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Title: A FOUR MONTH PROSPECTIVE DESCRIPTIVE EXPLORATORY STUDY OF PATIENTS RECEIVING ANTIBIOTICS IN ONE EMERGENCY DEPARTMENT

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Abstract: Background: Any infection can potentially develop into sepsis. Many patients present to the Emergency Department (ED) with Infection and go on to require antibiotics. However, the timeliness of antibiotics can make a difference to patient survival and reduce the risk of infection developing into sepsis and or septic shock.
Methods: Our study was a four month prospective descriptive exploratory pilot study.
Results: Of all adult (n=18807) presentations 3339 (18%) patients had a primary diagnosis related to infection. The study collected data on 104 (3%) patients who were administered antibiotics. One hundred (95%) patients who received antibiotics were admitted to hospital. Triage code did not influence time to antibiotic (p=.352). Eighty-five (81%) patients waited longer than one hour for their first antibiotic with the shortest administration time 19 minutes (Mean 233 minutes, SD 247) and the maximum wait for antibiotics was 1481minutes. For sepsis or septic shock patients (n=8) the average time to antibiotics was 411 minutes (SD =455 minutes).
Conclusion: The study provides a detailed analysis of ED patients receiving antibiotics. Further research is needed to identify strategies to improve the timely delivery of antibiotics for patients with infections.

***Title page with Author details**

A FOUR MONTH PROSPECTIVE DESCRIPTIVE EXPLORATORY STUDY OF PATIENTS RECEIVING ANTIBIOTICS IN ONE EMERGENCY DEPARTMENT

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Keywords infection rate; sepsis; emergency care; antibiotic time; safety; triage

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***Detailed Response to Reviewers**

Friday, 6 July 2012

Hello, please find my detailed response for the reviewers' and editor's comments.

Reviewer #1:	Action	Change
I wonder whether the data could be better presented in a chart format rather than text but perhaps that's just being lazy!	I have submitted four Tables to condense the paper. Given review 2 and the editor have not supported this I have not added a fifth table.	No change
Note use of 'datum' word on line 116.	Changed to data	.. while one data set was missing.
Note use of 'datum' word on line 140.	Changed to data	.. There were 7 (7%) missing data sets.
Discussion, Limitations and Conclusion appropriate.	No action required	
Reviewer #2:		
Overall this is a good paper presenting valuable knowledge in the clinical management of sepsis.	No action required	
Editor		
Your title says 'pilot' although this is not mentioned anywhere in the paper - if 'pilot' then explain plan, if not, just remove it from the title - reads perfectly well without.	Pilot removed from title	A four month prospective descriptive exploratory study of patients RECEIVING antibiotics in one EMERGENCY DEPARTMENT
L15 - should read 'Harrison et al..' as per journal guidance	Fix references	Corrected in line with journal guidelines
L14-15 - these figures seem incongruous - are they ICU data? There are not only 97,000ish admissions to hospitals (generally) in the UK as a total, and a 27% sepsis rate for general admissions is very high. It is also from the ICU database and the data sounds about right for ICU.	You were correct it was ICU data and the 38% was the patient mortality rate for severe sepsis.	Sentence changed to.. In Canada, 2008-2009, there were 30,500 sepsis hospital admissions and of intensive care patients with severe sepsis over 38% died.
L23-24 - should there be a comma after 'symptoms'	L24 comma added after 'symptoms'	L24 Given the variety of infective presentations, clinical urgency and signs and symptoms, early recognition of

