Introduction:
Acute respiratory distress syndrome (ARDS) patients usually lack of surfactant. Surfactant administration may be a useful therapy in adult ARDS patients. The purpose of this study was to perform a systematic review and meta-analysis of the effect of surfactant administration on outcomes of adult acute respiratory distress syndrome patients.

Methods:
PubMed, EMBASE, Medline, Cochrane database, Elsevier, Web of Science and ClinicalTrials.gov were searched until December 2016. Randomized controlled trials comparing surfactant administration with general therapy in adults with acute respiratory distress syndrome were included. The primary outcome was mortality (7-10 days, 28-30 days and 90-180 days). Secondary outcome included a change in oxygenation (PaO2/FiO2 ratio).

Demographic variables, surfactant administration, and outcomes were retrieved. Internal validity was assessed using the risk of bias tool. Random errors were evaluated with trial sequential analysis. Quality levels were assessed by Grading of Recommendations Assessment, Development, and Evaluation methodology.

Results:
Eleven RCTs and 3038 patients were identified. Surfactant administration could not improve mortality of adult patients [RR (95%CI)=1.02(0.93-1.12), p=0.65]. Subgroup analysis revealed no difference of 7-10-day mortality [RR(95%CI)=0.86(0.52-1.43), p=0.56], 28-30-day mortality [RR(95%CI)=1.00(0.89-1.12), p=0.98] and 90-180-day mortality [RR(95%CI)=1.11(0.94-1.32), p=0.22] between surfactant group and control group. The change in the PaO2/FiO2 ratio was significant [RR(95%CI)=0.29(0.12-0.46), p=0.0008]. Finally, trial sequential analysis and GRADE indicated lack of firm evidence for a beneficial effect.

Conclusion:
Surfactant administration may improve oxygenation but has not been shown to improve mortality for adult ARDS patients. Large rigorous randomized trials are needed to explore the effect of surfactant to adult ARDS patients.

Image 1:
Figure 1. Forest plots of subgroup analyses on the effect of surfactant based on different days mortality. CI Confidence interval, M-H Mantel-Haenszel.
Figure 2. Forest plots of the effect of surfactant based on PaO2/FiO2. CI
Confidence interval, M-H Mantel-Haenszel.