Outpatient IV antibiotic use in the U.S. hemodialysis population, 1995 to 2007

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Introduction
• Hemodialysis (HD) patients are vulnerable to infections and are frequently treated with antibiotics.
• Monitoring trends in antibiotic use in dialysis units is important for improving patient safety and quality of care.
• The Dialysis Surveillance Network, a voluntary national surveillance system monitoring bloodstream and vascular infections, was initiated by the Centers for Disease Control in 1999 to collect information, but only a small proportion of dialysis units participate.
• Intravenous (IV) antibiotics given at outpatient (OP) dialysis centers are billable services to Medicare and therefore will generate claims. Historically these claims are billed on a monthly basis, although a change in the billing process has resulted in the ability to identify antibiotic administration date for claims in 2007 and later.
• The objective of this report was to examine antibiotic use trends in hemodialysis patients dialyzing in all OP dialysis centers across the U.S.

Methods
• Using the United States Renal Data System database, we evaluated OP antibiotic use in all dialysis units across the U.S.
• Yearly cohorts (1995-2007) of patients who survived and remained on HD for the entire calendar year were identified.
• OP claims were searched for any type of IV antibiotic, and data were summarized on a yearly basis.
• Antibiotics were grouped together by individual antibiotic (vancomycin, cefazolin, levofloxacin) or by antibiotic group (aminoglycosides: gentamicin, tobramycin, amikacin; 3rd generation cephalosporins: cefazidime, cefotaxime, ceftiraxone); remaining ones were placed in the “other” category.

Results
• Since 1995, the percent of patients receiving at least one IV antibiotic in the OP setting each year has increased steadily from 31%, reaching as high as 44% in 2005 and decreasing slightly since then.
• Vancomycin was the predominant antibiotic used; use decreased from 1995 to 1999 (25% to 20%), but then rose gradually to 28% in 2005.
• Cefazolin use rose steadily from 3% of patients in 1998 to 18% in 2007.
• Aminoglycoside and 3rd generation cephalosporin use has remained stable for several years at about 15% and 5% of patients, respectively.
• Use of other IV antibiotics was fairly limited.
• The percent of patients with at least 2 different IV antibiotics in the same month peaked in 2005, and then trended down.
• Over 92% of patients on combination antibiotics in 1994 received both vancomycin and an aminoglycoside; this fell to 79% in 2007. Use of vancomycin plus 3rd generation cephalosporins has become more common.
• In 2007, when cefazolin and vancomycin claims were found in each month, vancomycin was given first 42% and cefazolin 41% of the time; 17% of the time they were given on the same date.

Conclusions
• The use of single and multiple OP IV antibiotics in HD patients increased from 1994 to 2005, then decreased slightly.
• Use of vancomycin, cefazolin, aminoglycoside and 3rd generation cephalosporin predominated.
• Vancomycin use dipped from 1996 to 1998, perhaps a reaction to initial reports of S. aureus with intermediate levels of vancomycin resistance. However, use has since rebounded.
• Use of other IV antibiotics is fairly limited, due primarily to the fact that the half-lives of most are insufficient to maintain adequate antibiotic levels between dialysis sessions.
• IV antibiotic use in the OP setting seems to parallel the trends seen in dialysis catheter use and infectious hospitalizations in HD patients over the timeframe of our study.