		severe infection and or sepsis can often be difficult for ED clinicians.
To break sentence up L24, 27, 210, 268 and throughout - you use 'and or' repeatedly - it reads poorly and would suggest changing throughout - if you need to use it, it should be 'and/or'	L24 L27, L210 L268	And or changed throughout manuscript to and/or
L147 - 8% of hypotensive patients - I think you mean it is 8% of the total patient group, but if you want to present the percentage of hypotensive patients - it's probably closer to 66% (6/9)?	Corrected the 8% was incorrect and should have read 67%	Six (67%) of the hypotensive patients received fluids.
L159/60 - not sure what this means - if 6 patients died in the study period with infective diagnoses why were they not in the study data?	Good point but we did not collect data on patients during resuscitation. Hence this group did not form part of the data sets.	Added to manuscript- No antibiotic data was collected for patients undergoing resuscitation. Of the patients included in the study no patient died in the ED.
L189 - change 'urgency' to 'urgent'	Sentence corrected	Consistency in triage allocation remains a concern for emergency clinicians and particularly for vulnerable patient groups with urgent signs and symptoms.
L228 - should read 'Shapiro et al..'	Check reference	Corrected in line with journal guidelines
L244 - do you mean 'overwrite' or 'over-ride'?	Corrected the word overwrite with over-ride	However, there is capacity for clinicians to over-ride the diagnosis menu.

A four month prospective descriptive exploratory study of patients receiving antibiotics in one emergency department

INTRODUCTION

Globally, severe infection cost the healthcare systems billions of dollars (Eber et al., 2010; Sepsis Alliance, 2011b). If severe infection is left unrecognised and/or untreated the development of sepsis and/or septic shock can ensue. While care practices have improved trauma, myocardial infarction and stroke outcomes, sepsis outcomes remain a serious health issue (ACI, 2010; Rivers et al., 2012). In the United States of America (USA) there are nearly one million new cases of sepsis diagnosed each year and 40% of severe septic patients die (Sepsis Alliance, 2011b, 2012). In Canada, 2008-2009, there were 30,500 sepsis hospital admissions and of intensive care patients with severe sepsis over 38% died. (Canadian Health Institute for Health Information, 2010) In the UK, an eight year study identified that 27% (92,672) of hospital admissions were diagnosed with having severe sepsis. (Harrison et al., 2006) Similarly in Australasia the sepsis rate identified by Finfer et al (2004), while less than that of other international countries, was substantial with an ICU sepsis rate of 0.77 per 1000 population and a mortality rate of 26.5%.

A delay in antibiotic administration, in the ED, can result in patient deterioration and the development of sepsis and/or septic shock. Sepsis mortality rate has been shown to be increased through poor recognition and antibiotic delay (Dellinger et al., 2008; Gao et al., 2005; Guimont et al., 2009; Kumar et al., 2006; Reade et al., 2010; Shapiro et al., 2005). Given the variety of infective presentations, clinical urgency and signs and symptoms, early recognition of severe infection and/or sepsis can often be difficult for ED clinicians. Yet ED clinicians are responsible for the early recognition and prompt treatment of patients with infection both minor and severe.

Often patients with infection require antibiotics to prevent deterioration and/or sepsis developing. With any infection there is a risk that sepsis or septic shock can develop. However, timely antibiotics have been shown to optimise patient outcomes and stop deterioration. (Sepsis Alliance, 2011a) Indeed, the time of antibiotic delivery for patients with severe infection has been identified as a critical predictor of patient death (Kumar et al., 2006) . Similarly, it has been identified that sepsis mortality rate increases by 7.6% with every hour's delay before antibiotic therapy begins within the first six hours of arrival (ACI, 2010; Kumar et al., 2006). Many studies have demonstrated that prompt delivery of antibiotics will improve patient outcome and more specifically survival (Castellanos-Ortega et al., 2010; Dellinger et al., 2008; Puskarich et al., 2009).

Patient admissions due to infection are a serious health burden. In the USA, during 1998-2006, there were 1.7 million hospital admissions due to infection annually (Eber et al., 2010). Many patients present with infection to Emergency Departments (ED) and a proportion of these patients will go on to require hospital admission, intensive care beds and intravenous antibiotic administration. However, there is little understanding of the patients presenting with infection and subsequently requiring antibiotics in Australian EDs.

