Background:
The rationale for 5% albumin as a resuscitation fluid is driven by a theoretical assumption that colloids lead to better intravascular volume expansion compared to crystalloids, and therefore reduce overall volume requirement. Although colloids result in a transient greater increase in intravascular volume, it has not been shown that greater intravascular volume expansion translates to improvement in mortality & morbidity outcomes (1-3). This may be due to the increased vascular permeability associated with sepsis, ARDS, and following cardiac surgery with cardiopulmonary bypass, which allows albumin to cross into the interstitial space just as easily as crystalloid. In addition, albumin may have risks, especially in the cardiac surgery population, including coagulation abnormalities and increased transfusion requirements (4), and increased risk of acute kidney injury (5).

In comparing the OHSU CVICU to other similar ICUs in the UHC database, we use more 5% albumin than average. For those hospitals that have lower albumin usage, there does not appear to be a correlation with mortality index, ICU days, or hospital LOS. At the moment, no clear evidence exists to support widespread use of albumin resuscitation.

Intervention:
An interdisciplinary work group developed a new standard work to reduce the use of 5% albumin as a volume expander. We removed 5% albumin from the post-cardiac surgery CVICU admission orderset, leaving lactated ringers as the fluid of choice for fluid resuscitation. This change occurred on January 11th, 2016. Education was provided to the ICU team members regarding the rationale for the change via ICU team meetings, the nursing education group, and the CVICU newsletter.

Methods:
In this retrospective, before-and-after evaluation, we compare the total volume of albumin used, and associated pharmacy costs, in CVICU patients in two distinct time periods: January through March 2015 (pre intervention) and January through March 2016 (post intervention).

Methods, cont:
An ongoing study will evaluate post-cardiac surgery patients only, and will extract patient-level data from various OHSU databases to determine if the intervention had an effect on the following clinical parameters:
1. Total fluid volume administered in the first 3 ICU days
2. Total ventilator hours
3. Time until off vasopressors
4. Total blood products administered postoperatively in the first 3 ICU days
5. Creatinine change (preoperative creatinine versus peak creatinine in the first 3 ICU days
6. Total urine output during the first 3 ICU days
7. ICU length of stay

Preliminary Results:
In the 12-week period following the intervention in 2016, the average number of patients treated with albumin in the CVICU was 1 ± 1.56 patient per week, compared to an average of 15 ± 2.57 patients per week in the same time period in 2015 (Fig 1).

In the 12-week period following the intervention in 2016, the average weekly actual cost of 5% albumin to the CVICU was $158.08 ± $208.33 vs. $1510.51 ± $433.29 during the same weeks in 2015 (Fig 2). Comparing the two 12-week time periods, the CVICU saved $16,229 in actual cost of 5% albumin. Extrapolated to a one year period, this could represent an approximately $65K cost reduction in a year.

Discussion:
With a simple intervention of removing 5% albumin from the post-cardiac surgery orderset, coupled with education targeted to the ICU teams, the use of albumin for resuscitation has decreased dramatically for CVICU patients, as has cost. A more in-depth analysis later this year will further explore any clinical implications of this change in practice for post-cardiac surgery patients.

References: