



The Future of Dialysis in the Time of COVID

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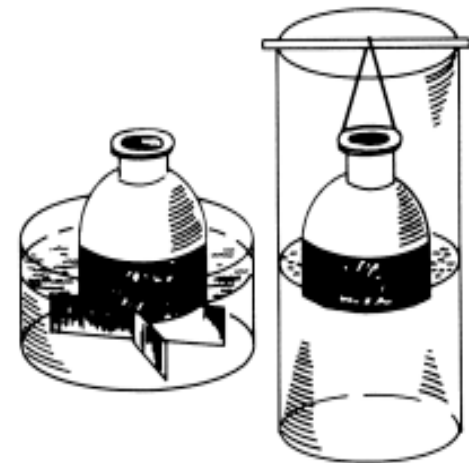
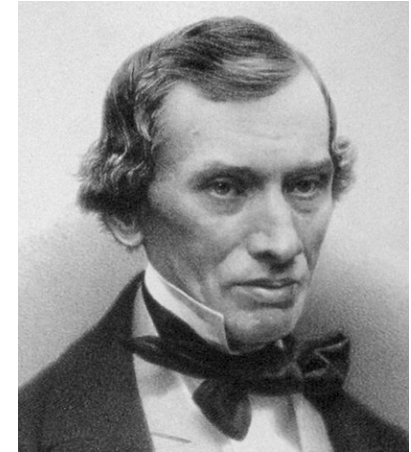
- Disclosure

- Natera: external advisory board
- Sanofi: external advisory board
- Alexion: speaker bureau

- Brief Description of dialysis
- Dialysis and COVID19
- Challenges
 - Safety for patients and staff
 - Maintenance
 - Acute dialysis in hospitals

Origin of Dialysis

- Thomas Graham
 - Scottish Chemist
 - 12/1805 – 9/1868
- Coined the term “Dialysis”
- Crystalloids diffuse through vegetable parchment coated with albumin (which acted as a semi-permeable membrane)
- He called this “Dialysis”. Using this method he was able to extract urea from urine
- Widely used in research, industry and now Medicine

