

# British Rhinological Society audit of the role of antibiotics in complications of acute rhinosinusitis: a national prospective audit\*

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## SUMMARY

**Objective:** Acute rhinosinusitis (ARS) is one of the most common presenting conditions to Primary Care physicians. Over-prescription of antibiotics has led to wide debate and divided expert opinion regarding the resulting increasing bacterial resistance or the merits of prevention of more serious complications of ARS. A national prospective audit was undertaken in the UK to evaluate use of antibiotics for ARS in Primary Care.

**Methods and Materials:** British Rhinological Society members were asked to contribute patients admitted with complications of ARS, between Feb 2008 – Feb 2009 to a national prospective audit via an on-line survey.

**Results:** Seventy-eight patients were admitted with complications of ARS. The majority of patients were started on antibiotics (59%) prior to admission, with penicillin/amoxicillin being most frequently (64%) prescribed. Similar complication rates were seen in patients treated with and without prior antibiotics.

**Conclusion:** Despite prior antibiotic treatment, complications of ARS seem to occur sporadically. Our study has shown that the complications which require surgical treatment are similar in both the prior antibiotic treated group and the no prior antibiotic group, suggesting limited benefit of oral antibiotics in the Primary Care setting. Early recognition with CT scanning and appropriate hospital management is essential to reduce any subsequent morbidity or mortality.

*Key words:* acute rhinosinusitis, complications, antibiotics

## INTRODUCTION

Acute rhinosinusitis (ARS) is one of the most common presenting conditions to Primary Care physicians. Over-prescription of antibiotics has led to wide debate and divided expert opinion regarding the resulting increasing bacterial resistance or the merits of prevention of more serious complications of ARS. Guidelines to restrict the use of antibiotics to bacterial-only ARS have recently been published in France<sup>(1)</sup>, however distinction between bacterial and viral infections is often difficult to interpret on clinical signs and symptoms. Complications of ARS can be broadly divided into orbital, intracranial and osseous. Over time, complication rates have declined but the incidence of orbital complications has still been reported to be 3% to 11%<sup>(2)</sup> and intracranial complications have a high incidence of morbidity and mortality between 5% and 10%<sup>(3)</sup>. A national prospective audit was undertaken in the UK to evaluate use of antibiotics for ARS in Primary Care in cases who went on to develop a complication of the infection and their subsequent management to offer some insight into whether the use of oral antibiotics prevent or reduce the complications of ARS.

## METHODS AND MATERIALS

### Survey

British Rhinological Society (BRS) members were asked to contribute all patients admitted with complications of ARS, between Feb 2008 and Feb 2009, to a national prospective audit via an on-line survey. Patients were admitted to hospitals throughout the UK and data was collected on age, sex, type of complication of ARS, prior antibiotic use, duration of symptoms prior to admission, investigations and treatment on admission and subsequent outcome from medical or surgical management. The type of complication of ARS was divided into orbital, which included periorbital cellulitis, orbital cellulitis, subperiosteal abscess and orbital abscess; intracranial, which included epidural, subdural, intracranial abscess, meningitis, encephalitis and cavernous sinus thrombosis; and osseous which included osteomyelitis.

## RESULTS

Data was prospectively collected on 78 patients (M 49, F 29) admitted with complications of ARS over a one-year period.

Age ranged between 1-65 yrs (median 13.5 yrs) with the majority of patients being children.

Two groups of patients were identified in this study. Those who developed rapid symptoms and complications of ARS and were admitted to the hospital within a few days of onset of symptoms (no antibiotic group), and those with a longer duration of symptoms allowing them to obtain oral antibiotics prior to development of severe symptoms and subsequent hospital admission (antibiotic group). Antibiotics were prescribed in 59% of the patients with duration of use most commonly less than 48 hours prior to admission to the hospital. Penicillin/amoxicillin (64%) was most frequently prescribed in this group.

Admission to hospitals with complications of ARS demonstrated a clear seasonal distribution with the majority of patients being admitted during the winter months – November to April – 54 (69%) and the minority being admitted in the summer months – May to October – 24 (31%). Patients were investigated with CT scan (71%), nasendoscopy (51%) and blood tests (90%). All patients admitted were treated with intravenous antibiotics, of which amoxicillin-clavulanate (37%) and cephalosporin (35%) were most commonly used.

The most common presenting complication of ARS in the whole group (n = 78) was orbital (76%) followed by intracranial complications (9%) and osteomyelitis (5%).

Patients either settled with medical management using intravenous antibiotics, nasal decongestants (given in 36%) and nasal steroid sprays (given in 27%) or required surgery in the form of either external or endoscopic frontoethmoidectomy for orbital complications, or neurosurgical intracranial surgical intervention. Concomitant treatment of the sinus with intracranial disease was undertaken to allow for both microbiological

culture and to prevent repeated surgical procedures<sup>(6)</sup>. One patient developed both orbital and intracranial complications and one death occurred in the series due to an intracranial complication.

