Healthcare Organization Commitment

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Commitment Details

Commitment Name
Optimization of Perioperative Fluid Therapy and Transfusions

How Many Hospitals Will This Commitment Represent?
1

Commitment Summary
Hemodynamic optimization using intravenous fluid administration may have a positive influence on outcomes of treatment in terms of lower occurrence of complications and
reduced length of stay in hospital, as well as improved long-term effects in moderate and high-risk patients. The complexity of the procedure is one of the reasons why only 16% of anaesthesiologists use GDFT for high-risk patients. Thus, automated clinical decision support systems (ACDSS) are entering the market. They are based on sophisticated simultaneous evaluation of several invasive and non-invasive flow-related parameters. However, there is evidence that hemodynamic optimization may not be sufficient for achieving the better results of treatment. Although benefits of GDFT were prevailing in early reports, the more recent data showed no benefit or even worse outcomes. These controversial findings may find explanation in the possibility of excessive fluid accumulation in tissues (edema) when fluids are infused following hemodynamic endpoints. However, conventional clinical methods are not sufficiently sensitive and specific for the detection of when the necessary fluid accumulation in tissues turns into edema during hemodynamic optimization by fluids. Thus, a mini Volume Loading Test (mVLT) for detection of imminent edema during stepwise infusion was proposed. The method defines hemodilution non-responsiveness as a sign of imminent edema. It may or may not coincide with non-responsiveness of hemodynamic parameters. The mVLT has undergone preliminary validation in healthy volunteers and major surgery patients. Its implementation needs automated real time analysis of changes in hemoglobin during stepwise fluid infusion. A software for a PC was developed for that purpose. It is used as part of the novel ACDSS in the prototype semi-closed loop (SCL) infusion system. The ACDSS generates clinical advices in compliance with an algorithm that was developed by orthopedic surgeons and anesthesiologists from our international research team. One of the parts of this is a goal directed optimization algorithm which implies evaluation of hemodilution responsiveness during stepwise fluid loading. According to an mVLT, further fluid loading is not any longer justifiable when plasma dilution is not any longer enhanced. Vasopressors are then considered. Red cell transfusion is considered if signs of anemia persist after the optimisation. This prototype currently undergoes the efficiency and safety evaluation in a randomized clinical trial that will end in June, 2015.

Commitment Description & Detail
The commitment is to develop a semi-automated system that would enable both the generation of clinical advice and administration of therapy such as fluid infusion, vasopressor injection or transfusion. That would optimize the treatment and increase the safety of a patient.

Action Plan
The prototype of a semi-closed loop infusion system currently undergoes the efficiency and safety evaluation in a randomized clinical trial that will end in June, 2015. Then it will be upgraded in order to process more vital signs and will be put to the test again.

Commitment Timeline

Impact Details
Estimate of Lives Potentially Saved
800,000 people lives worldwide may be saved in a perioperative period if rational fluid therapy is applied.