Clinical Service Line: Renal

Date:

Project Title:

Clinical Challenge: The purpose of this project is to decrease the incidence of peritonitis for current and future peritoneal dialysis patients that result in readmission into the hospital by identifying infection in its early stages and refining/replacing the mechanics of existing PD devices to increase reliability of PD home care.

Clinical Challenge (James): The purpose of this project is to decrease the incidence of peritonitis for current and future peritoneal dialysis patients by identifying infection in its early stages and refining/replacing the mechanics of existing PD devices.

End stage renal disease healthcare is experiencing a shift from in-center hemodialysis to home dialysis due to the recent executive order on Advancing American Kidney Health (AAKH). Peritoneal dialysis is considered the simplest and less taxing form of home dialysis option and will likely be the form that most new patients will utilize. However, the major barrier to consistent, long-lasting peritoneal dialysis viability is commonly occurring infection of the peritoneal cavity, or peritonitis. About 0.7 infections/patient/year will occur.

Feedback from Dr. Rosen & Company: Some more focus of the populations that are particularly at risk for ESDR (and how those numbers are in rates of infection as well). Talk a little bit more on those populations that are vulnerable (race & SES) and how those play a role. Talk about finances of how certain % people on PD get infections and how that number is going to go through the roof as this shift occurs ($$ for infection in PD, multiple by steep curve of patients moving into PD).

Potential Contribution to Patient Care: The AAKH order set a goal of putting 80% of new dialysis patients on home dialysis by 2025. Attenuating the major downside of peritoneal dialysis infection is likely to make a big impact in the next five years and beyond. Less infection of the peritoneal cavity will result in 3 major health contributions:

1) Less distress for the patient, better quality of life, and allows for work

2) Fewer patients seeking emergency care for infection

3) Longer-lasting viability of the peritoneal cavity, and thus a longer time to utilize peritoneal dialysis as a therapy.

We have discussed this clinical challenge, and each member of our team, our Clinical Advisor(s), and our Professors agree that this project addresses a clearly defined clinically need, is relevant to clinical practice at the BMC, and meets the course requirements for a BME Master of Engineering degree.

Meeting with Dr. Bowman and Dr. Khan:

Investment now for the future of home dialysis: “getting compensation for doing the right thing”.

EOB: Medicare is straightforward

* Complication vs barrier
* Baxter: more of an outreach that Fresenius: Baxter tends to be less user friendly
* Infection detection
* Infection can come from within to not just form the outside
* Detection of leukocytes
  + What reagents
  + Glucose, pH
  + 100< white blood cells w/ at least 50% leukocytes/neutrophils (how do they do this now)
  + Think of like a litmus test

Tyto with a phone light.

Positive control and changes color at infection

When it’s just one patient: get rid of one time cost

Dispose the fluid and throw the bag away: weighs bag to determine ultrafiltration

* Not as precise

Optical?

Chemical?

External vs Internal? Software vs Hardware

Fibrosis of the peritoneum

Make it available to a lot of patients.

Patient burnout, other complications

Other osmotic agents: glucose is toxic to the membrane

Starch