The antibiotic group and the no antibiotic group had similar duration of admission to hospital suggesting similar recovery time. Analysis on the two groups individually suggests that 50% of patients in either group settle with conservative medical treatment and 50% settle with surgical management suggesting no obvious difference in outcome between the groups.

## DISCUSSION

Despite prior antibiotic treatment, complications of ARS seem to occur randomly and are not necessarily prevented by use of oral antibiotics. Our study has shown that the complications rates which require surgical treatment are similar in both the 'prior antibiotic group and the 'no prior antibiotic' group, showing limited benefit of oral antibiotics in the Primary Care setting. Studies by Young et al.<sup>(5)</sup> and Van Buchem et al.<sup>(6)</sup> have shown that oral antibiotic treatment did not improve the clinical course of ARS and are not advocated in the initial treatment of acute sinus infection in Holland and many Scandinavian countries. Recommendations from the National Institute of Clinical Excellence in the UK also do not advocate antibiotic use in ARS<sup>(7)</sup>. Despite this data, Primary Care physicians in the UK continue to prescribe antibiotics for fear of complications of ARS as they are aware that intracranial complications continue to have a significant morbidity and mortality rate<sup>(3)</sup>. The use of an antibiotic has previously been supported by a study showing that penicillin and amoxicillin are more effective than placebo in the treatment of acute sinusitis<sup>(8)</sup>. However, a more recent Cochrane database systematic review in 2008 suggests only a small treatment effect of oral antibiotics in reducing duration of symptoms of uncomplicated acute rhinosinusitis only<sup>(9)</sup>.

The paediatric population demonstrate greater vulnerability in our study and are more likely to develop a complication of ARS. About 56% of the cases were under 15 years old with the most common age range being 1 year to 5 years old. This has also been seen in other paediatric studies with similar age ranges of 3 to 6 years being most commonly affected<sup>(10)</sup>. Immature immune system and sinus development are the likely cause of paediatric vulnerability.

Table 1. Patients admitted with complications of acute rhinosinusitis

	Antibiotic group n = 44	No antibiotics group n = 34
Male/Female	30 M 14F	19M 15F
Mean age (range)	23.2 (1 – 65)	16 (1 – 63)
Mean duration of symptoms prior to admission	8.4 days	2.8 days
Orbital complications	34	23
Intracranial complications	3	4
Osseous complications	3	1
Median duration of admission	4-7 days	4-7 days
Resolution with medical management	23	14
Resolution with surgical management	20	13
Mortality		1 (intracranial complication)

Outcome data incomplete for 7 patients

Table 2. Patients admitted with complications of acute rhinosinusitis

Complications	No antibiotics	Prior antibiotics	No. of patients (%) (n = 78)*
Orbital complications	34 (77.00%)	23 (67.00%)	59 (76%)
Intracranial complications	3 (0.07%)	4 (0.10%)	7 (9%)
Osseous complications	3 (0.07%)	1 (0.03%)	4 (5%)
Other (incomplete data set)			8 (10%)

\* More than one complication in one individual

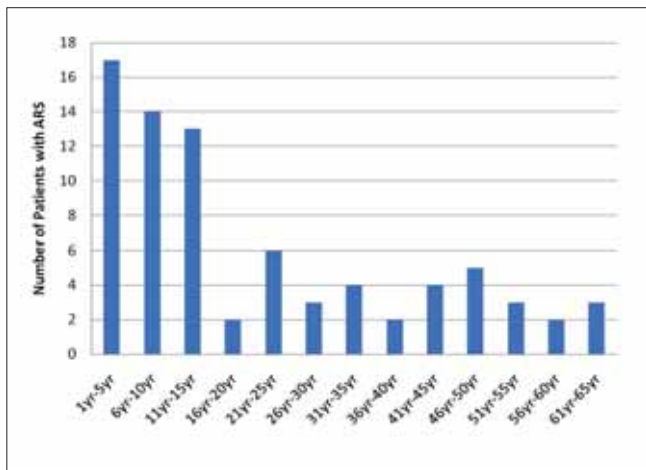


Figure 1. Age Distribution of patients admitted with ARS.

