Introduction: Pulmonary aspiration of gastric content is a serious peri-operative complication. We have recently reported the use of portable ultrasound as a non-invasive tool to assess gastric content, both qualitatively and quantitatively at the bedside. In our previous study we presented a mathematical model to predict gastric volume based on antral cross-sectional area (CSA). The present study aims to test (validate or revise) our previously built mathematical model by correlating it with measurements of gastric volume by direct suctioning during gastroscopic examination.

Methods: After REB approval and written patient consent, 110 patients will be enrolled to participate in this study. Following an overnight fast, subjects are randomized to ingest one of 6 different volumes of apple juice (0mL, 50 mL, 100 mL, 200 mL, 300 mL or 400 mL). Following ingestion, a focused ultrasound examination of the stomach is performed by a blinded sonographer, following a standardized scanning protocol. The antrum is identified, and its cross-sectional area is documented. A “predicted” gastric fluid volume is calculated based on our existing mathematical model and compared to the volume suctioned during gastroscopic examination.

Results: Fifty-six subjects have been studied so far. Results suggest that the existing mathematical model correlates in a linear manner with suctioned gastric volumes, but tends to overestimate gastric volume. Therefore a new mathematical model is being fitted to more closely represent “true” gastric volume. The new resulting adjusted equation is as follows: Volume = 134.0212*[log (lat) – 1.45431]^2 (figure 1). This new model (represented by a black line) more closely correlates with the suctioned volumes (red circles) than the previous mathematical model (blue circles).

Discussion: Interim results suggest that the existing mathematical model needs to be adjusted to more accurately predict gastric fluid volume. The new equation correlating antral cross-sectional area to gastric volume is not affected by either gender, weight, height or Body Mass Index which suggests this model is applicable to all adults within the demographic ranges studied, and may simplify its future clinical application.