

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: ceftazidime, cefotaxime, ceftriaxone); remaining ones were placed in the "other" category.

Results

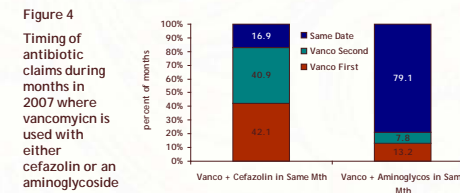
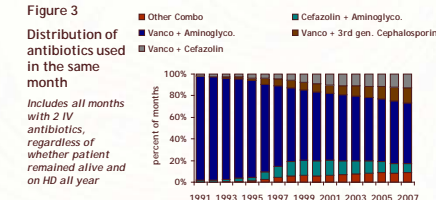
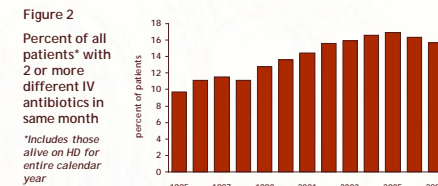
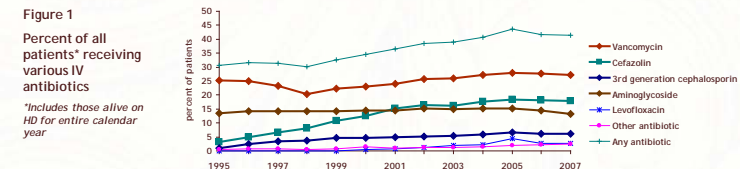
- Since 1995, the percent of patients receiving at least one IV antibiotic in the OP setting each year has increased steadily from 31%, reaching as high as 44% in 2005 and decreasing slightly since then.

Results cont.

- Vancomycin was the predominant antibiotic used; use decreased from 1995 to 1998 (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 56% 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.

Year	Total N	N with Any IV AB	% with Any IV AB
1995	91,037	27,923	30.7%
1996	98,232	31,247	31.6%
1997	106,684	33,461	31.4%
1998	112,956	33,964	30.1%
1999	117,369	38,245	32.6%
2000	124,366	42,918	34.5%
2001	131,308	47,970	36.5%
2002	139,442	53,841	38.6%
2003	147,329	57,397	39.0%
2004	154,081	62,819	40.8%
2005	161,375	70,291	43.6%
2006	164,805	68,527	41.6%
2007	170,245	70,372	41.3%

Includes those alive on HD for entire calendar year



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.