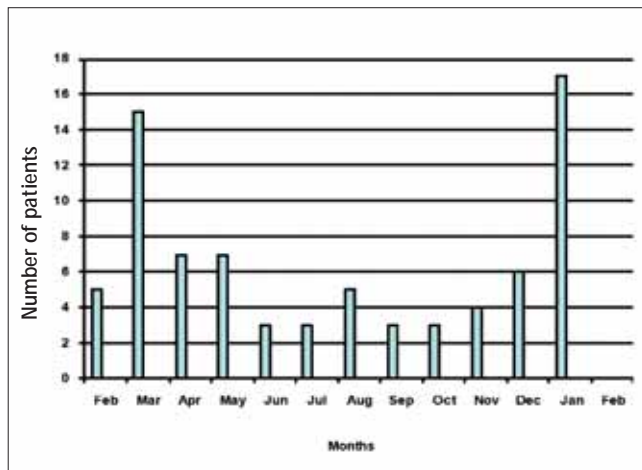


Figure 2. Seasonal distribution of complications of acute rhinosinusitis.



Figure 3. Right orbital subperiosteal abscess.

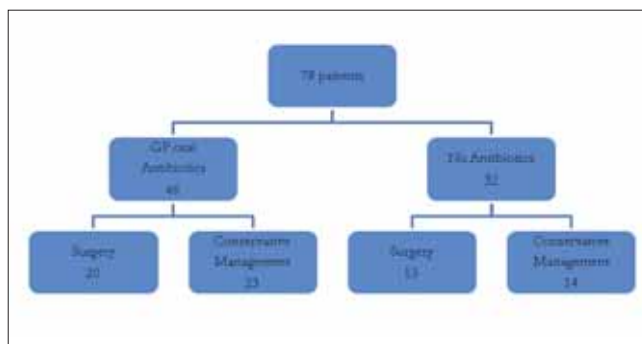


Figure 4. Patient outcome data. (Incomplete data set on 8 patients).

Complications of ARS continue to occur sporadically although prevalence is more common during the winter months and in the paediatric population such that vigilance and early recognition with CT scanning and appropriate hospital management are crucial to prevent any subsequent morbidity or mortality. Unfortunately, detailed microbiology was not available in this audit to elucidate whether a particularly virulent organism was responsible for some of the clustering of cases and should be addressed in a future study. *Haemophilus influenzae* and *Streptococcus pneumoniae* have been implicated in intracranial complications, *Staphylococcus* and *Streptococcus* species in orbital complications and *Staphylococcus* in osseous complications<sup>(3,11)</sup>. However, we have no evidence that treating all patients with acute bacterial rhinosinusitis with an oral broad spectrum antibiotic would prevent progression to a complication and this study shows that a significant number of individuals with complications had received such treatment. Of course we cannot know how many theoretically were prevent-

ed from developing a complication by such medication but anecdotal evidence does not suggest a higher incidence of complications in countries where antibiotics are rarely given for ARS in general practice as compared to countries where they are regularly prescribed/more freely available.

An evidence based management algorithm for adults with acute rhinosinusitis in primary care should be based on the recommendations of the EPOS document<sup>(3)</sup>. Sudden onset of two or more symptoms, one of which should be either nasal blockage/obstruction/congestion or nasal discharge can be accompanied by facial pain/pressure or reduction/loss of smell are suggestive of ARS. Early recognition of more sinister symptoms of periorbital oedema, displaced globe, double vision, ophthalmoplegia, reduced visual acuity, severe frontal headaches or swelling, signs of meningitis or focal neurological signs should alert the clinician into immediate hospital referral for the appropriate management of the complications of acute

rhinosinusitis thereby reducing morbidity and mortality of a treatable disease.

#### ACKNOWLEDGEMENTS

We would like to thank and acknowledge all the BRS members for their contribution in submitting the data for this audit.

Details of the data collected for the ARS audit are available on the BRS website. These details are also added as an appendix in the webversion of this article available on the Rhinology website.

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Survey: BRS Audit of Antibiotic Use for Complications of Acute Rhinosinusitis