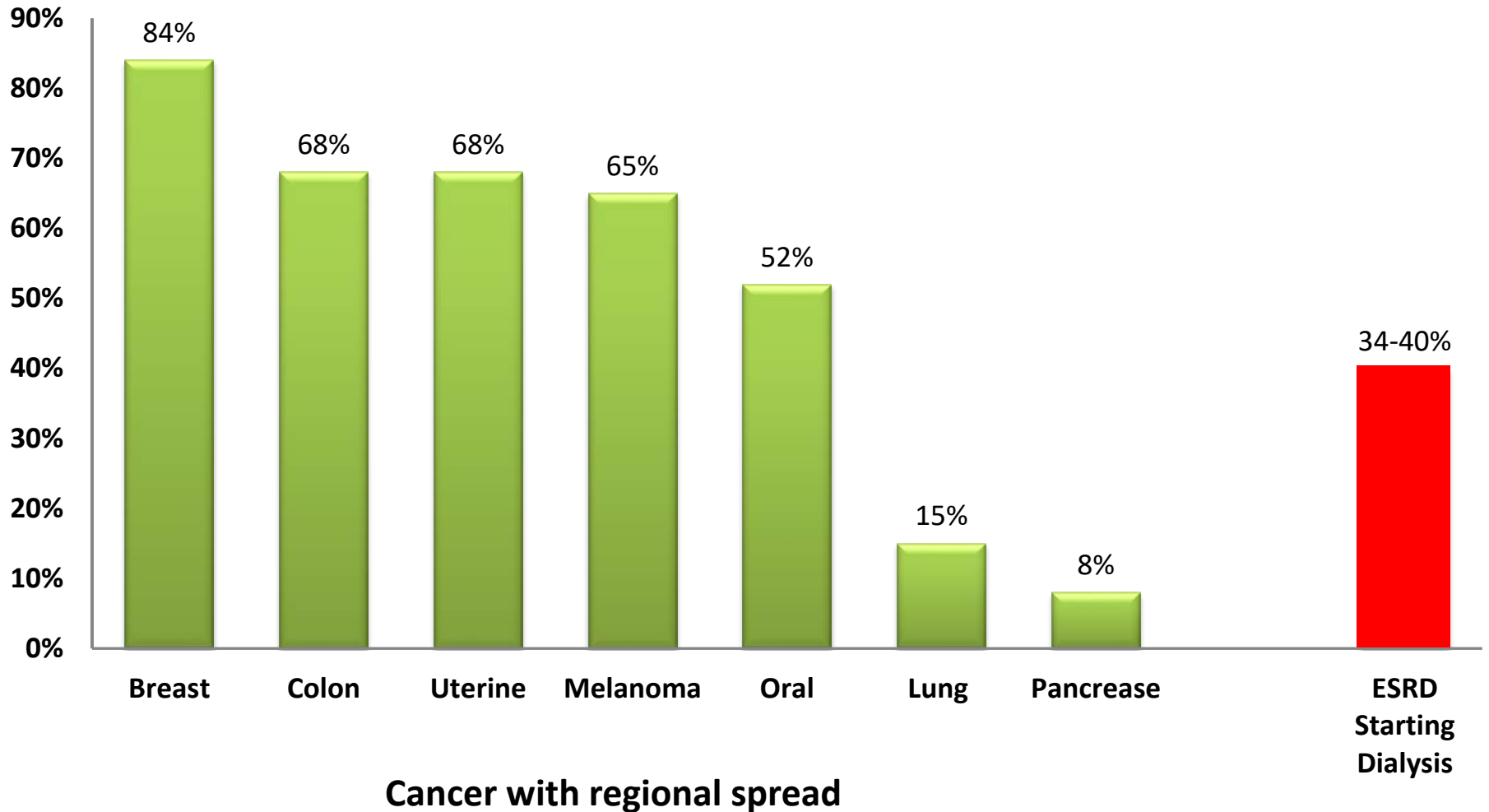


"Bulb Dialyser" um 1855 nach T.Graham

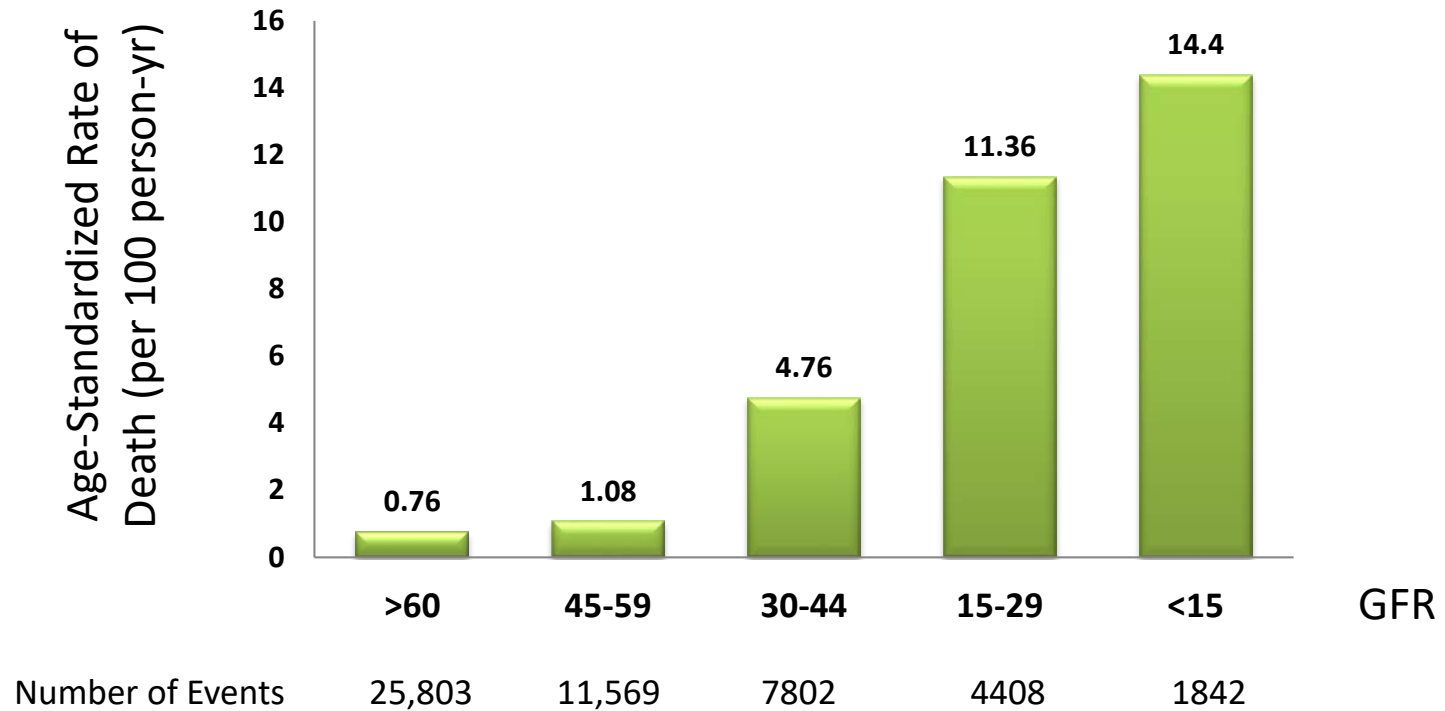
Dialysis

- Renal Replacement Therapy
- Needed to sustain life in patients with terminal kidney Failure (ESRD, ESKD)
- Can be in acute setting or chronic setting