The aim of our research was to explore the i) prevalence of patients presenting to one ED with infection; ii) triage characteristics and time to antibiotic for patients receiving antibiotics, and ii) patients physiological characteristics and time to antibiotic, clinical interventions and disposition.

METHODS

This was a four month prospective descriptive exploratory study.

STUDY DESIGN

The four month study (1st April – 31st July 2011) was conducted to explore the prevalence of adult (>16 years) ED patients presenting with infection. All adult patients who presented to the ED and received antibiotics were eligible for enrollment. All children (<16 years) were excluded from the study as there were specific clinical guidelines for this patient groups.

A survey tool was developed to document patient clinical information including: triage-antibiotic time and types, administration method, patient vital signs (heart rate, blood pressure, temperature, respiratory rate, Glasgow Coma Scale, oxygen saturation) and clinical interventions (pathology tests; lactate levels and intravenous fluids).

The survey data was correlated with patient demographic and clinical information extracted from the Emergency Department Database (FirstNet^{TM}). Data retrieved included patient age, gender, time of arrival, triage code, medical seen by time, treating doctor, time of discharge, discharge diagnosis and disposition. ED discharge diagnostic codes were examined to determine the presentation rate for patients with infection.

FirstNet^{TM} incorporates the SNOMED CT^{TM} diagnostic code classification, which is based on the Australian modification of ICD-10 (Hansen et al., 2011). The infection presentation rate was determined by examining each patient record for diagnostic codes synonymous with infection. For example, ‘fever’, ‘sepsis’, ‘urinary tract infection’, ‘wound infection’ or ‘lower respiratory tract infection’. Patients that had a recording of an infection had the triage assessment reviewed for further analysis. The authors resolved disagreements by consensus.

Study Setting and Population

The study was conducted in a 550 bed university tertiary referral hospital providing around 50,000 admissions and 770,000 outpatient treatments annually to a catchment population of 250,000. The annual ED presentation rate is over 59,700 with an admission rate of 42% (St George Hospital, 2010).

Data analysis

Data were analysed using IBM SPSS v.19. Missing data were not used in the analyses. Descriptive statistics were calculated, followed by comparisons of antibiotic and non-antibiotic groups using the X^2 test and *t*-test. Ethical approval was obtained from the local Human Research Ethics Committee. Patient consent was waived for the study. The ethical conduct of research was maintained during and after the research. All data sources were stored in password protected files.

RESULTS

During the four month study there were 18807 adult patient presentations of which 3339 (18%) patients had a primary diagnosis related to infection. Respiratory infection (n=885; 27%) was the most frequent diagnostic group (Table1). One hundred and four (3.1%) patients received antibiotics. More females (n=55; 53%) received antibiotics. The majority of antibiotics were administered for abdominal (n=33; 32%) or respiratory (n=29; 29%) infections (Table 1). There was no significant difference when diagnostic groups were compared by gender (X^2=7.554, df=8, p=.478) or age (X^2=8.866, df=8, p=.354). Fifty-eight (56%) patients were 65 years or older. There was no significant difference for patients over 65 years of age compared by diagnostic group (X^2=8.666, df=8, p=.354).

The antibiotic group waited, to be seen, on average 53 minutes (*SD*=217 minutes) by a medical officer or Nurse Practitioner. Eighty-five (82%) patients waited longer than one hour for the first antibiotic to be administered (Table 1). For patients diagnosed with infection the average time to antibiotics was 233 minutes (*SD*=247 minutes). For patients diagnosed with sepsis or septic shock (n=8) the average time to antibiotics was 411 minutes (*SD*=455minutes, median 231.5 minutes).