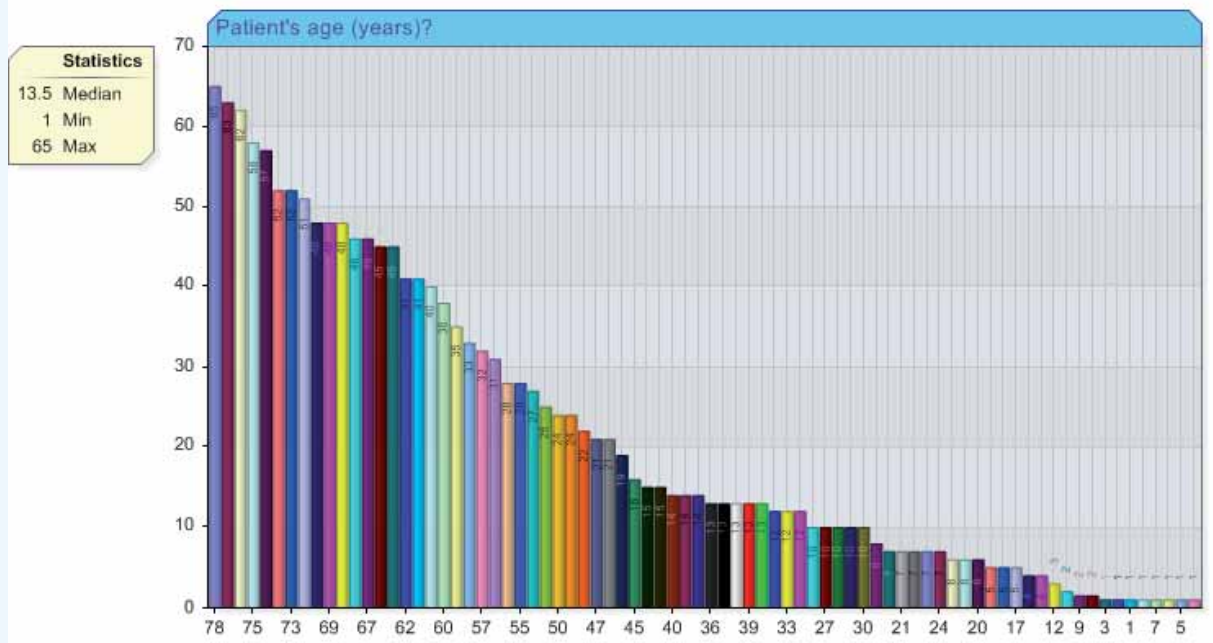
Report: Default Report

Survey Status	Respondent Statistics	Points Summary:	
<b>Status:</b> Live	<b>Total Responses:</b> 78	No Points Questions used in this survey.	<a href="#">Convert to PDF</a> <a href="#">Email PDF</a> <a href="#">Export to Excel</a>
<b>Deploy Date:</b> 12/07/2007	<b>Completes:</b> 68		
<b>Closed Date:</b>	<b>Partials:</b> 10		



View Questions: 1 to 5

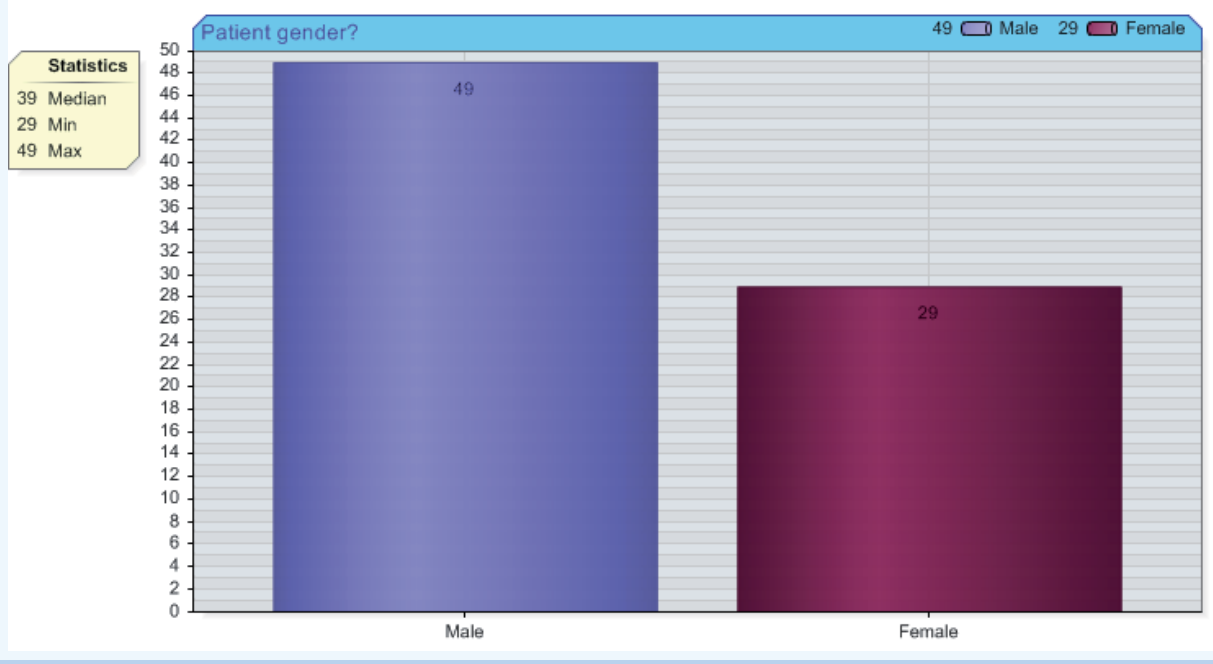
1. Patient's age (years)?

