Introduction:
Cardiac function is known to be negatively impacted by sepsis. Monitoring Cardiac Output (CO) and Stroke volume (SV) trends over the course of treatment may provide insight into cardiac function and predict patient outcome. The goal of this study was to explore the relationship between the change in cardiac output over time in septic shock.

Methods:
FRESH is randomized controlled study, evaluating the hemodynamics in critically ill patients with sepsis or septic shock (NCT02837731). Patients randomized to PLR guided resuscitation received hemodynamic monitoring for 72 or until ICU discharge, whichever occurred first (Starling SV, Cheetah Medical). Patients that exhibited an improvement in cardiac output at 12, 24, 36 and 48 hours were compared to those who did not exhibit improvement. Overall improvement in cardiac output (first CO measurement compared to last CO measurement) was also compared between groups.

Results:
90 patients with septic shock received hemodynamic monitoring over a 72 hour monitoring period. 60% were female, and the average age was 61 years. Overall, 44% of assessments demonstrated a fluid responsive positive response after receiving initial resuscitation fluid of 2.3 L. Patients who exhibited improved CO at 48 hours received less fluid over the course of their ICU stay. This difference was consistent both when pre-enrollment fluids were included (5985.6 ± 2293.0 vs 8667.2 ± 3750.6, p=0.01) and only when post enrollment fluids were used (4056.2 ± 2149.2 vs 6296.5 ± 3646.8, p=0.024). Notably, patients who exhibited an overall improvement in CO also exhibited a decreased in serum creatinine over the study period (-0.28 ± 0.27 vs 0.52 ± 0.23, p=0.029) (Figure 1).

Conclusion:
We have previously shown that patients who improve CO in response to the resuscitation exhibited improved outcome. Trending cardiac output over the ICU stay revealed additional usefulness in predicting patients with improved outcome. The results highlight the importance of trending hemodynamics in therapy.
Outcomes for Improved CO

Cardiac Output and Patient Outcome