

## RESEARCH ARTICLE

# Predictors of Mortality of Critically Ill Gynecological Patients

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## ABSTRACT

**Background:** Gynecological patients with serious underlying morbidities require admission into intensive care units (ICUs) albeit being few in numbers.

**Objectives:** To review gynecological cases with non-pregnancy-related illness, admitted to ICU with respect to diagnosis, associated risk factors, intervention required, aspects of management, and rate of mortality.

**Materials and methods:** Retrospective record view of gynecological patients admitted in the ICU from 2005 to 2014.

**Setting:** Aga Khan University Hospital, Karachi.

**Findings:** Twenty-six patients were admitted with complications secondary to gynecological indications. The most common reason was pulmonary edema (26.9%); sepsis was documented in 23.1% of all patients. Hemorrhagic shock was found in 11.5% gynecological ICU admissions, cardiogenic shock in 15.4%, and renal failure in 7.7%. Fourteen critically ill women with gynecological cancer were admitted to the ICU (ovarian cancer, n=8; cervical cancer, n=1; and endometrial cancer, n=5). The overall mortality of gynecological patients was 26.92%. The most common interventions were mechanical ventilation (96%) followed by arterial line insertion (88%) and central line insertion (85%).

**Conclusion:** Critically ill gynecological patients requiring invasive mechanical ventilation, central hemodynamic monitoring, and invasive arterial pressure monitoring should be admitted to an intensive care unit.

**Keywords:** Critical care, Gynecology, Mortality.

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## INTRODUCTION

A review of the literature showed that while a significant amount of work has been done on the critical care management of obstetric patients, there is still a paucity of literature in gynecological populations, especially in the developing world.<sup>1</sup> This study displays information about gynecological patients admitted to the ICU over a period of 10 years along with the reasons why they required admission and the ensuing mortality rate. It has public health implications for the purpose of planning of health care and allocation of funds to high-risk gynecological patients.

## BACKGROUND

Gynecological patients with serious underlying morbidity need admission into intensive care units (ICUs) albeit being few in number.<sup>1</sup> The critical care features of a gynecological patient are comparable to the care of critically ill, adult patient with respect to organ and physiologic support.<sup>2</sup> Common diagnoses at admission include postoperative hemorrhage and infection, while preexisting or emerging medical disorders and gynecological malignancy are clinically valuable predictors of ultimate outcome.<sup>3,4</sup>

Diagnosis may vary in countries depending on the predominant diseases and the structure of the health system.<sup>1</sup> In developing countries a more severe spectrum of disease is observed in gynecological patients who require admission to the ICU owing to late presentation.<sup>5</sup> Some factors for late presentation include awareness levels, weak referral systems, financial constraints, gender discrimination, constraints on mobility, health-seeking behavior during illnesses, and acceptable norms related to physiologic phenomenon, i.e., menstruation, pregnancy, and childbirth. Additionally, the absence of medical facilities also results in the amplified morbidity and mortality in this group of patients.<sup>6</sup>

Furthermore, a majority of women do not recognize the significance of preventative measures for the management of gynecological malignancies. In Pakistan, only 2.6% had undergone the PAP smears procedure and only 5% of women are conscious of the necessity of screening tests for the early diagnosis of cervical carcinoma.<sup>7</sup> The local incidence of cancers were cervix (3.6%), uterus (3.4%), and ovary (3.4%).<sup>8</sup> A better knowledge of the features,

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range, and outcomes of the diseases affecting this group of patients is the first step toward accomplishing prevention and hence reduction of both mortality and morbidity.<sup>9</sup> Due to the fact that physiological scores do not perform well in this patient group,<sup>6</sup> the task of foreseeing possible outcomes and measuring the risk of critically ill cancer patients is challenging.

Literature has shown the rate of obstetrical and gynecological complications report at 71 and 29% respectively.<sup>10</sup> Thus, there is a need to assess the proportion of critically ill gynecological patients admitted to the ICU in order to properly identify poor predictive features at the time of hospital admission that might enable us to pledge more aggressive interventions earlier.