The majority (n=49; 47%) of patients receiving antibiotics were allocated a Triage Code 3 (Table 2). There was no significant difference when diagnostic patient groups were compared by Triage Code (X^2=34.264, df=32, p=.360). Thirteen (13%) patients were allocated to the resuscitation area (Triage Code 1,2,3); 42 were allocated to the acute monitoring area (Triage Code 2,3,4); 28 patients were allocated to a non-acute monitoring area (Triage Code 2,3,4); and 21 were allocated to the fast track area (Triage Code 3,4,5). Triage codes did not significantly influence the delivery of antibiotics (X^2=34.264, df=32, p=.360). The average time to antibiotic for Triage Code 2 (157 minutes) and Triage Code 3 (245 minutes) was longer that of Triage Code 5 (98 minutes) (Table 2).

Patients' physiological characteristics were documented by the triage nurse (Table 3). Ninety-five (91% n=95) patients arrived normotensive. Nine (9%) patients were documented as being hypotensive (<100mmHg systolic) of which 7 (6%) had a systolic<95mmHg. The majority (n=4; 44%) of hypotensive patients presented with diagnostic codes related to abdominal infection.

Hypotensive patients with a systolic<95mmHg were allocated Triage Code 1(n=1), Triage Code 2 (n=3), Triage Code 3 (n=3) and Triage Code 4 (n=1). There was a statistical difference for patients with hypotension (X^2=18.545, df=8, p=.017) by triage code. Proportionally they were allocated higher urgency codes. For the 9 patients who arrived with hypotension (systolic< 100mmHg) the average time to antibiotic was 139 minutes (*SD* =132 minutes).

Twenty-four (22%) patients were documented by the triage nurse to have an altered level of consciousness (Glasgow Coma Score <15) while one data set was missing. Patients with an altered level of consciousness were allocated Triage Code 1 (n=2;8%), Triage Code 2 (n=9;37%), Triage Code 3 (n=10;41%) or Triage Code 4 (n=3;12%). There was no significant difference by triage code for patients with an altered level of consciousness (X^2=13.830, df=8, p=.086). For patients who arrived with an altered level of consciousness the average time to antibiotic was 214 minutes (*SD*= 284 minutes).

Thirty-one (30%) patients were documented by the triage nurse to have an abnormal respiratory rate (>25 breaths per minute). Five data sets were missing. Patients were allocated a Triage Code 1 (n=2;3%), Triage Code 2 (n=15; 39%), Triage Code 3 (n=12;47%) or Triage Code 4 (n=2;11%). There was a statistical difference for patients with an elevated respiratory rate (X^2=21.933, df=8, p=.005) when compared by triage code. Patients with an abnormal respiratory rate waited on average 162 minutes (*SD*=162 minutes) for antibiotics.

Sixteen (15%) patients were documented by the triage nurse to have had an oxygen saturation of less than 95%. Of these patients they were allocated Triage Code 1 (n=1; 6%), Triage Code 2 (n=6;37%), Triage Code 3 (n=5; 31%) or Triage Code 4 (n=4;25%). There were two missing data sets. Patients with abnormal oxygen saturation waited on average 149 minutes (*SD*=115 minutes) for antibiotics. There was no significant difference for patients with decreased oxygen saturation by Triage Code (X^2=5.190, df=8, p=.737).

The first antibiotic administered to patients was usually a cephalosporin (n=46; 44%) or penicillin (n=41; 39%) (Table 4). Of these patients 78 (75%) received a second antibiotic (Table 4). The majority (n=89; 86%) of patients received intravenous antibiotics with two (2%) receiving oral and 13 (13%) receiving both oral and intravenous antibiotics. The average time to second antibiotic was 38 minutes (*SD*=67 minutes) and third antibiotic was 309 minutes (*SD*=349 minutes).

Seventy-one (68%) patients received intravenous fluids. There were 7 (7%) missing data sets. Eighteen (17%) patients received more than 1000mls of intravenous fluids and of this group the average fluid resuscitation was 3027ml (*SD*=1144mls). Patients receiving fluids were allocated Triage Code 1 (n=2; 8%), Triage Code 2 (n=21; 30%), Triage Code 3 (n=36; 50%), Triage Code 4 (n=11; 15%) or Triage Code 5 (n=1; 1%). There was no significant difference when comparing intravenous fluid administration by triage code (X^2=12.856, df=8, p=.117).