	Value
Highest:	65.00
Lowest:	1.00
Average:	21.22
Median:	13.50
Total Responded to this question:	78 100%
Total who skipped this question:	0 0%
Total:	78 100%



### 2. Patient gender?

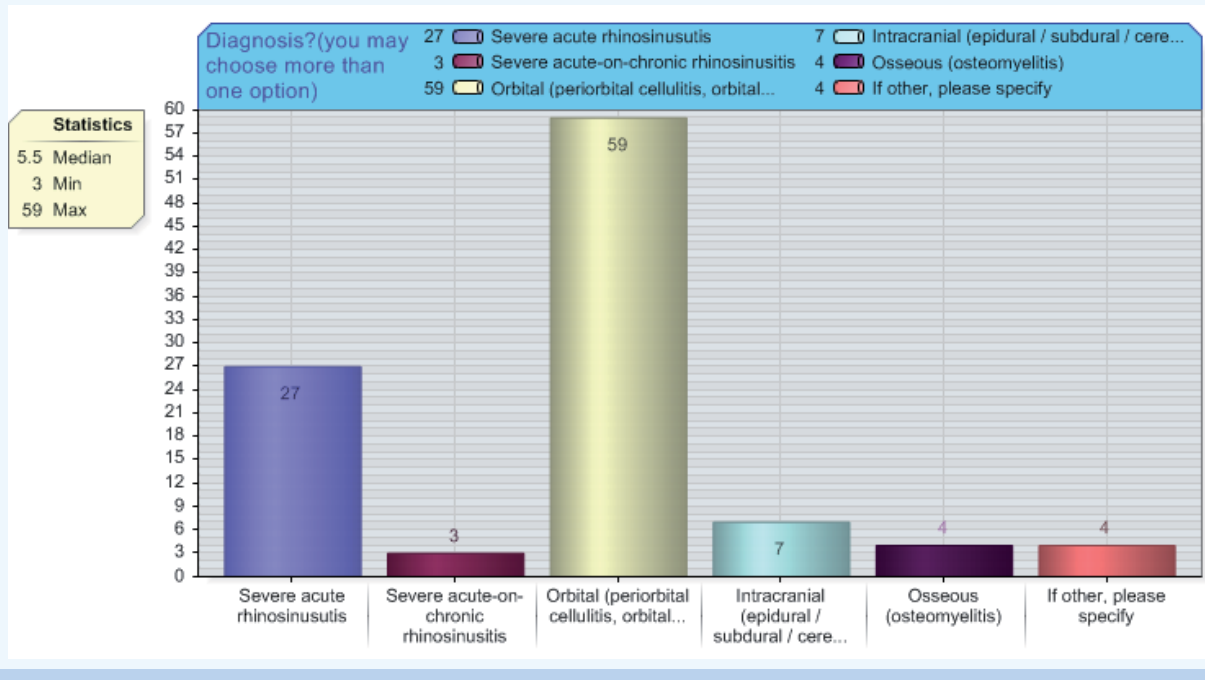
	Responses	Percent
Male: 	49	62.82%
Female: 	29	37.18%
Total Responded to this question:	78	100%
Total who skipped this question:	0	0%
Total:	78	100%





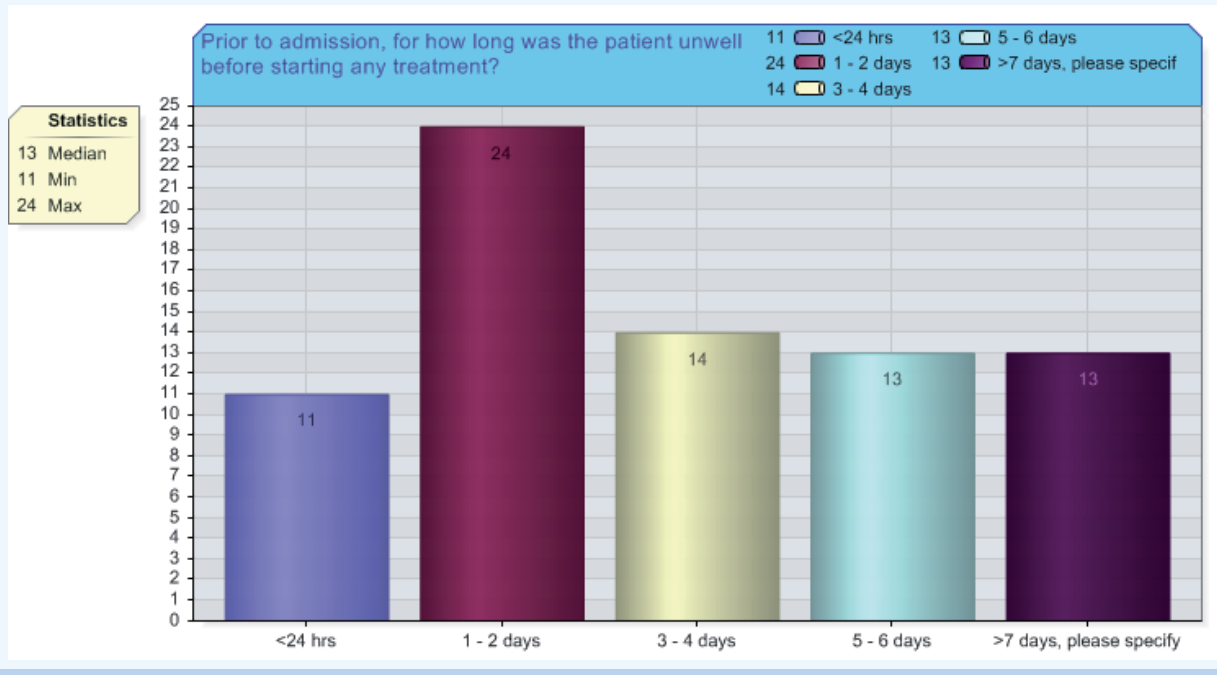
**3. Diagnosis?**  
(you may choose more than one option)