## MATERIALS AND METHODS

### Patients

A retrospective chart review was undertaken of all the gynecological patients admitted internally to the multidisciplinary ICU at the Aga Khan University Hospital (AKUH) between January 2005 and December 2014. The Aga Khan University Hospital is a 577-bedded tertiary care hospital with 55 critical care beds available in multidisciplinary ICU, cardiac care unit, and NICU. The nonprofit private hospital not only caters to its own patients but also accommodates referrals from all over the city and the country. It has the region's lowest average length of stay of 3.3 days<sup>11</sup> and its ICU has a broad admission policy with frequent reappraisals of intensive care benefits. The admission criteria to ICU include the need for respiratory support and/or intensive therapy. In all cases, the decision to admit a patient to the ICU is made by both the intensive care team and the primary attending physician. Patients who require hemodynamic monitoring and vasopressor support, or invasive or noninvasive ventilatory support, and/or patients with a major organ dysfunction all require admission to the ICU.

The records of all gynecology patients admitted during January 2005 to December 2014 to ICU were reviewed retrospectively. These patients were part of a larger group of gynecological patients being managed at the study hospital and who were internally referred to the ICU. The definition of gynecological patient for the review excluded all pregnant patients in any stages of their trimester. Patients were identified through the hospital medical records system for classification and were coded through the ICD 10 for patient diagnosis at the time of discharge or death. Data was obtained from cases for whom there was a sufficient amount of retrievable demographic and laboratory data.

A detailed review of indications, management, and any related outcome of these patients was done. The

data collected included maternal age, basic demographic characteristics, clinical history, the indication and the diagnosis for admission, ICU course, the length of stay, and outcomes. The need for monitoring, mechanical ventilation, and invasive monitoring or dialysis was determined and recorded. The following laboratory data was obtained: Hemoglobin, white cell and platelet counts, serum creatinine levels, pro-thrombin time, international normalized ratio (INR), bilirubin, SGPT/SGOT, and alkaline phosphatase. The disease identified to be responsible for the patient's critical illness was referred to as the primary diagnosis, and patients were categorized according to related complications and the outcome of the disease.

### Statistical Methods

Continuous variables were estimated through median and interquartile ranges (IQR), and frequencies and percentages were computed for categorical variables. Chi-square was used to identify associated risk factors with the survival of the patient kept at univariate level. A p-value of  $\leq 0.05$  was considered statistically significant. The data was analyzed using Statistical Package for the Social Sciences (SPSS) version 19 (SPSS Inc., Chicago, IL) and the study was approved by the Ethics Committee of the Aga Khan University Hospital.

## RESULTS

During 2005 to 2014, 26 patients were admitted with complications secondary to gynecological indications. A detailed review was conducted of the indications, management, and related outcome, shown in Tables 1 to 3.

The relevant demographic and laboratory data on the day of admission to hospital are given in Table 1. In this study, 85% of the admissions were direct without any referral and 15% were referred cases from peripheral hospitals where inadequate or no intensive care facilities existed for the intensive supportive therapy that these patients required. A majority of the patients were admitted

**Table 1:** Demographics and laboratory data of gynecological patients

Parameter	Median (IQR)	Min–Max
Age (years)	47.5 (24)	20–66
Weight (kg)	65 (18)	45–108
BMI (kg/m <sup>2</sup> )	27 (7.6)	17.6–44.4
ICU stay (Days)	4 (2)	1–11
Hb (11.1–14.5 g/dl)	9.45 (2.5)	5.6–16
WBC (4.5–10.0 × 10 <sup>9</sup> per liter (L))	11.05 (5.9)	0.1–27.7
Platelets (150–400 × 10 <sup>9</sup> per liter (L))	184 (190.5)	5–532
Creatinine (0.6–1.1 mg/dl)	0.95 (1.9)	0.4–4.6
INR	1.1 (0.3)	0.9–1.8

Median (interquartile range); INR: International normalized ratio; Hb: Hemoglobin; BMI: Body mass index; WBC: White blood cells

**Table 2:** Indications for ICU admission

Indications	Total (n = 26)	Survived (n = 19)	Expired (n = 7)	p-value
Pulmonary edema	7 (26.9%)	7 (36.8%)	0 (0%)	0.13
Septic shock	6 (23.1%)	2 (10.5%)	4 (57.1%)	0.028
Hemorrhagic shock	3 (11.5%)	2 (10.5%)	1 (14.3%)	0.79
Cardiogenic shock	4 (15.4%)	3 (15.8%)	1 (14.3%)	0.93
Acute abdomen (portal vein thrombosis)	1 (3.8%)	0 (0%)	1 (14.3%)	0.27
Renal failure	2 (7.7%)	2 (10.5%)	0 (0%)	0.37
Postoperative monitoring expected (ventilatory support)	3 (11.5%)	3 (15.8%)	0 (0%)	0.54