Intravenous fluids were administered more commonly to patients with abdominal (n=19; 27%) or respiratory (n=20; 28%) infections. Six (67%) of the hypotensive patients received fluids.

All (n=104) patients had a Full Blood Count sent to pathology. The average time for pathology to be sent was 90minutes (*SD*=71minutes). Emergency staff obtained from the ED pathology machine a serum lactate level for 39 (37%) patients. Patients' documented serum lactate levels ranged from 0.5-10.6mg/dl (mean 2.4; SD 1.9 mg/dl). Of these patients 6 (15%) had a lactate level equal to or greater than 4.0mg/dl. Five of these patients were documented to have received intravenous fluids. Of the six patients, they were allocated Triage Code 1 (n=1; 16%) Triage Code 2 (n=4; 66%) Triage Code 4 (n=1; 16%). The Triage Code 4 patient presented with confusion and a low grade temperature 37.9^{o} Celsius and had a lactate of 10.6 mg/dl. There was a statistical difference for patients when comparing lactate levels greater than 4.0mg/dl (X^2=31.01, df=8, p≤.001) by triage code. Proportionally patients were more likely to be allocated higher urgency codes.

During the study period, 37 (0.5%) patients died in the ED. Six (16%) patient deaths had a diagnosis synonymous with infection (5 sepsis; 1 aspiration pneumonia). No antibiotic data was collected for patients undergoing resuscitation. Of the patients included in the study no patient died in the ED.

Of the patients receiving antibiotics in the ED 95% (n=100) were admitted to hospital (Table 1). Average ED length of stay for non-study patients was 339 minutes (*SD*= 277 minutes) and for the antibiotic group 331 minutes (398 minutes). Using a *t*-test for independent samples there was no significant difference (*t*-=.291, df=18805, p=.838) identified for length of stay when comparing antibiotic and non-antibiotic groups and non-infection and infection patient groups (t=.315; df=18805; p=.605).

Four (4%) patients were discharged from the ED. These patients were allocated Triage Code 3 (n=1), or Triage Code 4 (n=3). Patients had an ED diagnosis related to an abdominal infection (n=4). All patients were normotensive on arrival and also received intravenous fluids.

Of the four patients discharged home vital sign observations were infrequently documented. One patient was documented to have a normal blood pressure while three patients had missing data sets; three patients were documented to have a normal temperature and one patient had an elevated temperature (37.1^{0}- 38.5^{0} Celsius); one patient was documented to have a normal respiratory rate while three patients had missing data sets; one patient was documented to have a normal oxygen saturation rates while three patients had missing data sets; and, no patient had a documented Glasgow Coma Score.

DISCUSSION

The study demonstrated that the prevalence of patients presenting to one ED with infection was substantial. We suggest that the study underestimates the presentation rate for infection given that selected diagnoses such as pancreatitis were excluded given its multiple etiologies. However, for some of these cases there would have been infection associated with the presentation.

The study demonstrated that triage codes did not significantly influence the delivery time of antibiotics. Nor did a patient's physiological characteristics, such as an altered level of consciousness or oxygen saturation, influence triage code. The exceptions were hypotension and respiratory rate whereby patients were more likely to be allocated a higher triage code. Consistency in triage allocation remains a concern for emergency clinicians and particularly for vulnerable patient groups with urgent signs and symptoms. Triage is a complex process influenced by a range of socio-geographical factors (Fry & Stainton, 2005). However, it may be appropriate given the trauma, stroke and myocardial infarction triage guidelines that sepsis triage guidelines be adopted nationally to improve the consistency of triage code allocation.

