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Evaluation of Morbidity and Mortality in Patients with Abdominal Surgery, Using P- Possum System

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Abstract

The research was a prospective and descriptive study; the utility of P-POSSUM scale was proven in 60 patients operated of abdominal surgery at the General Surgery Service of the Central Hospital of the Armed Forces of Santo Domingo, DR. This scale was used to predict morbidity and mortality of patients, and compared with the complications observed. Data were obtained from medical records to fill the data collection instrument with P-POSSUM scale. The expected risk was calculated and compared with that observed in the monitoring of patients. During the period from February to May 2015.

Keywords: Morbidity, Mortality, P-POSSUM, POSSUM, Surgery, Abdominal, Risk, Calculation, Scale, Score.

Introduction

In the 1980s, scores or scales of severity began to develop with the intention of having more sensitive and objective elements that allow analyzing severity, stratifying patients and obtaining prognostic information, such as determining the risk of dying during their hospital stay. The subsequent advance in the 1990s in the knowledge of certain clinical entities also implied an advance in the diagnostic, descriptive and evaluation capacity about these patients. For these purposes, two types of scales were created: first, those that measure survival called Severiy Scales; and second, Descriptive Scale. These scales are predictors of morbidity and mortality and, depending on the total score, the probability of complications and death can be estimated during hospital admission, as well as in the surgical procedure [1].

The P-POSSUM scale (Portmouth-Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity), is a scoring system that adjusts to the physiological state of the patient before of the surgical intervention and the severity of it, derived from the POSSUM scale (Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity). This scale allows comparisons between hospitals, surgical services and surgeons for adjusted risk; a more accurate way than with the use of gross rates [2-4]. Whiteley and another group of researchers, after initially using the POSSUM system in their own patients, came to the conclusion that with the equations described by inicially Copeland in 1991 [5-7] mortality in the risk group was overestimated, this caused that the equation has been adjusted, seeking to correct this tendency, which was called Portmouth-POSSUM.

The system consists of 2 types of variables:

1. Physiological variables: There are 12, and include cardiopulmonary signs and symptoms, blood cell and biochemical determinations, and

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electrocardiographic alterations. If any of the variables cannot be collected, one (1) point is assigned. They are obtained before surgery.

2. Surgical variables: there are six, divided into four scores (1, 2, 4 and 8). Surgical score is obtained after surgery [5-7].

Other systems of medical scales are: APACHE I-IV (Acute Physiology and Chronic Health Evaluation) [8,9]. SAPS I-III (Simplified Acute Physiology Score) [7-9], MODS (Multiple Organ Dysfunction Score) [10-12], SOFA (Sequential Organ Failure Assessment) [8], MPI (Mannheim Peritonitis Index) [13,14], MPM (Mortality Prediction Model), SRS (Surgical Risk Scale) [9].

Material and Methods

A descriptive and prospective study was carried out, which included 60 patients undergoing abdominal surgery who entered electively and urgently in the General Surgery Service until the day of hospital discharge and their post-surgical consultation, and who accepted sign the informed consent to be part of the research study. The data collection instrument corresponds to a template designed for the study, based and considering all the parameters of the P-POSSUM prognostic scale (age, cardiac and respiratory disease, systolic blood pressure, pulse, Glasgow scale, urea, sodium, potassium, hemoglobin, leukocytes, EKG, surgery severity, number of procedures, if requires blood transfusion quality of peritoneal liquid, malignity and type of surgery), and including the patient's information, its diagnosis and its evolution, as well as the risk of morbidity and mortality that it presents according to the scale (Figure 1). Diagnostics and post-surgical data were recorded, surgical procedure performed and final evolution of the patients, observing the presence or not of complications or death.

The main examples of the degree of intervention in general surgery were:

1. Minor: hernias, extensive subcutaneous tumors, biopsies of skin and soft tissues, perianal surgery.
2. Moderate: conventional/laparoscopic cholecystectomy, appendectomy, minor amputations, hemithyroidectomy.
3. Major: intestinal resection, colectomies, major amputations, main bile duct surgery, complete thyroidectomy, partial gastrectomies.
4. Major+: Milles abdomino-perineal resection, total gastrectomy, duodenum-cephalic pancreatectomy (Whipple procedure), complete hepatectomies.

