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Impact of an Antimicrobial Stewardship Program (ASP) on antimicrobial use and clinical outcomes at a Veterans Affairs (VA) Teaching Hospital

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ABSTRACT

Background: ASPs are used as key strategies to limit the spread of resistance through appropriate antimicrobial utilization practices.

Methods: In September 2012, a formal ASP was implemented at the Providence VA Medical Center (PVAMC). The ASP team of attending and fellow ID physicians, a clinical ID pharmacist and fellow, and pharmacy residents and students prospectively audited all inpatient antimicrobial use (IV and PO) daily (Monday-Friday). Antimicrobial use and clinical outcomes were compared between inpatients on antimicrobials in a 1 year period before (pre-ASP; Oct 2010 -Sept 2011) and after (post-ASP; Sept 2012-Aug 2013) ASP implementation. To assess ASP impact on inpatient mortality, 30-day readmission, and 14 day length of stay Poisson regression models were used to calculate adjusted relative risk (RR) and 95% confidence intervals to assess ASP impact on inpatient mortality, 30-day readmission, and 14 day length of stay.

Results: Post-ASP implementation, 522 interventions were made with an acceptance rate of 77%. A total of 2659 pts (49% pre-ASP; 51% post-ASP) were included for evaluation. IV antimicrobial use in the pre- and post-ASP pts decreased from 306 to 281 days of therapy (DOT)/ 1000 patient days (PD) and PO antimicrobial use increased from 192 to 197 DOT/ 1000 PD. The DOT/1000 PD of several broad spectrum antimicrobial agents decreased from pre- to post- ASP periods, including piperacillin-tazobactam (-9%), 3rd/4th generation cephalosporins (-11%), fluoroquinolones (-30%), and carbapenems (-46%). IV vancomycin and linezolid DOT/1000 PD decreased 2% and 62%, respectively, from the pre- to post-ASP periods. Post-ASP implementation, inpatient mortality decreased significantly (adjusted relative risk [RR] 0.59, 95% CI 0.35 - 0.99), 14 day length of stay decreased non-significantly (RR 0.78, 95% CI 0.61 - 1.01) and 30-day readmission increased non-significantly (RR 1.05, 95% CI 0.91 - 1.21).

Conclusions: Our ASP was associated with improvements in use of several broad spectrum antimicrobials and clinical outcomes, including inpatient mortality and length of stay. However, further ASP efforts are needed to improve 30-day readmission rates.

BACKGROUND

- Antimicrobial resistance is a serious public health problem of increasing magnitude.[1,2]
- ASPs promote appropriate antimicrobial use and are used as key strategies to limit the spread of antimicrobial resistance.[1]

Methods

- PVAMC small VA teaching hospital, licensed 118 beds
- Formal ASP started at the PVAMC September 2012
- Multidisciplinary team (ID attending/fellow physicians, ID pharmacist, 2 ID fellows, pharmacy residents/students)
- Prospective audit and feedback on all inpatient antimicrobial use (IV + PO) daily (Monday-Friday)

METHODS

- Antimicrobial use and clinical outcomes compared between between pre-and post-intervention periods
- Timeline:
  - Pre-intervention period (PIP) – Oct 2010 – Sept 2011
  - Intervention period (IP) – Sept 2012 – Aug 2013
- Poisson regression models were used to calculate adjusted relative risk (RR) and 95% confidence intervals to assess ASP impact on inpatient mortality, 30-day readmission, and 14 day length of stay.

RESULTS

- Interventions made in 380 patients (36.2 %)
- 522 interventions made with an overall acceptance rate of 77.2%
- 13.2% of interventions not accepted, unknown if the team ever received the intervention or were not applicable (ie. pt discharged/abx changed)

Figure 1. Intervention types and acceptance rates, n(%)

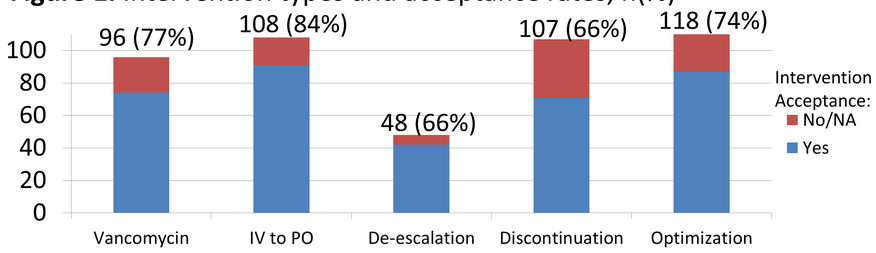

Table 1. Demographics and Clinical Characteristics by Period

	PIP (n=1293)	IP (n=1366)
Age , mean ± standard deviation	70.1 ± 13.6	70.6 ± 13.9
Male, n (%)	1259 (97.4)	1319 (96.6)
Caucasian, n (%)*	1184 (91.6)	1261 (92.3)
General Medicine Admission, n (%)*	873 (67.5)	894 (65.5)
Chronic Respiratory Disease, n (%)	486 (37.6)	489(35.8)
Chronic Renal Disease, n (%)*	211 (16.3)	166 (12.2)
Diabetes Mellitus, n (%)*	390 (30.2)	464 (33.4)
Congestive Heart Failure, n (%)*	272 (21.0)	190 (13.9)
Influenza, n (%)*	2 (0.2)	49 (3.6)
Pneumonia, n (%)	273 (21.1)	304 (22.3)
Bacteremia, n (%)	55 (4.3)	49 (3.6)
Skin and soft tissue infection, n (%)	267 (20.7)	310 (22.7)
Urinary tract infection, n (%)	321 (24.8)	323 (23.7)

*=p<0.05

RESULTS

Figure 2: Overall, IV, and PO Antibiotic Use in Days of Therapy/ 1000 Patient Days

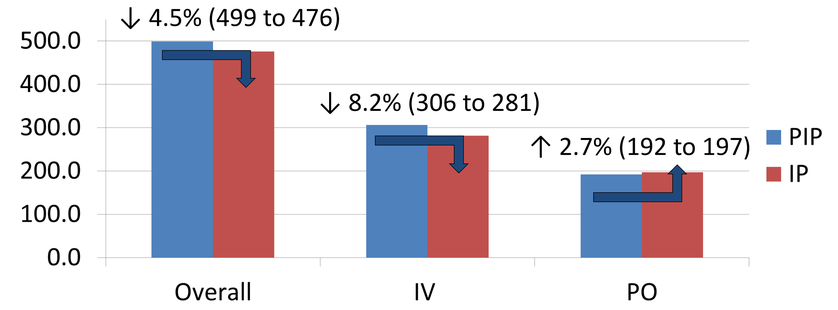

Table 3. Clinical Outcomes by Period

	Relative Risk (95% Confidence Interval)	Forest Plot
Inpatient mortality		
- Unadjusted	0.60 (0.36 - 1.01)	
- Adjusted	0.59 (0.35 - 0.99)	
14 day length of stay		
- Unadjusted	0.69 (0.55-0.88)	
- Adjusted	0.78 (0.61 - 1.01)	
30-day readmission		
- Unadjusted	1.12 (0.97-1.30)	
- Adjusted	1.05 (0.91 - 1.21)	

PIP= 1293; IP=1366

CONCLUSIONS

- Our ASP was associated with improvements in use of several broad spectrum antimicrobials and clinical outcomes, including inpatient mortality and length of stay.
- Further ASP efforts are needed to improve 30-day readmission rates.

References 1. Dellit. CID 2007;44:159-77 2. CDC. Antibiotic resistance threats in the US, 2013.

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