	Responses	Percent
Severe acute rhinosinusitis:	27	34.62%
Severe acute-on-chronic rhinosinusitis:	3	3.85%
Orbital (periobital cellulitis, orbital cellulitis, orbital / subperiosteal abscess):	59	75.64%
Intracranial (epidural / subdural / cerebral abscess, meningitis, cerebritis, cavernous sinus thrombosis):	7	8.97%
Osseous (osteomyelitis):	4	5.13%
If other, please specify :	4	5%
Total Responded to this question:		78 100%
Total who skipped this question:		0 0%
Total:		78 100%



**4. Prior to admission, for how long was the patient unwell before starting any treatment?**

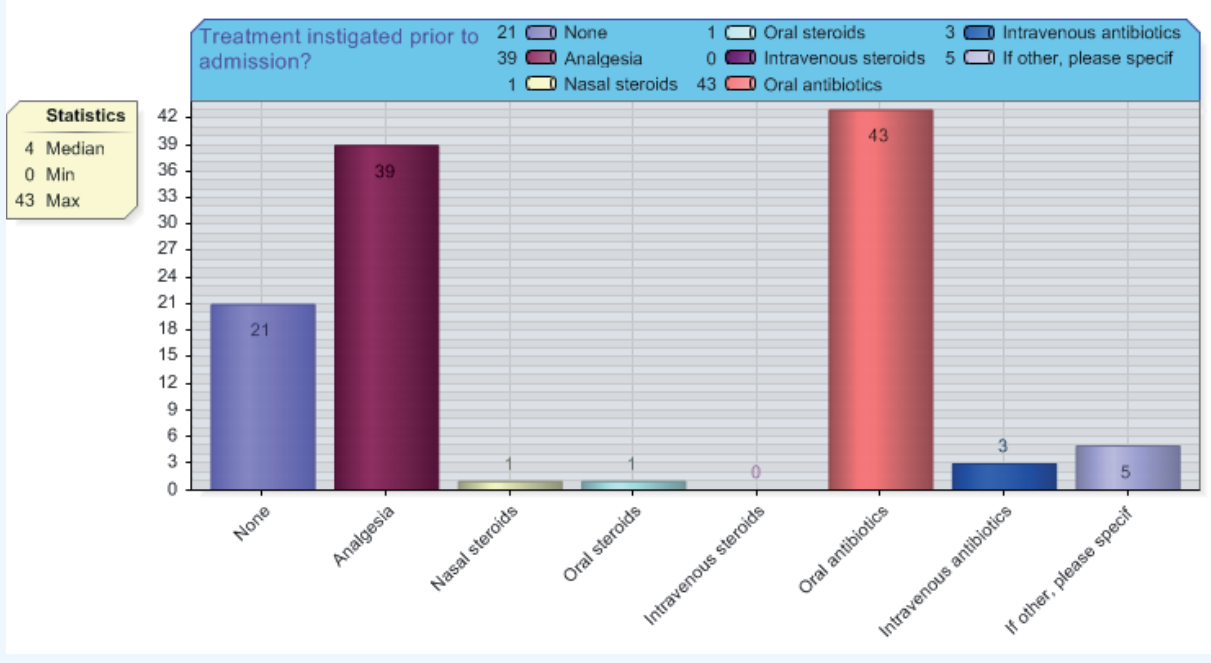
	Responses	Percent
<24 hrs:	11	14.67%
1 - 2 days:	24	32%
3 - 4 days:	14	18.67%
5 - 6 days:	13	17.33%
>7 days, please specify :	13	17.33%
Total Responded to this question:		75 96.15%
Total who skipped this question:		3 3.85%
Total:		78 100%