- Hemodialysis or Peritoneal Dialysis
 - Hemodialysis can be in-center or at home
 - PD is a home modality
- ***In most patients should be a bridge to transplant***

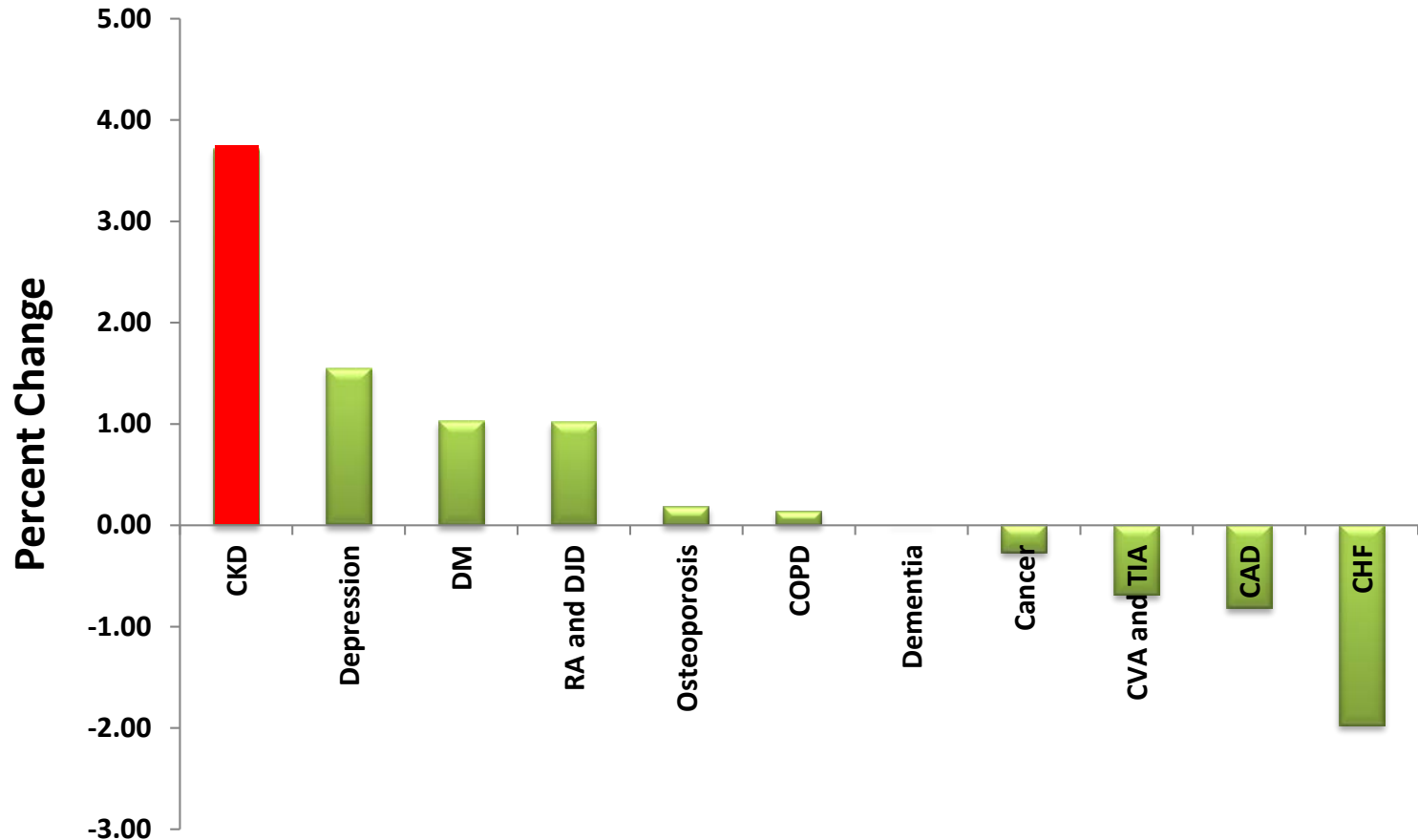
Five Year Survival: Starting Dialysis vs Cancer (Higher is better)