**Table 3:** Outcome according to initial diagnosis, type, and complications

Initial diagnosis	Types	Complications leading to ICU admission	Survived (n = 19)	Expired (n = 7)	
Gynecological cancer	Ovarian CA	Pulmonary edema	4	4	
		Septic shock	2	0	
		Cardiogenic shock	0	2	
		Acute abdomen	0	1	
		Renal failure	0	1	
		Postoperative monitoring	1	0	
		Expected ventilator	1	0	
	Endometrial CA	Pulmonary edema	5	0	
		Cardiogenic shock	2	0	
		Renal failure	2	0	
	Benign conditions	Cervical CA	Septic shock	1	0
			Uterine fibroid		
		Uterine fibroid	Pulmonary edema	6	0
			Septic shock	2	0
Hemorrhagic shock			1	0	
Postoperative monitoring			1	0	
Expected ventilator			2	0	
Ruptured ovarian cyst		Septic shock	0	2	
		Hemorrhagic shock	0	1	
			0	1	
Sepsis	Endometrial hyperplasia	Cardiogenic shock	1	0	
	Uterovaginal prolapse	Pulmonary Edema	1	0	
	Pelvic inflammatory disease	Hemorrhagic shock	1	0	
	Postoperative sepsis	Septic shock	0	1	

CA: Carcinoma

through the ER. The median age in this study was 47 years. The median of ICU stay was 4 days and maximum ICU stay was 11 days. It was noted that derangements in the serum creatinine levels, WBC, and platelets levels were present in the majority of patients at the time of hospital admission. Furthermore, it was observed that significantly severe irregularities of Hb were present in those who died. Additionally, the IQR for LFTs (liver function tests) was bilirubin 1.0, SGPT 35.8, SGOT 41.5, and alkaline phosphatase 224. With regards to cultures, only 15 (1.25%) yielded positive cultures, which included five blood samples (14.2%), eight urine samples (25%), and two high vaginal swabs (5%). The most common bacterium present was *Streptococcus*.

The indications for ICU admission are presented in Table 2. The most common reason observed was pulmonary edema at 26.9%. Sepsis was documented in 23.1% of all patients, significant difference in survivors and nonsurvivors was established, and mortality was

noted as the highest among patients presenting with septic shock. Of those presenting with gynecological indications, hemorrhagic shock was found in 11.5%, cardiogenic shock in 15.4%, and renal failure in 7.7%, but these statistics were not significantly different between survivors and nonsurvivors. Most women had multiple complications and were included in more than one category. Anesthesia was not considered to be the primary cause of or a contributing factor to severe morbidity in any case; however, 11.5% were admitted for Postoperative monitoring ventilator support.

The initial diagnoses on admission and complications leading to ICU admission are shown in Table 3. During the 10-year period, 14 critically ill women with gynecological cancer were admitted to the ICU (ovarian cancer, n=8; cervical cancer, n=1; and endometrial cancer, n=5). In comparison with gynecological patients who had benign diseases, the cancer patients were specifically at a higher risk for ICU admission. At the time of admission

to ICU, 3 patients with gynecological cancer were also known to have metastatic disease. The main reasons for admission to ICU were sepsis, respiratory failure, cardiogenic shock, and hypotension with a need for vasoactive support. The ICU mortality in gynecological cancer patients was 57.14%, while the overall mortality of gynecological patients admitted in ICU during the last 10-year period was 26.92%. In all cases, the cause of death in women admitted to the ICU was multi-organ failure. None of the patients received chemotherapy during their stay in the ICU. The most common interventions implemented in gynecological patients admitted to the ICU were mechanical ventilation (96%) followed by arterial line insertion (88%) and central line insertion (85%). Consequently, the mean cost of ICU treatment of each critically ill woman in the ICU was 3,300 and the average cost per patient per day was 562.5 USD.

