NEPHROTOXICITY

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CAROLINA NEPHROLOGY

ITS ALL IN THE NUMBERS

- ABOUT 37,000,000 US ADULTS ARE ESTIMATED TO HAVE CKD ---US CENSUS FOR THE ENTIRE POPULATION OF SOUTH CAROLINA IS 5,148,714
- 48% OF PEOPLE ARE NOT AWARE THEY HAVE CKD
- EVERY 24 HOURS, ABOUT 340 PEOPLE BEGIN DIALYSIS TREATMENTS
- IN 2017, TREATING MEDICARE BENEFICIARIES WITH CKD COST OVER $84 BILLION, AND TREATING PEOPLE WITH ESRD COST AN ADDITIONAL $36 BILLION
- HTTPS://WWW.CDC.GOV/KIDNEYDISEASE/BASICS.HTML
- HTTPS://WWW.CENSUS.GOV/QUICKFACTS/SC

NEPHROTOXICITY

EXPOSURE TO A DRUG OR TOXIN THAT CAUSES DAMAGE TO THE KIDNEYS

ACUTE KIDNEY INJURY FROM NEPHROTOXICITY

- THE FREQUENCY OF DRUG-INDUCED NEPHROTOXICITY CAUSING AKI IS APPROXIMATELY 14-26% IN ADULT POPULATIONS
- AMONG OLDER ADULTS, THE INCIDENCE OF DRUG-INDUCED NEPHROTOXICITY MAY BE AS HIGH AS 66%

  HTTPS://BMCNEPHROL.BIOMEDCENTRAL.COM/ARTICLES/10.1186/S12882-017-0536-3
- HTTPS://WWW.AAFP.ORG/AFP/2008/0915/P743.HTML#SEC-2

CONTRIBUTING NEPHROTOXIC FACTORS

- AGE OLDER THAN 60 YEARS
- UNDERLYING RENAL INSUFFICIENCY
- VOLUME DEPLETION
- DIABETES
- HEART FAILURE
- SEPSIS
- HTTPS://WWW.AAFP.ORG/AFP/2008/0915/P743.HTML#SEC-2

ACUTE KIDNEY INJURY
THE COST--$$$

- PROGRESSIVELY LARGER INCREASES IN SERUM CR ARE ASSOCIATED WITH INCREMENTALLY WORSE CLINICAL OUTCOMES, INCLUDING MORTALITY AS WELL AS HIGHER COSTS
- INCREASES IN CR OF 0.5MG/DL TO 0.9 MG/DL ARE ASSOCIATED WITH AN INCREASE IN HOSPITAL COSTS OF OVER $5,000.00
- INCREASES IN CR OF >2.0 MG/DL ARE ASSOCIATED WITH INCREASED COSTS OF ALMOST $25,000.00
- AFTER ADJUSTMENT FOR CONFOUNDING VARIABLES SUCH AS AGE, GENDER, WEIGHT, AND OTHER CONCOMITANT MEDICAL CONDITIONS. AN INCREASED IN CR OF ≥0.5 MG/DL WAS ASSOCIATED WITH A 6.5-FOLD INCREASE IN MORTALITY AND A 3.5-DAY INCREASE IN LENGTH OF STAY.
- HTTPS://WWW.CATHLABDIGEST.COM/ARTICLES/CONTRAST-INDUCED-NEPHROPATHY-HOW-AVOID-LIFE-CIN

COMMON NEPHROTOXIC DRUGS

- ANTIBIOTICS: AMINOGLYCOSIDES (VANCOMYCIN), BACTRIM
- ANTIFUNGALS: AMPHOTERICIN B
- ANTIVIRALS: ACYCLOVIR
- ANTIHYPERTENSIVES: ACE INHIBITORS, ARBS
- NSAIDS: MOTRIN, TORDAL, IBUPROFEN
- COX 2 INHIBITORS: CELEBREX
- IMMUNOMODULATORS: CHEMOTHERAPY AGENTS, CYCLOSPORINE, TACROLIMUS
- CONTRAST DYE: 3RD LEADING CAUSE OF HOSPITAL ACQUIRED AKI