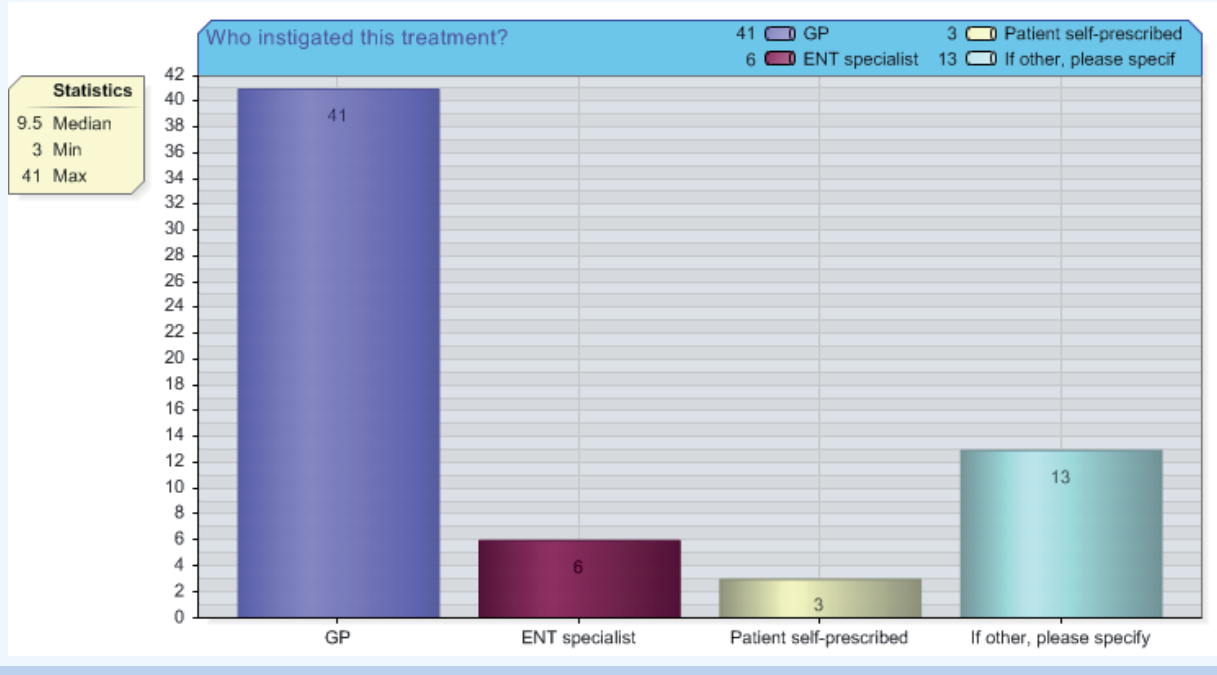
**5. Treatment instigated prior to admission?**

	Responses	Percent
None:	21	28%
Analgesia:	39	52%
Nasal steroids:	1	1.33%
Oral steroids:	1	1.33%
Intravenous steroids:	0	0%
Oral antibiotics:	43	57.33%
Intravenous antibiotics:	3	4%
If other, please specify :	5	6%
Total Responded to this question:		75 96.15%
Total who skipped this question:		3 3.85%
Total:		78 100%