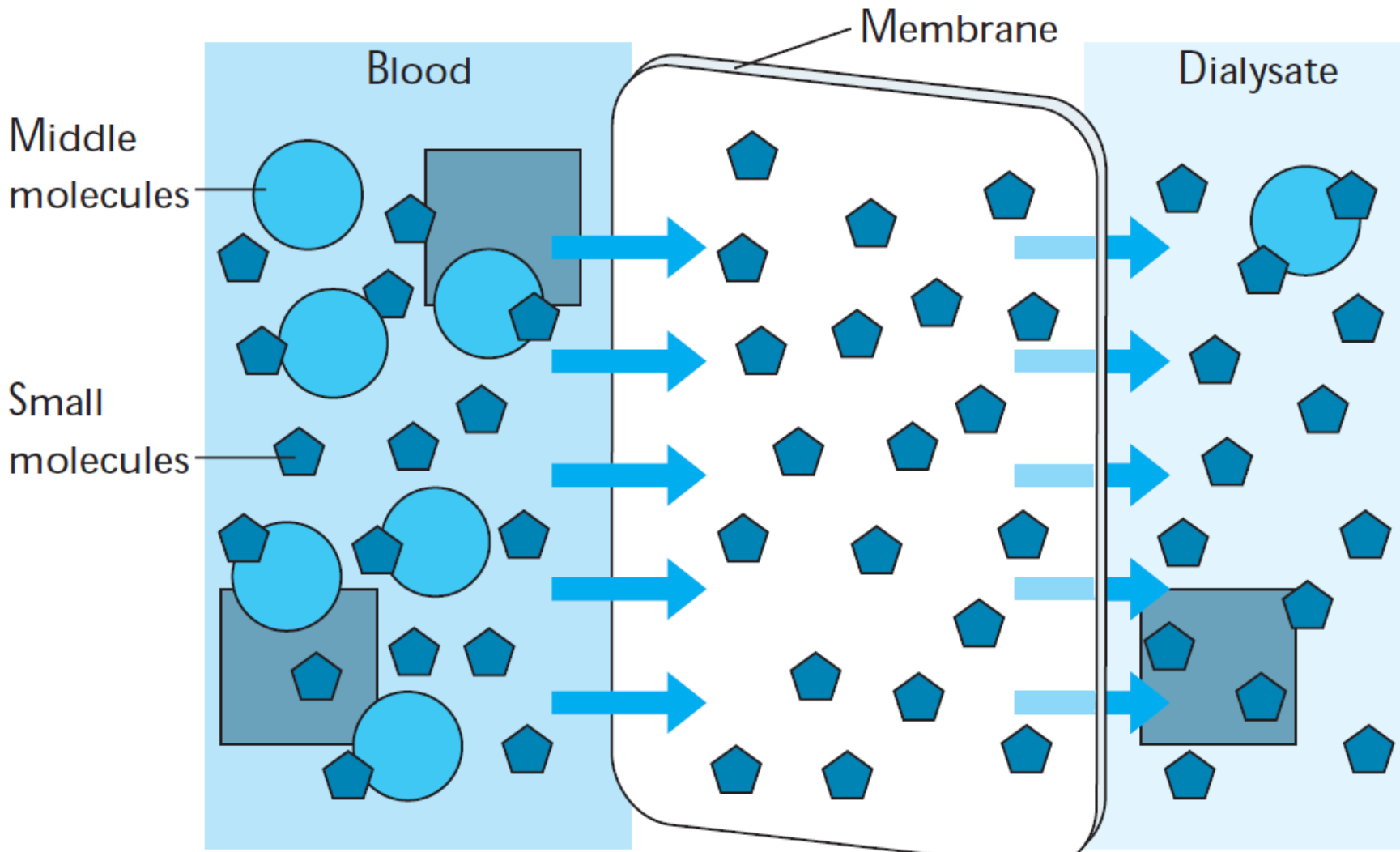
Age Standardized Rate of Death in CKD



CKD is the Fastest Growing Chronic Disease in USA



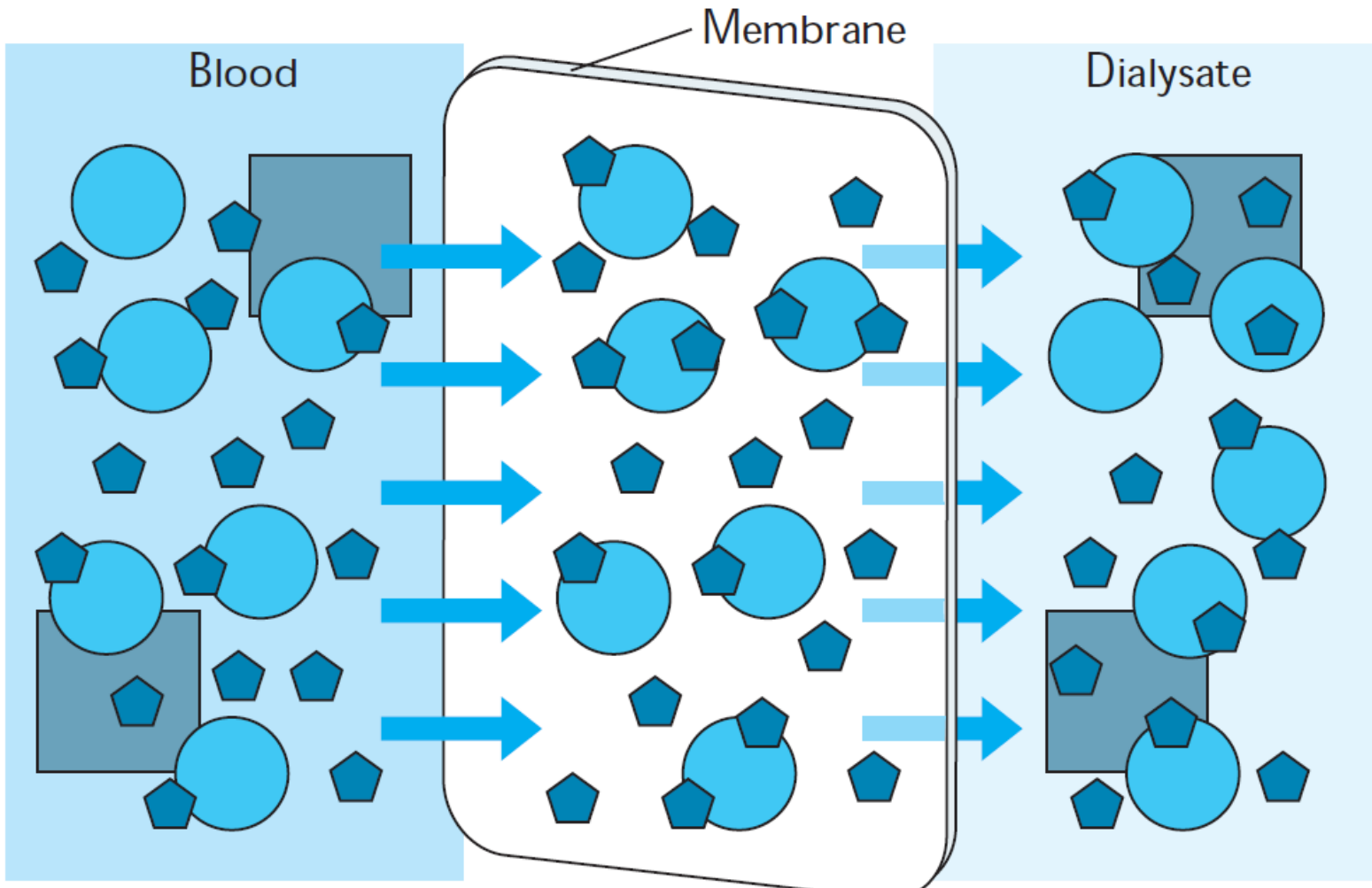
Change in Prevalence of Chronic Diseases in Medicare/Medicaid Beneficiaries 2008-2010