CONTRAST INDUCED NEPHROPATHY

- **CONTRAST-INDUCED NEPHROPATHY** (CIN) IS THE IMPAIRMENT OF KIDNEY FUNCTION—MEASURED AS EITHER A 25% INCREASE IN SERUM CREATININE FROM BASELINE OR A 0.5 MG/DL INCREASE IN ABSOLUTE SCR VALUE—WITHIN 48-72 HOURS AFTER INTRAVENOUS **CONTRAST** ADMINISTRATION
- INCREASE CANNOT BE ATTRIBUTED TO ANY OTHER IDENTIFIABLE CAUSE OF RENAL FAILURE. SCR USUALLY RETURNS TO NORMAL IN 14 DAYS.
- HTTPS://EMEDICINE.MEDSCAPE.COM/ARTICLE/246751-OVERVIEW

CONTRAST INDUCED NEPHROPATHY

- PATHOGENESIS IS NOT BEEN CLEARLY DEFINED
- IT IS HYPOTHESIZED THAT TOXIC EFFECTS OF CONTRAST MEDIA CREATE OXIDATIVE STRESS IN THE FORM OF RADICAL OXYGEN SPECIES AND SUBSEQUENT HYPOXIA-INDUCED RENAL TUBULAR DAMAGE.
- EVEN SMALL BUMPS IN CREATININE REFLECT GENUINE RENAL DAMAGE, WHICH IN TURN IS CLINICALLY RELEVANT
- HOWEVER, MOST PEOPLE WILL RETURN TO THEIR BASELINE CREATININE UNLESS THERE ARE OTHER FACTORS…..
- HTTPS://EMCRIT.ORG/IBCC/CONTRAST/

CONTRAST INDUCED NEPHROPATHY

- INCREASED LENGTH OF HOSPITAL STAY
- ADVANCED INTERVENTIONAL TREATMENT SUCH AS DIALYSIS
- PRE-EXISTING COMORBIDITIES SUCH AS HYPOTENSION, HYPOVOLEMIA, DIABETES, AND CONGESTIVE HEART FAILURE CONTINUED TREATMENT OR EXACERBATION WHILE IN HOSPITAL

CONTRAST INDUCED NEPHROPATHY-THE COST

- PATIENTS WHO DEVELOP CIN ARE MORE LIKELY TO EXPERIENCE ADVERSE EVENTS, TO UNDERGO PROLONGED DIALYSIS, TO HAVE LONGER HOSPITAL AND INTENSIVE CARE UNIT STAYS AND TO HAVE HIGHER MORTALITY RATES

  HTTPS://WWW.NCBI.NLM.NIH.GOV/PUBMED/19702434

EVALUATE

- ASSESSING BASELINE RENAL FUNCTION BEFORE INITIATION OF THERAPY
- POSSIBLE ADJUSTMENT OF DOSAGE ESP IF GFR < 50
- MONITOR RENAL FUNCTION AND VITAL SIGNS
- AVOIDING NEPHROTOXIC DRUG COMBINATIONS

FOR THOUGHT

- THE NUMBER OF ESRD PATIENTS ON DIALYSIS IN THE UNITED STATES HAS GROWN FROM 49,885 IN 1980 TO 430,273 IN 2011
- PREVALENCE OF ESRD-- 746,557 IN 2017 (VERSUS 727,912 IN 2016). THIS REPRESENTS A 2.6% INCREASE SINCE 2016, WHICH IS THE RESULT OF DECREASING DEATH RATES IN THE ESRD POPULATION.
- HTTPS://WWW.CDC.GOV/PICTUREOFAMERICA/PDFS/PICTURE_OF_AMERICA_CHRONIC_KIDNEY_DISEASE.PDF
- HTTPS://WWW.UOFMHEALTH.ORG/NEWS/ARCHIVE/201911/US-RENAL-DATA-SYSTEM-2019-ANNUAL-DATA-REPORT-EPIDEMIOLOGY

FOR THOUGHT

- THE TOTAL MEDICARE SPENDING ON BOTH CHRONIC KIDNEY DISEASE AND ESRD PATIENTS WAS IN EXCESS OF $120 BILLION IN 2017. FOR IDENTIFIED CKD (NOT ESRD), THE TOTAL MEDICARE EXPENDITURE WAS $84 BILLION. SPENDING FOR ESRD PATIENTS TOTALED $35.9 BILLION, ACCOUNTING FOR 7.2% OF THE OVERALL MEDICARE-PAID CLAIMS IN THE FEE-FOR-SERVICE SYSTEM
- HTTPS://WWW.UOFMHEALTH.ORG/NEWS/ARCHIVE/201911/US-RENAL-DATA-SYSTEM-2019-ANNUAL-DATA-REPORT-EPIDEMIOLOGY