons for admission, as well as the APACH severity score.
The incidence of prolongedstaysremainsrelatively high in ourstudy, and this has a significanteconomic impact. A great deal of effort needs to be made to reduce the length of stay, in particular by setting up weaning or post-intensive care units, especially for neurosurgical patients, to enable specific care to becontinued in an environmentthatiskeptsafe, whilepreserving the capacity of intensive care units and reducing the economic impact of a prolongedstay.

Disclaimer (Artificial intelligence)

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Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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Details of the AI usage are given below:

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3.

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