INTRODUCTION
Suspected Acute Poisoning (SAP) is a common clinical presentation in an emergency department of a general hospital. Stratifying risk enables emergency physicians to classify patients into a high risk group requiring close monitoring and a low risk group that can be safely discharged after a short period of observation.

Literature review
A number of risk factors are associated with severity of poisoning including age, intentional poisoning, respiratory and circulatory failure, unresponsiveness and seizures [1-6]. Prognostic electrocardiographic signs include non-sinus rhythm, AV block, prolonged QT and QRS intervals, and right axis deviation of the terminal 40ms QRS axis [1, 7-13]. Biochemical markers associated with poison severity include pCO2≥45mmHg, renal impairment, and lactate levels [1, 5, 14]. Hypophosphatemia, serum cholinesterase activity, and creatine phosphokinase levels are associated with severity of paracetamol hepatotoxicity, organophosphate and carbon monoxide poisoning respectively [15-17]. The Glasgow Coma Scale (GCS) predicts the need for intubation and the risk of aspiration pneumonia in patients with poisoning [18, 19]. Individual scores for motor, verbal and eye signs, have similar prediction of adverse outcome of acute poisoning compared to the total GCS, [20]. The AVPU scale is a simple score of level of consciousness (A=alert, V=responds to verbal stimuli, P=responds to pain, U=unresponsive) and correlates with GCS in poisoned patients [21]. The Modified Early Warning Score (MEWS) is a clinical score that has been validated in acute medical wards [22]. The Poison Severity Score (PSS) grades organ injury due to poisoning and correlated with clinical outcomes of acute poisoning in hydrocarbon, organophosphate and carbon monoxide poisoning [23-29]. The PSS also correlated with the GCS, the APACHE II score and the Predicted Mortality Rate (PMR) in organophosphate poisoning [30]. However, the PSS did not correlate with the Simplified Acute Physiology Score [31].

Aim and objective
The aim of the study was to identify factors that are related to poison severity by evaluating the prognostic value of single and composite clinical risk factors using the Poison Severity Score as a measure of outcome.

METHODOLOGY
A retrospective case-control study was carried out at Mater Dei Hospital, Malta, on 350 patients with acute poisoning from 1st January to 30 September 2010, comparing clinical, electrocardiographic and biochemical parameters and composite clinical scores in two groups of poison severity graded by the Poison Severity Score. Subjects were included if a diagnosis of acute poisoning was established from the clinical findings and laboratory results. Exclusion criteria included missing case notes and unclear diagnosis. Cases were defined as patients with a PSS≤1 whilst controls were defined as those with a PSS>1.

Continuous independent variables included vital parameters, blood gases and electrocardiographic intervals. Dichotomous independent variables included female gender, age less than 50 years, history of a medical condition, history of a psychiatric condition, history of drug abuse, history of trauma, MEWS-1, AVPU score<1, AVPU score<2. The dependent variable was a dichotomous value for the PSS grade with a cut off value of 1 (PSS≤1 or PSS>1) representing two groups with absent to mild and moderate to severe organ injury.

Univariate analysis was performed using SPSS comparing the two poison severity groups. Regression analyses and receiver operator characteristic (ROC) curve analysis were performed for three clinical composite scores (MEWS, AVPU and GCS).

RESULTS

Descriptive data
There were 153/350 (43.7%) females and 197/350 (56.3%) males with a range of ages of 14 to 89 years and a mean of 35 years. There were 256/350 (73.1%) patients with a PSS<1 of which 136/256 (53.1%) were males and 120/256 (46.9%) were females and the mean age was 35 years. There were 94/350 (26.9%) patients with a PSS≥1 of which 61/94 (64.9%) were males and 33/94 (35.1%) were females with a mean age of 37 years.

Comparison of risk factors grouped by grade of Poison Severity Score (PSS).
In a comparison of continuous variables, only GCS, pH and pCO2 were significant risk factors of severity of poisoning (PSS grade > 1) with a mean difference of 5 points in GCS (15 vs 10, p<0.001), 0.04 in pH (7.41 vs 7.37, p<0.001) and 2mmHg in pCO2 (39 vs 45, p<0.019) as shown in Table 1. Heart rate, blood pressure, respiratory rate and ECG durations of the PR, QRS and QT intervals had no significant mean difference in the two groups.

The ratio of the odds for categorical variables in the low and high poison severity grades (Table 2) showed that, apart from age≥50 years, none had a statistical prognostic risk. The odds ratio for age≥50 years was 0.515 (95% CI 0.230-0.879, p=0.014) inferring that the converse (age<50 years) was a significant risk factor. The clinical scores MEWS 1, AVPU-1 and AVPU-2 showed significant risk for severity with Odds Ratio=4.91 (95%CI 2.96-8.14; p<0.001), 14.05 (95%CI 7.02-28.13; p<0.001) and 115.74 (95%CI 26.69-502.00; p<0.001 respectively).

DISCUSSION

Logistic regression
Separate univariate regression analyses showed that all three clinical scores (MEWS, AVPU and in reverse GCS) had a significant prognostic risk with adjusted Odds Ratio=2.635, 8.234 and 3.344 respectively as shown in Table 3.

Receiver operator Curve analysis
ROC curve analysis (Figure 1) comparing the three clinical scores showed similar values for area under the curve: 0.805 (95% CI 0.710-0.899; p<0.001) for MEWS, 0.847 (95% CI 0.764-0.934; p<0.001) for AVPU and 0.843 (95%CI 0.754-0.932; p<0.001) for reverse GCS (Table 4).

CONCLUSIONS

The general lack of significance of individual clinical and electrocardiographic risk factors contrasts with other studies showing significant risk for heart rate, blood pressure and QRS interval [1, 3]. The prognostic significance of age is similar to findings in two studies showing an increased risk for elderly patients (above 61 and 65 years) with poisoning [2, 3]. The more simple AVPU scale was found to predict severity of poisoning to a similar degree to the more complex MEWS and GCS.

Limitations
The study was retrospective and missing data in case notes limited analysis.

Conclusion
Individual clinical, blood gases and ECG parameters were found to have limited utility as predictors of severity of poisoning, whereas composite clinical scores (MEWS, AVPU and GCS) were similarly accurate predictors of poisoning severity. Since the AVPU is simpler to calculate, it may be a more practical clinical tool for risk stratification of acute poisoning.

REFERENCES