Diffusion

Concentration gradient

Small Solute clearance



Convection

Pressure gradient and Solvent Drag
Better Middle Molecule Clearance

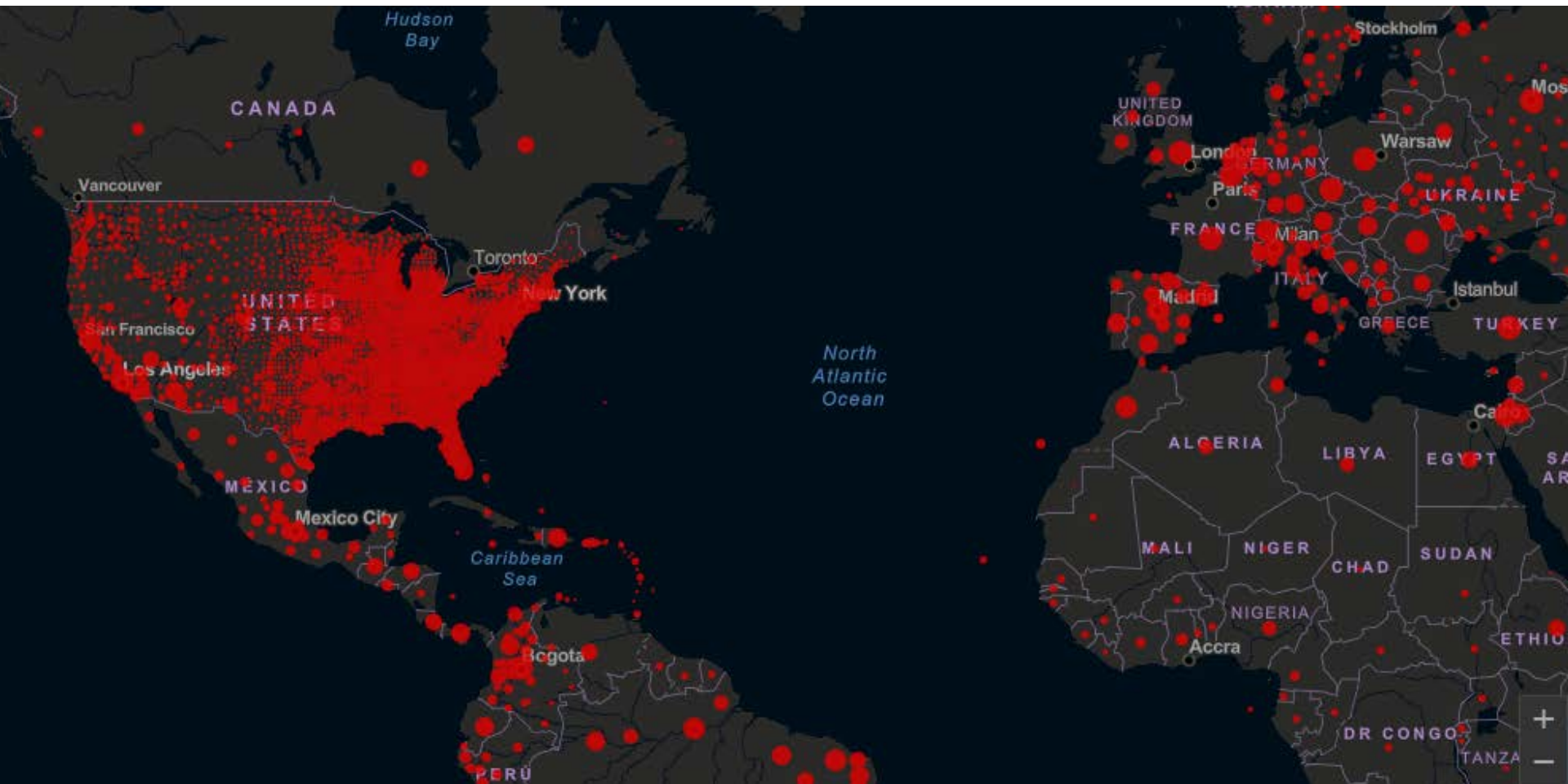
SARS-CoV2 and COVID19

- A novel corona virus
- ***No effective treatment***
- More than 1.2 million death world wide
- High infection rate
- High debility and mortality
 - In general population up to 4%
 - In dialysis population up to 20%
- Transmission: mainly by droplet and contact
 - Droplets can hang in the air for up to 3 hours

SARS-CoV2 in USA

- More than 10 million cases
 - Top in the world
 - Rank 16th in number of cases per million population
- More than 240,000 death (2.4%)

Cumulative Cases USA and Europe



Risk for In-Center Dialysis Population

- **Higher exposure risk**
 - Patients cannot self isolate unless they are on home dialysis
 - Close contact for potentially infected subjects (transport, patients, staff)
- **Higher mortality rate** than rest of population
- **Limited and saturable resources in hospitals**
 - Limited number of dialysis machines
 - Limited number of trained dialysis staff
 - Limited physical space

Protecting Dialysis Population

- **Protect Staff**
- Reduce transmission
- Early identification of cases
- Proper isolation of cases and managing resources

Controlling Transmission

- Educating patients and staff.
- Transmission does not stop at dialysis unit door
- Use of PPE
 - Masks, face shields, goggles, gowns, gloves.
- Physical distance (not always feasible)
 - 6 Feet
- Hand washing
- Air Sanitization and air circulation (**especially common closed space like brake rooms**)
 - Most hospitals systems > 6 exchange per hour

Challenges for COVID19 Hospitalized Dialysis Patients

- No sufficient isolation rooms
- Not enough staff to dialyze all in their own hospital rooms
- Cutting dialysis time
- Communication with outpatient dialysis
- Risk of exposure to other pathogens

Home Dialysis to the Rescue

- Better outcome compared to in-center
- Lower mortality compared to in-center
- No risk for exposure
- COVID19 has incentivized patients to chose home dialysis

- Not every one can do (multiple factors)
- Requires dedicated staff to train and support patients

Summary

- Dialysis patients are at higher risk of being infected
- Higher mortality rate than rest of population
- Home dialysis provides an excellent safe therapy
- Dialysis units are safer than supermarkets and definitely safer than Bars
- Do not become *Typhoid Mary*



America

The Future of Transplant in the Time of COVID

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Director of Abdominal Transplant
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November 12, 2020

Objectives

- Discuss the impact of COVID 19 on the care of transplant recipients.
- Describe the short and long term care of transplant recipients.
- Describe short and long term complications post-transplant

Disclosure

I have nothing to disclose

By the Numbers

There are **109,501** people waiting for lifesaving organ transplants in the U.S.

- **68,324** are active on the waiting list.

Of these, **92,477** await kidney transplants.

- **55,858** are active on the waiting list.

In 2019, **23,401** kidney transplants took place in the US.

- This was a **10.6%** increase from 2018 when 21,167 kidney transplants were performed.
- **11,152** were from deceased donors
- **6,863** were from living donors

Source: OPTN data as of 8/5/20

By the Numbers

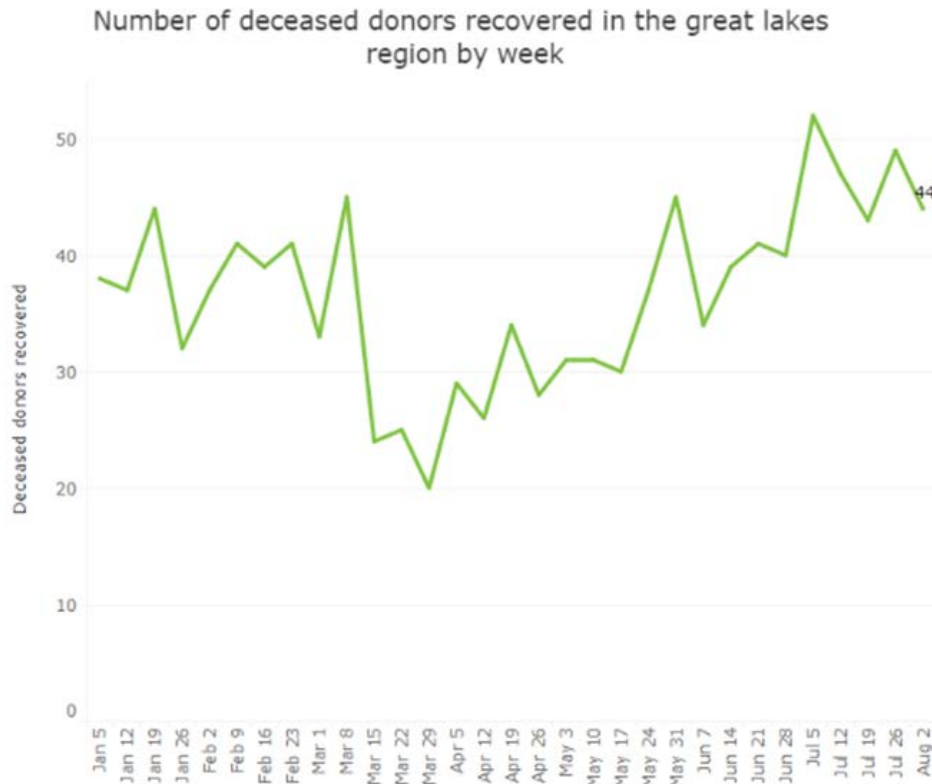
- **41,093 candidates were added to the kidney waitlist in 2019**
 - **112** added to the waitlist per day
 - **291** were from Wisconsin
- **3,746 patients died while waiting for a kidney transplant. Another, 4,228 people became too sick to receive a kidney transplant.**
 - **10** people die per day waiting for a kidney transplant.

