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Efficacy and Patterns of Antimicrobial Prophylaxis for Gunshot Wound Infection in a South African Hospital Setting: A Prospective Study Using Propensity Score Based Analyses

Introduction

Limited evidence supports the efficacy of antimicrobial prophylaxis (AP) in prevention of gunshot wound (GSW) infection in resource restricted areas.

At Tygerberg Hospital, South Africa, it is standard care for GSW patients to receive one dose of broad-spectrum AP. For various reasons protocol adherence can be suboptimal.

This study aimed to assess the efficacy with regard to reduction of in-hospital GSW infection and to identify opportunities for practice improvement.

Figure 1: new GSW patients and antimicrobial therapy per week day (blocks is AP according to protocol, lines is no AP or not according to protocol)

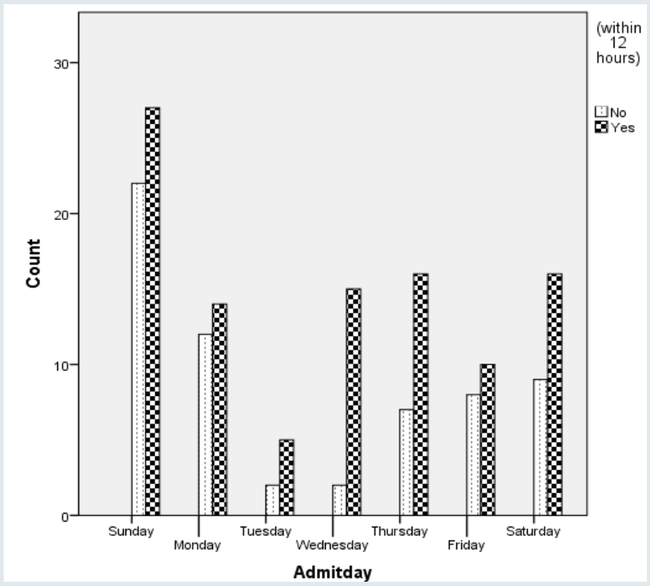

Table 1: Univariate analysis of baseline characteristics for receiving AP according to protocol

Variable	Prophylaxis within 12h No. (%)	No Prophylaxis within 12h No. (%)	RR (95%CI)	p-value
Total	103	62		
Presence of a Fracture due to the gunshot	65 (60)	29 (47)	1.29 (1.00 – 1.67)	0.04
Presence of Hollow Viscus Injury due to the gunshot	24 (23)	4 (6)	1.48 (1.21 – 1.83)	0.005
Day(s) of admission:				
Monday/Tuesday	19 (18)	14 (23)	0.90 (0.66 – 1.25)	0.52
Wednesday/Thursday	31 (30)	9 (15)	1.35 (1.07 – 1.68)	0.02
Friday/Saturday/Sunday	53 (51)	39 (63)	0.84 (0.67 – 1.06)	0.15
Surgery within 24h	22 (21)	4 (6)	1.45 (1.17 – 1.80)	0.01

Legend: No. = Number; RR = Relative Risk; 95%CI = 95% Confidence Interval; GSW = Gunshot Wound; AP = Antimicrobial Prophylaxis.

Table 2: Univariate analysis of baseline characteristics for acquiring an in-hospital GSW infection

Variable	GSW Infection Yes No. (%)	GSW Infection No No. (%)	RR (95% CI)	p-value
Total	51	114		
Amount of GSWs				
Single GSW	23 (45)	81 (71)	0.48 (0.31 – 0.76)	0.001
Multiple GSW	28 (55)	33 (29)		
Presence of a Fracture	36 (71)	58 (51)	1.81 (1.08 – 3.04)	0.02
Presence of Hollow Viscus Injury	22 (43)	6 (5)	3.71 (2.55 – 5.41)	<0.001
Surgery within 24h	18 (35)	8 (7)	2.92 (1.97 – 4.32)	<0.001

Legend: No. = Number; RR = Relative Risk; 95%CI = 95%; Confidence Interval; GSW = Gunshot Wound; AP = Antimicrobial Prophylaxis.

Results

A total of 165 consecutive patients were included. Hundred-and-three patients received AP according to protocol within 12 hours after admission, 62 patients did not.
Results of the descriptive analyses are shown in table 1 and 2.
PSM showed that AP reduced GSW infection risk by 12% (95%CI 0.2-24%, p=0.046).
IPW showed that AP reduced the risk for infection by 14% (95%CI, 3% to 27%, p=0.015).

Methods

Over three months all admitted GSW patients were prospectively included. Data regarding injury characteristics, circumstances of the incident, type of AP and surgery were obtained.

The occurrence of in-hospital GSW infection was monitored over 30 days or until discharge. To correct for confounding, propensity score matching (PSM) and inverse probability weighting (IPW) methods were used to assess the effect of AP on the occurrence of GSW infection.

Table 3: Propensity Score Analyses for the efficacy of antimicrobial prophylaxis in GSW patients

Method	Effect (% reduction in GSW-infection)	95%CI	p-value
PS-Matching (nearest neighbor)	12	0.2 - 24	0.046
Inverse Probability Weighting	14	3 - 27	0.015

Conclusions

Providing antimicrobial prophylaxis to GSW patients appeared to result in a moderate but clinically relevant lower risk of in-hospital GSW infection.

In this study setting, optimization of provision of AP for all patients with multiple GSW's or a GSW-related fracture are opportunities for reduction of GSW infection.

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