The scores of these variables are necessary to calculate the predicted morbidity and mortality according to the P-POSSUM scale were transferred to an online calculator (web page: http://www.riskprediction.org.uk/index.php). The results were placed in the data collection form, to be compared with the post-surgical results at the end of their discharge and their medical consultation. The collection of follow-up information was made by the researcher and the collaborating team made up of residents, until the patient's day of discharge and during his medical consultation.

Results

Of the total of 60 patients, there were 20 female patients in whom morbidity was expected in six of them (10% of the total), and some type of complication was observed in six (10%). Of the 40 male patients, in 18 (30% of the total) morbidity risk was expected, and only 11 of them (18%) presented some type of complication. For an exact correlation in case of the group of female patients (Table 1, Graph 1). Regarding age, morbidity was expected in 15 (25%) patients, with only 10 (17%) of the group under 60 years of age was observed. In the group of 61 to 70 years, it was expected that two (3.3%) presented some complication, presenting in three (5%) patients. Of the group older than 71 years, morbidity was expected in seven patients (11.7%), being observed in only four (6.7%). For a total of 24 (40%) expected complications and 17 (28.3%) observed. (Table 2, Graph 2).

The morbidity evidenced was varied, clinical and surgical complications, from the minor and most manageable, to the most complex, triggering death. These include: allergic drug reaction, electrolyte imbalance, bladder balloon, post cholecystectomy syndrome, paralytic ileus, hyperglycemia, hypertension, pneumonia, acute pulmonary edema, cardiac arrest, infection and dehiscence of the surgical wound (Figures 2 and 3), dehiscence of the colo-colonic anastomosis (two patients, Figure 3), intestinal dehiscence (Figure 2), intra-abdominal abscess (three patients, Figure 4), colostomy prolapse (Figure 5), colostomy´s stoma necrosis (Figure 6), suprahepatic abscess, peritonitis and sepsis.

Of the total of 20 female patients, mortality was expected in four (6.7%), and three (5%) of them died. Of the 40 male patients, 10 (16.7%) had mortality risk, only one (1.7%) died (Table 3, Graph 3). Of 44 patients in the group <60 years, mortality was predicted in nine (15%) of them, only two being observed (3.3%). In the group of 61 to 70 years, one was expected to die (1.7%), who died. Of the group older than 71 years, mortality was expected in four (6.7%), with only one (1.7%) dying. For a total of 14 (23.3%) expected deaths and four (6.7%) observed (Table 4, Graph 4).

Discussion

The P-POSSUM scale has been used more frequently in general surgery services, and has been positioned above other scales of surgical risk. In 2013 Morillo-Esparza and colleagues [6] reported a sensitivity of 93% and a specificity of 98%, with a NPV of 96%, concluding that it is a valid and reliable tool to apply in surgical patients. Campillo-Soto [7] in 2009 conducted a study in which he found no statistically significant differences in the results, concluding that POSSUM and P-POSSUM showed high reproducibility. Unlike these studies, in our investigation the morbidity and mortality expected according to the scale was above that observed, overestimating the risk in the different age groups, but not in their estimation of the risk taking into account the sex of the patient. On the other hand, in 2006 Mohil [4] found a good correlation between the risks calculated by the scale, although with an underestimation of the morbidity in the subgroup of low risk patients.

DATA COLLECTION INSTRUMENT

PATIENT INFORMATION

Name: _____ **Sex:** _____ **Date:** _____
Diagnosis: _____ **Qx area:** ____ **Room:** _____
Evolution: Safistactory Vs. Unsatisfactory (Complication? Which one? _____/ Die? _____)