Source : OPTN data as of 8/5/20

COVID By the Numbers - OPO

Organ donation decreased at the beginning of pandemic due to multiple factors (lack of donor COVID testing initially, hospital support, etc)

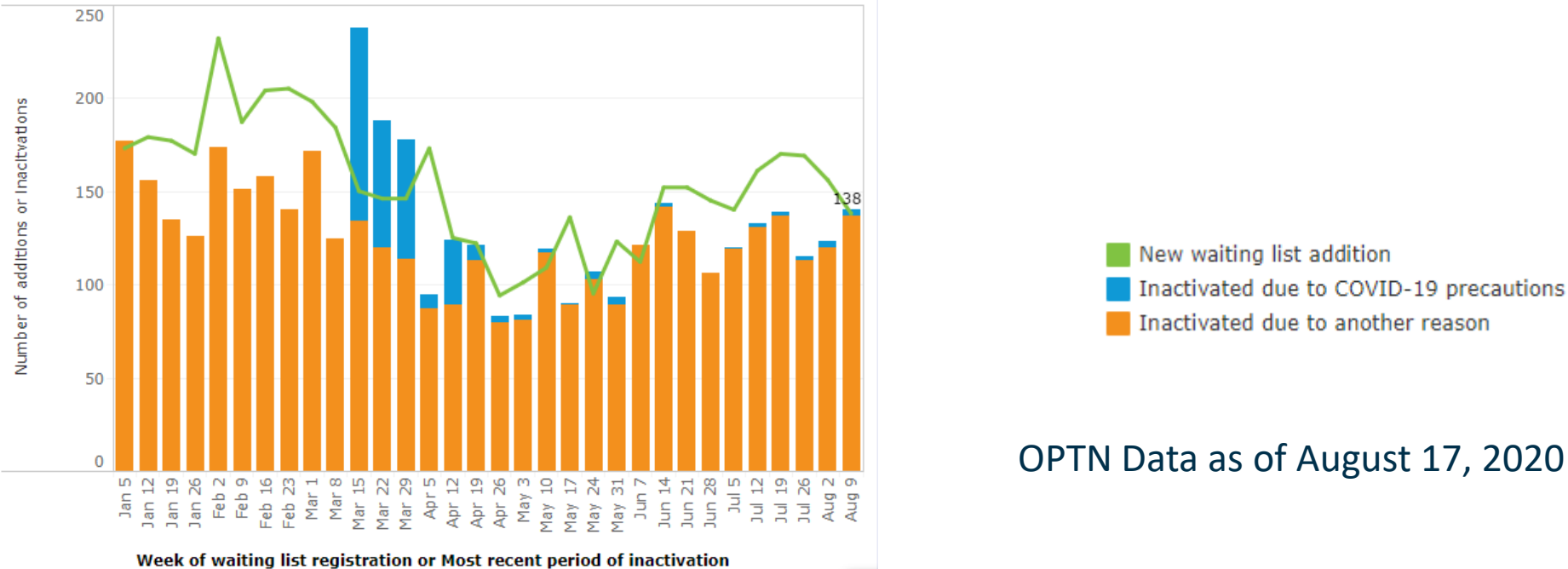
CMS deemed transplant an essential service March 18, 2020



OPTN Data as of
August, 17, 2020

COVID By the Numbers - Waitlist

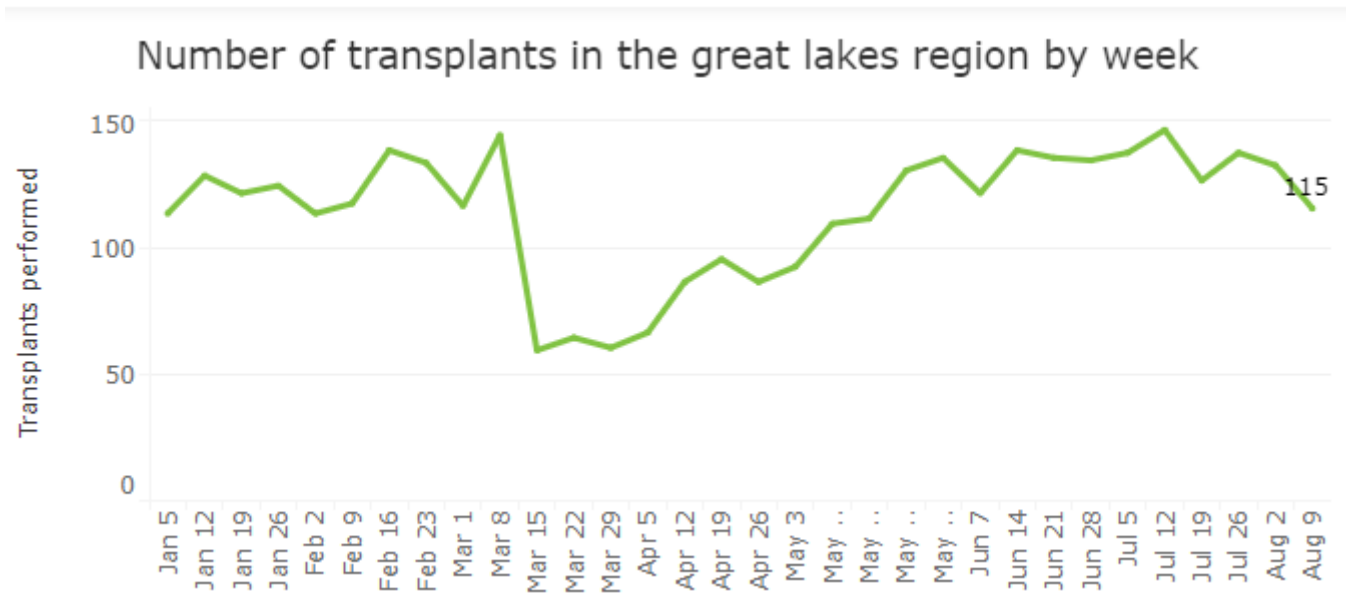
Waitlist additions and inactivations in the great lakes region



