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# **Retrospective Review of the use of Swan Ganz Catheters in our Intensive Care Unit (ICU): a Short Report**

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### **Abstract**

The widespread and often 'misuse' of the Swan Ganz (SG) or Pulmonary artery catheter has often been seen in intensive care patients. The objective of this preliminary review was to observe the trends and possibly formulate an association with outcome of the use of SG catheters as well as to determine the frequency of use and possible complications.

The chart review of ten patients was carried out for the months of January and February 2004 in a retrospective manner. The incidence of SG catheter insertion was 12% per month on average. Nine out of 10 patients received the SG catheters for 'fluid management'; and 1 for 'haemodynamic instability'. Eight out of 10 patients expired and average length of stay was 9 days. There were no complications recorded. The cause of death in all patients was 'severe sepsis'. The overwhelming majority of patients who received these catheters expired at the end of their stay.

### **Introduction**

Existing randomized controlled trials on SG catheter-guided strategies reveal a modest risk reduction that does not reach statistical significance. Risk reduction appears to be greatest in surgical series.<sup>1</sup> The procedure commonly includes insertion of a flexible, balloon-tipped catheter into the pulmonary artery for haemodynamic monitoring of the critically ill patient.<sup>2</sup> This is primarily inserted for patients with systemic shock requiring haemodynamic support. However the efficacy of data collected from its

use is debatable.<sup>3,4</sup> The safety of pulmonary artery catheterization has been questioned.<sup>5</sup> Most clinicians believe that PAC use is beneficial in guiding therapy and may improve outcome. Despite these beliefs and hundreds of published articles related to SG catheters, appropriate use and impact on outcome remain unclear.<sup>6</sup> Direct pressure measurements are obtained in the respective cardiac chambers and pulmonary artery. An indirect measurement of left atrial filling pressure is obtained when the catheter is "wedged". In addition, other haemodynamic parameters may be easily measured, such as the cardiac output, systemic vascular resistance (SVR), mixed venous oxygen saturation, and intrapulmonary shunt fraction.<sup>7</sup> Many studies have been done in the West looking at similar parameters as ours in their setting.<sup>8</sup> However, given the high cost of intensive care and monitoring and doubtful improvement in outcome, we wished to embark on a retrospective review to observe, the frequency of SG catheter use, and indications for SG catheter use in our ICU. Correlation with length of stay (days), outcome of the patient and complications, if any were also noted.

### **Methods and Results**

A retrospective chart review was carried out on all patients who had a SG catheter placed whilst in the ICU from January 1<sup>st</sup> - February 28<sup>th</sup> 2005. Inclusion criteria was all adults (above the age of 18) receiving SG catheters. Exclusion criteria were all paediatric patients and post cardiopulmonary resuscitation (CPR) patients. The setting was a 12 bedded multidisciplinary intensive care unit of a tertiary

care university hospital. The parameters noted were frequency of use, indications of use, length of stay, outcome and complications. Results are shown in table. The frequency of use was in 12 % patients per month; fluid management was the indication in 90% cases; 9 days were the average length of stay in the ICU and 80% expired due to severe sepsis. No complications were reported. Despite being a small sample size, we have found no conclusive evidence that use of Swan Ganz catheter improves survival in any way.

**Table. Review of Swan Ganz Catheter outcomes.**

Patient No.	Indication	Length of stay (days)	Outcome	Complication
<b>January</b>				
1.	Fluid management	18	Expired: severe sepsis	None reported
2.	Fluid management	9	Expired: severe sepsis	None reported
3.	Fluid management	1	Expired: severe sepsis	None reported
4.	Fluid management	17	Discharged to floor	None reported
5.	Haemodynamic instability	7	Expired: severe sepsis	None reported
6.	Fluid management	6	Expired: severe sepsis	None reported
<b>February</b>				
7.	Fluid management	11	Expired: severe sepsis	None reported
8.	Fluid management	11	Expired: severe sepsis	None reported
9.	Fluid management	6	Discharged to floor	None reported
10.	Fluid management	4	Expired: severe sepsis	None reported

### Comments

Most clinicians believe that SG catheter use is beneficial in guiding therapy and may improve outcome.<sup>9</sup> Access to haemodynamic data provided by the SG catheter, coupled with accurate interpretation of the data, may lead to reduced peri-operative morbidity and mortality. Although it may be used for 'fluid monitoring alone, many assumptions

have to be fulfilled first which are often not present in critically ill patients.<sup>3,4</sup> These include absence of pulmonary or left ventricular dysfunction.

However, its use is associated with life-threatening complications such as Line sepsis, cardiac rupture, pulmonary artery rupture, cardiac tamponade, among others, if not recognized and treated early. The cost of inserting and monitoring these catheters is also high. As Critical care moves towards a more technologically dependent era, we must carefully consider the downside of using maneuvers which will not be of benefit and could possibly harm the patient including increasing the resources utilized.<sup>10</sup> There are very few large randomized studies done to justify the use of SG catheters and until then it is at best a means of providing a "guesstimate" of the fluid status of a patient. We recommend a careful reevaluation, including designing a prospective controlled study in our environment to look at the efficacy of these catheters in the future. Clinical examination and judgement must not ever replace the "numbers" obtained and their often misread interpretation and measurement by the ICU staff.

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