P-POSSUM Scale

Punctuation	1	2	4	8
Physiological variables (PV)				
1. Age	< 60	61-70	> 70	----------
2. Cardiac system	No disease	Use drugs	Edema/ heart disease	Cardiomegaly
3. Respiratory system	----------	COPD Mild	COPD Moderate	COPD Severe
4. Systolic BP (mmHg)	110-129	130/170 o 100/109	> 170 o 90-99	< 90
5. Pulse (bpm)	50-80	81-100 o 40-49	101-120	> 120 o < 40
6. Glasgow	15	12-14	9-11	< 9
7. Urea (mg/dl)	< 20.99	21-28	28.01-42	> 42.01
8. Sodium (mEq/L)	> 136	131-135	126-130.99	< 126
9. Potassium (mEq/L)	3,5-5	3,1-3,4/5,1-5,3	2,9-3,1/5,4-5,9	< 2,9 o > 5,9
10. Hemoglobin (g/dl)	13-16	11,5-12,9/16,1-17	10-11,4/17,1-18	< 10 o > 18
11. Leukocytes	4-10.000	10,1-20/3,1-3,9	> 20 o < 3,1	----------
12. EKG	Normal	----------	Controlled atrial fibrillation	Other
Surgical variables (SV)				
1. Surgery severity	Minor	Moderate	Major	Major +
2. Number of surgeries	1	2	> 2	----------
3. Blood transfusion (ml)	< 100	101-500	501-1.000	> 1.000
4. Peritoneal liquid	No	Serous	Local pus	Diffuse peritonitis
5. Malignity	No	Local tumor	Adenopathies	Metastasis
6. Tipe of surgery	Programmed	----------	Urgent-Possible resuscitation	Immediate urgency

PV:_____ SV:____ Morbidity expected (%): _____ Mortality expected (%): _____

Figure 1: Data collection instrument.

Figure 2: Abdominal wound dehiscence 30 days after surgery in a 35 y/o male patient with intestinal injury by gunshot.

Figure 3: Abdominal wound infected with dehiscence of suture in the abdominal wall, after dehiscence of the colo-colonic anastomosis, in a 42 y/o male patient with colonicinjury by gunshot.

Figure 4: Computed axial tomography showing an intraabdominal (psoas) abscess, in a 30 y/o diabetic female patient with a complicated appendicitis stage.

Figure 5: Colostomy stoma prolapse in a 30 y/o male patient with an colonic injury by gunshot.

Figure 6: colostomy necrosis in a 42 y/o male patient with an intestinal injury by gunshot.

Table 1: Comparison between expected and observed morbidity by sex.

Sex	Number of patients	Morbidity expected	Morbidity observed	Ratio (O:E)
Female	20	6	6	1
Male	40	18	11	0.611
Total	60	24	17	0.71

Table 2: Comparison between expected and observed morbidity according to age.

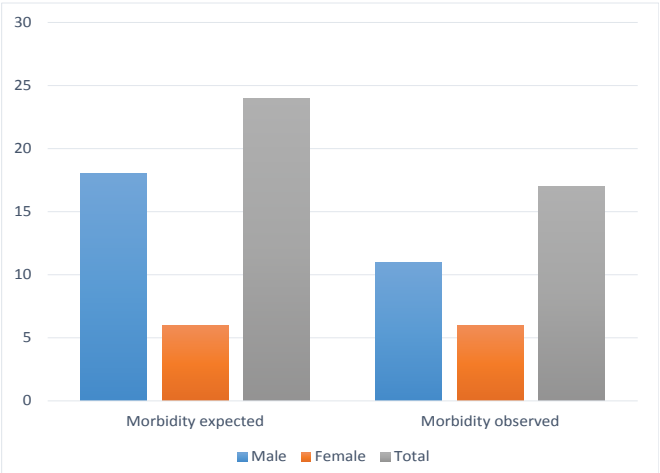
Groups of age	Number of patients	Morbidity expected	Morbidity observed	Ratio
<60	44	15	10	0.667
61-70	6	2	3	1.5
>70	10	7	4	0.571
Total	60	24	17	0.71

Table 3: Comparison between expected and observed mortality according to sex.