OPTN Data as of August 17, 2020

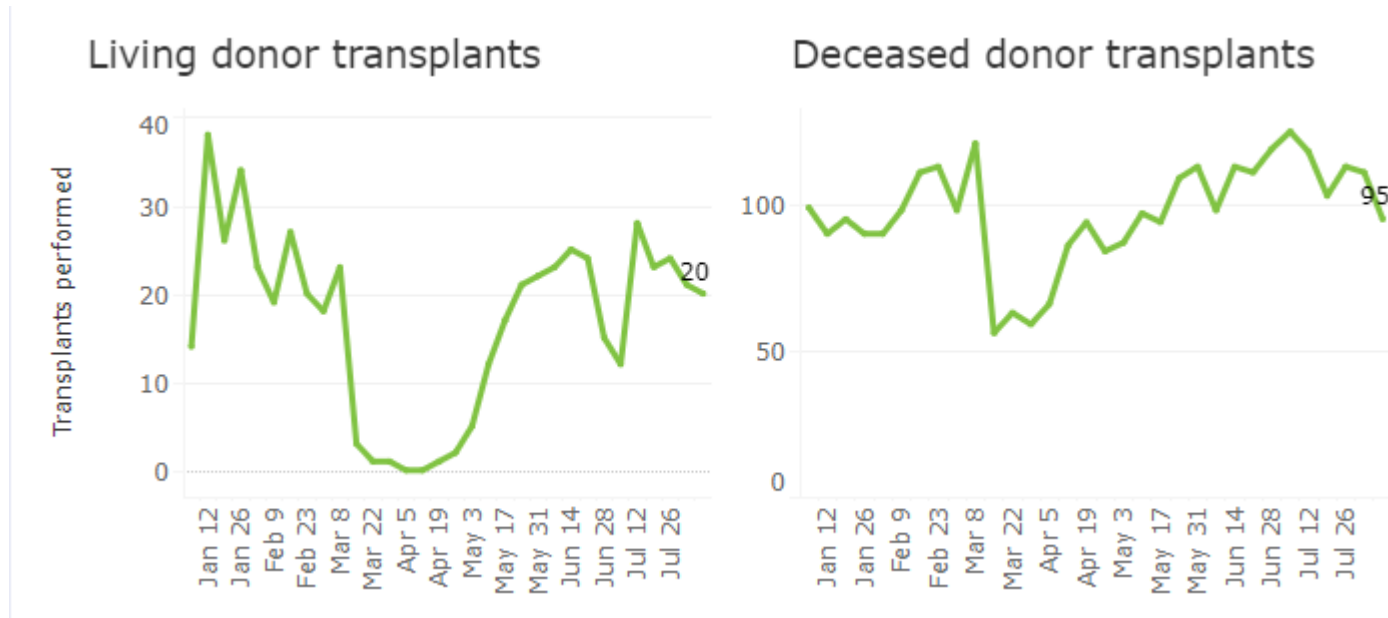
COVID By the Numbers - Transplantation

COVID impacted organ transplantation at the beginning of the pandemic and returned to normal within 2 months.



OPTN Data as of August 17, 2020

COVID By the Numbers - Transplantation



OPTN Data as of August 17, 2020

COVID's Impact on Transplant

- OPOs led the way with timely and reliable COVID testing
 - Transplant centers were refusing organs without testing
- Many transplant centers had to temporarily suspend transplant activities d/t hospital resources (PPE conservation, limited recipient COVID tests, hospital bed shortages, medication shortages, staffing, etc)
 - Living donor kidney transplantation was viewed as elective
- No visitor policies made assessment of family support and family education challenging
 - Many centers transitioned to virtual platforms
- Transplant evaluations were suspended
 - Office visits were transitioned to virtual, labs and diagnostics postponed

Short-term Care of the Transplant Patient

- Short-term is during the transplant admission
- ICU length of stay 24-28 hours
 - Extubated ASAP
 - Close hemodynamic monitoring for graft function optimization
 - Goal SBPs between 120-160s
 - Too low = ATN or thrombus
 - Too high = anastomosis complications or CVA
 - Hourly I&O – volume replacement per protocol
 - Foley until POD 4 to promote anastomosis healing
- Immunosuppression adjustments
 - Tacrolimus Cellcept and Prednisone
 - Tacro levels drawn daily for trough levels – dosing depends on levels
 - Prednisone taper over several weeks

Complications – Short-term

- Acute Tubular Necrosis (ATN)
 - Ischemic injury sustained by the transplanted kidney - Completely reversible process
 - Signs include: Anuria or oliguria lasting days to weeks with electrolyte derangements
 - May require intermittent dialysis post-transplant to control fluid overload and uremia until the transplanted kidney begins to filter adequately
- Bleeding
 - Pre-op history of bleeding disorders or platelet deficiency, Anticoagulation (Heparin, Plavix, ASA, or Coumadin), Post-operative hematoma
 - Signs include: Increased abdominal pain/distention, Increased bloody drainage from Jackson-Pratt (JP) Drain, Hemoglobin & Hematocrit that continues to steadily fall requiring frequent blood transfusions, New onset tachycardia and/or hypotension not responding to volume resuscitation
 - Treatments include: Consider obtaining US or CT to assess for fluid collections around the kidney transplant, If JP present, send fluid for Hematocrit, Consider emergency exploratory laparotomy if indicated
- Renal artery thrombosis
 - Arterial or Venous, usually arterial, Due to clots or technical surgical problems such a tortuous anastomosis, Post-operative edema can mimic stenosis
 - Signs include: Sudden decline or cessation in urinary output, Tenderness at graft site, Elevating creatinine or dramatic jump, Hematuria (may be secondary to ureteral stent placement)
 - Consider US with doppler to evaluate vascular flow (RIs)
 - If abnormal, then percutaneous thrombectomy vs laparotomy with transplant nephrectomy if kidney is not viable