## DISCUSSION

This sample consists only of those women who had access to health care, and like many other developing countries, the study may be missing cases with advanced medical conditions who are not able to access the benefits of the health sector due to inaccessibility, cultural factors, or lack of exposure to intensive diagnostic procedures. The mortality may be high because of late presentation to the hospital or hospital admission at an advanced stage of disease.<sup>1,6</sup>

Although usually safe, gynecological procedures can have a number of possible complications that include but are not limited to anesthesia, hemorrhage, sepsis, or organ injury resulting in a variety of serious outcomes. Timely rectification of these complications, however, can decrease the dangers of long-term morbidity and mortality.<sup>12</sup>

The mortality in our study among a particular group of diseases is significantly associated with multi-organ failure, which indicated a more severe outcome than in patients with only single or no organ failure.<sup>13</sup> This study confirmed that the number of dysfunctional organs is a vital risk factor for death in cancer patients admitted to the ICU.<sup>6</sup> Additionally, sepsis was found as the most common cause of disease leading to ICU admission.

The duration of ICU stay in this study ranged from 1 to 11 days, although the majority stayed for 2 to 4 days. Extended stay was more common in women suffering from renal failure and respiratory insufficiency. The trend for ventilatory support was observed in 96% of the sample and respiratory failure was the main indication for ICU admission.

In our sample, gynecological cancer is comparatively a larger group indicating necessity for oncology services link with health facilities providing ICU care.

Ovarian cancer was the most common type of cancer in our patient group, and this is consistent with other local studies that have shown ovarian cancer to be the third most common malignant type after oral cavity cancer.<sup>10</sup> Cervical cancer is showing a gradual but significant rise.<sup>8</sup> Our study specified a 26.67% ICU mortality in gynecological cancer patients, and it has been suggested that aggressive treatment management together with surgical intervention and timely ICU admission be strongly recommended in these patients.<sup>1,12</sup>

Countries with substantial cancer burden and increasing risk factors have a need for cancer control programs for the prevention and early detection of the diseases, thereby reducing burden on ICUs. Low-resource countries have weak health systems<sup>14</sup> with constraints on medical services, for example, ICUs that require an advanced level of technology and financial investment.<sup>8</sup> In well-defined health care systems, patients flow through different levels of health care systems depending upon their need. This ensures appropriate planning for different levels of health care and provision of beds according to patient needs. Additionally, in such health care systems there exists a third party payer who ensures that patients receive due quality health care. Patients in low- and middle-income countries in comparison are often self-negotiating the maze of health levels and facilities. They are required to pay themselves while carrying the burden of all kinds of diseases. Consequently, people of low socioeconomic status have been associated with worse outcomes.<sup>9</sup>

In the milieu of developing countries, women are found to have lesser access to health-promoting resources, have more susceptibility to illness, and are underprivileged within the health care system.<sup>15</sup> The failure of policy-making at the level of health service provision, to highlight the extent and nature of women's health problems, has been emphasized. In such a situation, it emphasizes the provision for health care services through the centralized availability of ICU facilities for gynecological patients based on the needs and volumes of geographical areas.

It is important to acknowledge the limitations of this review. The sample size was not large enough for an in-depth analysis of the results and important variances among living and expired patients could not be verified. Consequently, nonsignificant outcomes need to be further analyzed. Moreover, we cannot eradicate any probable selection biases that may have ensued as a result of our discharge policy or ICU admission. Despite determining the mean cost of the ICU treatment of each critically ill woman it is important to estimate the quality and value of life per period of survival. Undoubtedly, further research is required to increase our understanding of the issues that control the prognosis of critically ill patients

as well as their psychological and medical needs, performance status, and quality of life after discharge from the ICU, so that clinicians and patients can be advised appropriately.<sup>6</sup>

## CONCLUSION

The choice to admit critically ill gynecological patients to the ICU should be grounded on the likelihood of managing the acute illness rather than the underlying malignancy. Hence, invasive therapy should not be suspended for these patients, especially if they are presenting with sepsis/septic shock. Our mortality highlights the necessity for further research into the supervision and quality of life of gynecological patients after being discharged from the ICU. We can conclude that critically ill gynecological Patients requiring invasive mechanical ventilation, central hemodynamic monitoring, and invasive arterial pressure monitoring should be admitted to an intensive care unit.

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