



**Service Priorities and Programmes**  
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**Submitting author:** Dr Yik Nang Cheung

**Post title:** Medical Officer, Pamela Youde Nethersole Eastern Hospital,

**Prognostic value of red cell distribution width (RDW) in patients undergoing major non-cardiac surgery**

*Cheung GYN(1), Shum HP(2), Chan KC(2), Chan OCY(3), Tang CN(3), Yan WW(2)*

*1 Department of Anesthesiology, Pamela Youde Nethersole Eastern Hospital 2*

*Department of Intensive Care, Pamela Youde Nethersole Eastern Hospital 3*

*Department of Surgery, Pamela Youde Nethersole Eastern Hospital*

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**Introduction**

Prognostication of surgical morbidity and mortality is an important quality assurance tools. Red cell distribution width (RDW), which quantifies heterogeneity in the size of circulating erythrocytes, is a readily available parameter from automated complete blood count. It has been shown to be associated with mortality in cardiac surgical patients or those critically ill.

**Objectives**

This study investigates the association of RDW with the 30-day mortality for those patients who undergo major or ultra-major non-cardiac surgery in a regional hospital

**Methodology**

Data submitted for Surgical Outcomes Monitoring and Improvement Program (SOMIP), which did not include RDW, and falling between July 2012 and May 2013 was retrieved. The pre-operative RDW of these patients were collected. Since RDW is strongly influenced by low hemoglobin (Hb) level, only those with pre-operative Hb level  $\geq 10\text{g/dL}$  were taken for further study. Univariate and multivariate analyses were performed to identify factors associated with 30-day mortality.

**Result**

A total of 1,598 patients were enrolled. After exclusion of 200 patients with pre-operative Hb  $< 10\text{g/dL}$ , 1398 patients' data were analyzed. The mean age was  $63.7 \pm 15.7$ . Among them, 443 patients (31.7 %) underwent ultra-major operation. 46.5% were abdominal operation while 28% were urological operation. The overall 30-day mortality was 11.4%. The mean RDW of the 30-day survivor was  $13.6 \pm 1.6$  and that of non-survivor was  $14.2 \pm 2.1$  ( $p < 0.001$ , t test) Other factors that were significantly different ( $p < 0.05$ ) between survivors and non-survivors included: age,

pre-operative pulse rate, use of anti-hypertensive agent, diabetic drugs, steroid or immunosuppressant, pre-operative sodium, urea, creatinine, albumin, Hb and international normalized ratio (INR). The area under receiver operating characteristic (ROC) curve for RDW in determining 30-day mortality was 0.6. A cut-off of 13.35% gave the best discrimination power (sensitivity = 0.625, specificity = 0.557). Logistic regression revealed that pre-operative RDW >13.35% ( $p=0.025$ , OR 1.52), albumin level ( $p<0.001$ , OR 0.909), INR ( $p=0.008$ , OR 4.49), pre-operative pulse rate ( $p=0.006$ , OR 1.02) and the use of anti-hypertensive medications ( $p=0.001$ , OR 1.82) were independent factors associated with 30-day mortality (C index 0.705, Hosmer-Lemeshow test  $p$ -value 0.412). CONCLUSIONS: Our study demonstrates that pre-operative RDW could be a readily available predictor of 30-day mortality in patients who undergo major or ultra-major non-cardiac surgery. Inclusion of RDW in surgical risk assessment and prognostication model warrants further investigation.