Complications – Short-term

- Urine Leak
 - Frequently occurs at the anastomosis, Foley remains in place until POD 4 to allow healing
 - Signs include: Decreased urine output, Post-Void Residuals >200ml consistently, Drain fluid creatinine > than serum creatinine, Systemic signs of infections
 - Treatments include: Consider Nuclear Medicine Renogram, US or CT to assess for fluid collection, If small leak, consider bladder decompression with Foley catheter and placement of percutaneous nephrostomy tube with ureteral stent across anastomosis. This creates diversion of urine to allow anastomotic site to heal. Can take 2-4 weeks. If persistent leak then surgical revision is needed
- Renal Artery Stenosis
 - Technical complication at the renal artery anastomosis
 - Signs include: Uncontrolled Hypertension, Worsening Renal Function, Audible bruit noted over stenotic artery
 - Treatment includes: Consider US with doppler of kidney transplant (evaluate RIs), Consider Renal artery angiogram for confirmation with angioplasty and stenting if needed. Use minimal dye to prevent contrast induced nephropathy in combination with an already compromised kidney. May require surgical intervention and reconstruction

Wound Infections

- All immunosuppression increases the susceptibility to infections and delay wound healing
- Diabetes is a common cause of CKD and leads to poor wound healing
- Provena vac to remain in place until POD 5
- Vitamin A to act as a steroid antagonist
- If persistent drainage, place dressing and change frequently to prevent wound infection

Acute Rejection

- Natural response of immune system
- Prevented with Thymoglobulin or Simulect induction and higher levels of immunosuppression

Signs

- Elevated creatinine
- Tenderness or pain over graft site
- Decreased urine output
- Fatigue
- Fever

Treatment

- Diagnosis via donor specific antibody vs kidney biopsy
- Treatment depending on type of rejection (Humoral vs Cellular)

Long Term Care of the Transplant Patient

Wound

- Monitor for S&S of infection
- Higher incidence of delayed wound healing with obesity
- Wound vac / Wound Clinic follow up

Staples

- Removed Post Op Day 21

Ureteral Stent to anastomosis site of Ureter/Transplanted Kidney

- Placed during transplant surgery
- Removed by Urology around Post Op week 2-4

Frequent labs

- Initially twice weekly weaning to monthly over time

Clinic Follow Up

- Twice weekly with Surgeon, then care is transferred to Nephrologist
Nephrologist wean visits to every 6 months over time

Managing medications

- New immunosuppression medications
- Potential changes to pre-transplant medications (IE, Blood pressure, etc.)

Long Term Care of the Transplant Patient

- Labs

Frequency

- Monthly labs – LIFETIME!!!
- Timed lab draw due to Tacrolimus trough level

Labs Hours

- Open early enough to accommodate timed lab draw
- Weekend hours PRN

Multiple Options for lab draws

- Labs – system facility
- Labs at outside provider facility
- Labs “at home” – location near residence
- Labs drawn by home health in the home

Need to plan for delay in obtaining Tacrolimus results due to remote lab locations, outside provider lab, etc.

Long Term Care of the Transplant Patient – Medication Management

Most medication changes made over the phone with patient by coordinator

- Changes to be called to patient, spouse, significant other, caretaker, sibling, etc.
- Important for coordinator/transplant team to know that changes can be made by competent individual AND done correctly

Filling Medication box

- Patient/Family
- VNA assistance
- Bubble wrapping by pharmacy

Supplements / Herbal medications

- Interfere with absorption of immunosuppression medications
- St. John's Wort and Herbalife known to cause rejection

Drug Interactions

Increase Prograf levels

- Antifungals (Fluconazole, Itraconazole, Ketoconazole)
- Antibiotics (Clarithromycin, Erythromycin)
- Calcium Channel Blockers

Decrease Prograf levels

- Rifampin
- Phenytoin
- Phenobarbital
- Carbamazepine

Complications – Long Term

HTN / Cardiovascular:

- Leading cause of death – 3 to 5 times greater in transplant patient
- Secondary effects of immunosuppression
- Pre-existing condition – transplantation will NOT improve - needs continued management post transplant
- Weight gain
- No smoking / Stop smoking
- Restricting sodium – 2 gram Sodium Diet

Hyperlipidemia:

- Secondary effects of immunosuppression
- Heredity factors

Diabetes:

- Secondary effects of immunosuppression
- Heredity factors
- Long term Prednisone

Complications – Long Term

Malignancy:

- Skin cancer most common, dermatology follow up Annually
- Liver cancer recurrence: tumor markers and imaging until 5 years post
- Up to date on routine screening: mammogram, colonoscopy, PSA, etc.
- Immunosuppression is decreased after cancer diagnosis

Infection:

- UTI
- CMV – most common viral infection post transplant
- BK Polyoma Virus

Skeletal:

- Bone loss most rapid first 6-12 months
- Bone Mineral Density every 2 years
- Calcium supplements
- Vitamin D promotes absorption of calcium

Complications – Long Term

Recurrent Disease

- Polycystic kidney disease

NOTE: Native kidneys not removed unless causing infection or uncontrolled Hypertension

- FSGS
- Hepatitis C
 - Treatment post transplant priority

Rejection

Cellular rejection

- Antibody mediated rejection

Stressing importance for patient to contact coordinator with any changes or updates to medical status

- Cardiac Cath: Utilization of minimal amount of dye, requires fluids before and/or after imaging
- Dental cleaning requires prophylactic antibiotics 1 hour pre-dental procedure

Special Considerations

Avoid NSAIDs: Medication is “hard” on kidneys

- Ibuprofen
- Aleve
- Naprosyn

Vaccines / Immunization

NO “LIVE” VACCINES...DEAD VIRUS ONLY!!!

Immunizations that you may receive

- Flu vaccine
- Pneumonia vaccine
- TDAP
- Hepatitis B vaccine series
- DPT Booster
- Tetanus
- Shingrex

Immunization that you may **NOT** receive:

- Smallpox
- Measles
- Rubella
- Chickenpox / Shingles Live virus
- Nasal mist flu vaccine

Long-Term Psychosocial Concerns

Side effects of medications

- Hair loss
- Weight gain
- Erectile dysfunction

Insurance

- Discuss any changes to insurance coverage after transplantation with financial coordinator

Return to Work

Noncompliance

- Labs
- Clinic follow up
- Medication

Return to ETOH / Drugs

“Home” away from home- The clinic

Questions?



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