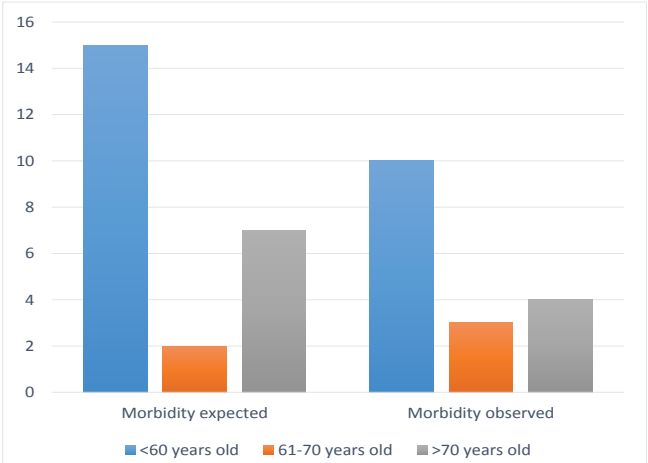
Sex	Number of patients	Mortality expected	Mortality observed	Ratio (O:E)
Female	20	4	3	0.75
Male	40	10	1	0.1
Total	60	14	4	0.285

Table 4: Comparison between expected and observed mortality according to age.

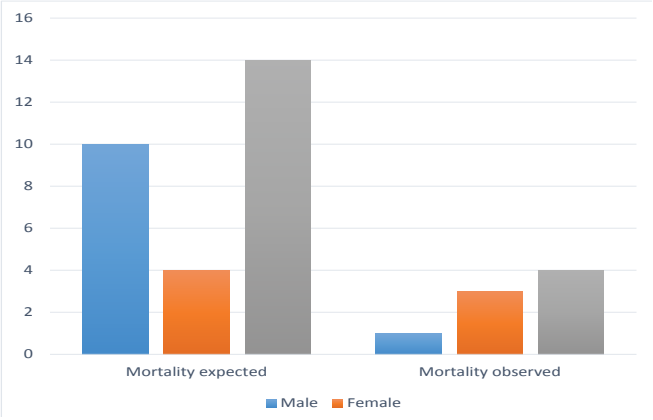
Groups of age	Number of patients	Mortality expected	Mortality observed	Ratio (O:E)
<60	44	9	2	0.222
61-70	6	1	1	1
>70	10	4	1	0.25
Total	60	14	4	0.285



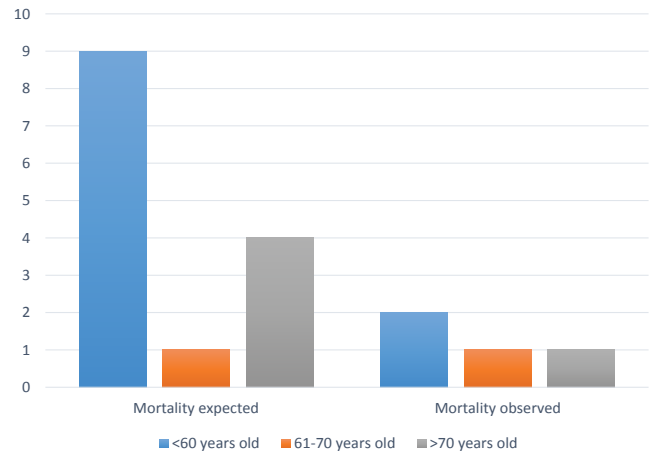
Graph 1: Comparison between expected and observed morbidity by sex.



Graph 2: Comparison between expected and observed morbidity according to age.



Graph 3: Comparison between expected and observed mortality according to sex.



Graph 4: Comparison between expected and observed mortality according to age.

Conclusion

As a predictive scale, the risk calculated by the test approached the results obtained and evidenced. The test overvalued some specific groups of patients both in the calculation of the risk of morbidity and mortality. In the study of each variable as a complication risk factor, it was found that all those physiological variables, with the exception of the Glasgow scale, had an impact on the triggering of some complication; also all surgical variables.

In general, the P-POSSUM scale was a useful instrument to perform an approximate risk calculation of morbidity and mortality, but tends to overestimate the risks, it may require an additional calibration before its use as a tool for surgical audit, with the purpose of improve the quality control of the care activity and the distribution of hospital economic resources and services, especially in the Surgical Intensive Care Units, where patients benefit from specialized care according to their characteristics and needs.

Ethical Considerations

The protocol of the study and the instruments designed for it were submitted for review by the Ethics Committee of the Autonomous University of Santo Domingo, through the School of Medicine and the coordination of the Research Unit, as well as the Teaching Unit of the hospital, whose approval was the requirement for the start of the study.

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