The development of sepsis can potentially be avoided and to this end all emergency nurses need to be skilled in risk assessment for patients with infection. Nursing processes should enhance the recognition of sepsis and prompt delivery of antibiotics. Validated and reliable early goal directed sepsis guidelines may go some way to ensuring greater consistency of triage code and recognition of actual or potential septic risk at the bedside. Further investigation of ED nurse led antibiotic standing orders may assist to fast track patients with severe infection or sepsis and thereby ensure prompt delivery of antibiotics. There is some evidence to suggest that nurse led teams could target vulnerable infective patient groups to ensure timely delivery of antibiotics (Tromp et al., 2010).

Recent studies suggest that for patients with sepsis the care goal should be to administer antibiotics within one hour of ED arrival (ACI, 2010). However, this study showed that the triage code did not generally influence the timeliness of antibiotics. Also while patients were seen by emergency staff within an hour the time to antibiotic was significantly longer. The finding would suggest that there are other care processes that influence the delivery of antibiotics at the bedside. This would suggest that unknown factors influence the decision to order and/or administer antibiotics. We would recommend that observational studies be conducted to determine care processes that delay time to antibiotic.

While there may be recognition and/or assessment barriers impeding the prescribing of antibiotics by medical officers or nurse practitioners the study demonstrated significant delays were experienced by patients receiving more than one antibiotic. Many patients receiving a second and/or third dose of antibiotic waited a significant time between doses. While some pharmacological agents need to be administered slowly, for example vancomycin (60 minutes) or azithromycin (60 minutes) the majority of antibiotics, identified in the study, could be administered within three to five minutes of each other (Agency for Clinical Innovation and the Clinical Excellence Commission, 2011). Antibiotic delay can result in the development of sepsis and contribute to patient death. Globally sepsis campaigns have sought to improve the management of patients with sepsis and more specifically timely delivery of antibiotics (Dellinger et al., 2008; Rivers et al., 2012; Sepsis Alliance, 2011a). Emergency nurses can make a significant contribution to patient outcomes by reviewing antibiotic delivery processes to reduce the time to and between antibiotics.

Evidence is provided that there is inconsistency in the management of patients with infective conditions and particularly for those with sepsis. While basic blood tests were performed on all patients there was inconsistency with lactate levels, intravenous fluid resuscitation and antibiotic administration. Consistency in management and administration of antimicrobial agents within the first hour would enhance service delivery and better ensure patients with infection survive (Dellinger et al., 2008; Nguyen et al., 2006; Shapiro et al., 2005).

From the study the documentation requirements for patients leaving the ED would seem unclear. However, patient discharge documentation should include vital signs. This is important legally, clinically and for ensuring patient safety. There does not appear to be any national ED guidelines and/or policies concerning the appropriate monitoring of patients prior to discharge. It is important to consider which physiological characteristics should alert staff to deferring discharge and which characteristics (if abnormal) are reasonable to send someone home. Documentation of patient vital signs prior to discharge can improve patient safety by determining a patient's wellbeing prior to leaving. Guidelines need to be developed, particularly for patients allocated high urgency codes, to determine appropriate discharge documentation. This may go some way to reducing the ED representation rate. Documentation of patient observations prior to discharge is an important safety feature for ED services and further research is needed into defining safe ED discharge care processes.

LIMITATIONS

There are several limitations to our study. The patient infection rate was determined retrospectively using the ED computer database. However, there is capacity for clinicians to over-ride the diagnosis menu. The consistency and reliability of the database may compromise interpretation and generalisability. A different interpretation may result if data were collected prospectively. While the database may not reflect the patient infection rate accurately this is the standard method for reviewing Australasian ED casemix.

The low completion rate for the data tool demonstrates the challenge in engaging clinicians to collect data which is additional to normal work processes. The method used to collect data relied on clinician's good will and accuracy to complete the data tool. The sample size was also small and while statistical significance was identified the result may be due to the sample size rather than a true finding.

The low tool completion rate may have been the result of clinician workload and not reflect the volume of patients receiving antibiotics. As a result we believe that the study sizably underestimates the number of patients receiving antibiotics. This means that the reported time to antibiotic may not genuinely reflect everyday clinical practice.

There was no investigation of missed ED diagnosis or patient outcomes for admitted non-infective patients. However, a Canadian study identified that 25% of septic patient diagnoses were made after transfer from ED (Canadian Institute for Health Information, 2009). The study may have underestimated the infection patient group.

CONCLUSIONS

The study provides an analysis of patients receiving antibiotics in one ED. To improve the time to antibiotic, system processes need to be reviewed to determine where delays occur and can ultimately be resolved. ED processes need to ensure the early recognition, management and safe discharge of patients with infection to prevent deterioration and/or development of sepsis.

While the study adds to the sepsis literature factors that influence triage to antibiotic time require further investigation to enhance the quality and safety of patient care. By auditing care processes the prompt delivery of antibiotics can be achieved and patient deterioration and/or development of sepsis prevented. Through auditing care processes EDs can go some way to achieving control over the quality and safety of service delivery and better meet patient and care goals.

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Table 1

Table 1: Prevalence of patients presenting with a diagnosis related to Infection

	Diagnosis related to infection	**Antibiotic Patient Group**
Age (mean)		62 (SD 20.9)
Gender	**N (%)**	**N (%)**
Male	1988 (60%)	49(47%)
Female	1351(40%)	55(53%)
Infection groups		
Respiratory Infections	885(27%)	29(27.88%)
Abdominal infections	475(14%)	33(31.73%)
Skin & wound infections	335(10%)	9(8.65%)
Other Infections*	311(9%)	5(4.81%)
Fever	244(7%)	7(6.73%)
Ear Nose & Throat infections*	167(5%)	0
Abscess	118(4%)	4(3.85%)
Sepsis /Septicemia	98(3.3%)	8(7.69%)
Bacteremia	12(0.03%)	1(0.96%)
Febrile Neutropenia	11(2.0%)	8(7.69%)
Triage Antibiotic Administration Time		
<60 minutes		19(18%)
>60 minutes		85(82%)
Minutes Mean (SD)		233 (SD 247)
Disposition		
Discharged treatment complete		4(4%)
Admitted		100(96%)
Total N	**3339**	**104**

* Viral infections, bone, encephalitis, herpes

Table 2

Table 2: Patient antibiotic administration by Triage Code

	Triage Code 1	Triage Code 2	Triage Code 3	Triage Code 4	Triage Code 5	
Mean Minutes from Triage-Antibiotics (SD minutes)	38 (18)	157 (291)	245(206)	307(265)	98	
Infection groups (N)						**Total**
Respiratory Infections		6	15	7	1	**29**
Abdominal infections	1	4	17	11		**33**
Skin & wound infections		5	3	1		**9**
Other Infections*			2	3		**5**
Fever		3	2	2		**7**
Abscess		3		1		**4**
Sepsis /Septicemia	1	1	5	1		**8**
Bacteremia			1			**1**
Febrile Neutropenia		4	4			**8**
Total N	**2**	**26**	**49**	**26**	**1**	

Table 3

Table 3: Patient physiological characteristics and interventions

Patient pathophysiological characteristics on arrival to triage	
Tachypnea	31(30%)
Altered Level of consciousness	24(22%)
Decreased oxygen saturation	16(15%)
Hypotension	9(9%)
Patient Interventions	
Intravenous fluids	71(68%)
Pathology	104(100%)
Lactate level	39(39%)

Table 4

Table 4 Antibiotic frequency and type

Antibiotic administered	**1st**	**2nd**	**3rd**
Cephalosporin	46(44%)	8(8%)	6(4.9%)
Penicillin	41(39%)	9(9%)	
Aminoglycoside	3(3%)	31(30%)	9(8.65%)
Quinolone	2(2%)	1(.096%)	
Macrolide	3(3%)	12(12%)	4(3.84%)
'Other'*	9(8.6%)	17(16%)	
Total N	**104**	**78**	**19**

** 'Other' category: Antifungals, metronidazale, meropenem and vancomycin*