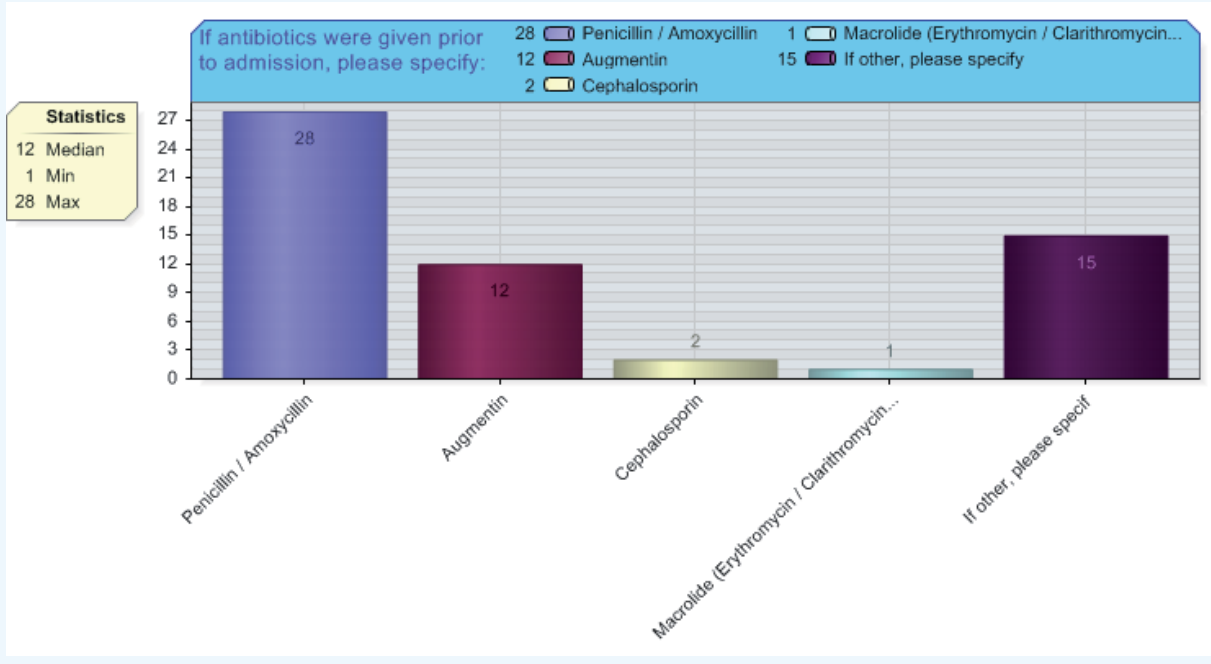
**6. Who instigated this treatment?**

	Responses	Percent
GP:	41	65.08%
ENT specialist:	6	9.52%
Patient self-prescribed:	3	4.76%
If other, please specify :	13	20.63%
Total Responded to this question:		63 80.77%
Total who skipped this question:		15 19.23%
Total:		78 100%



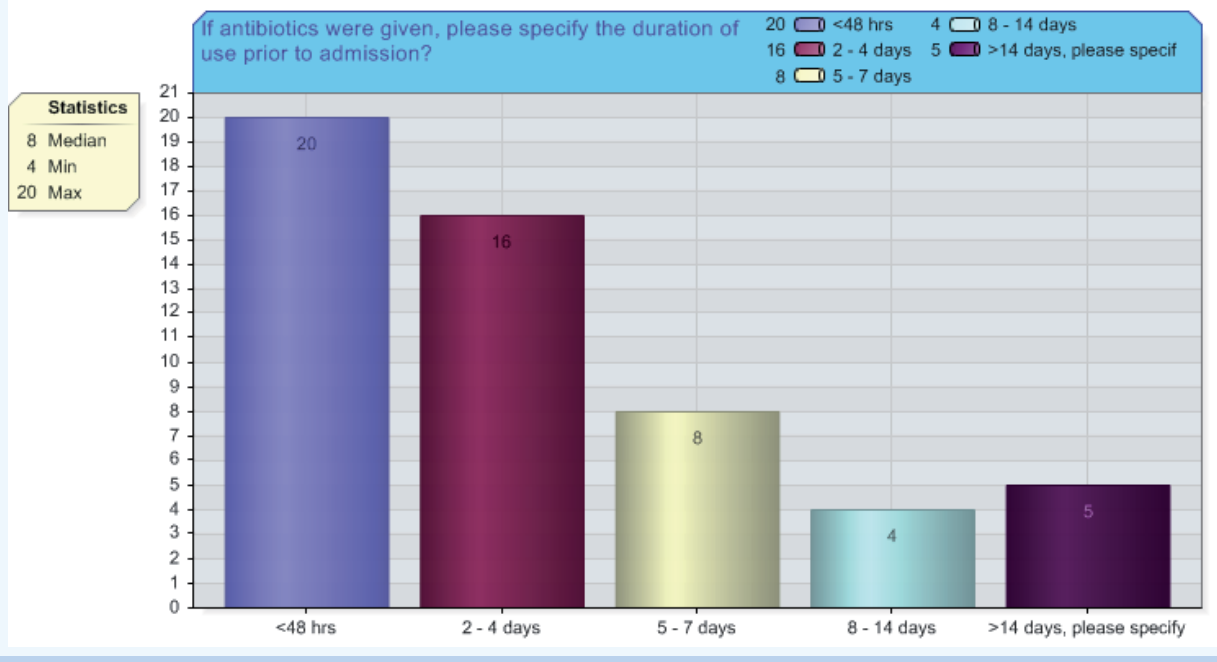
**7. If antibiotics were given prior to admission, please specify:**

	Responses	Percent
Penicillin / Amoxicillin:	28	52.83%
Augmentin:	12	22.64%
Cephalosporin:	2	3.77%
Macrolide (Erythromycin / Clarithromycin):	1	1.89%
If other, please specify :	15	28%
Total Responded to this question:		53 67.95%
Total who skipped this question:		25 32.05%
Total:		78 100%



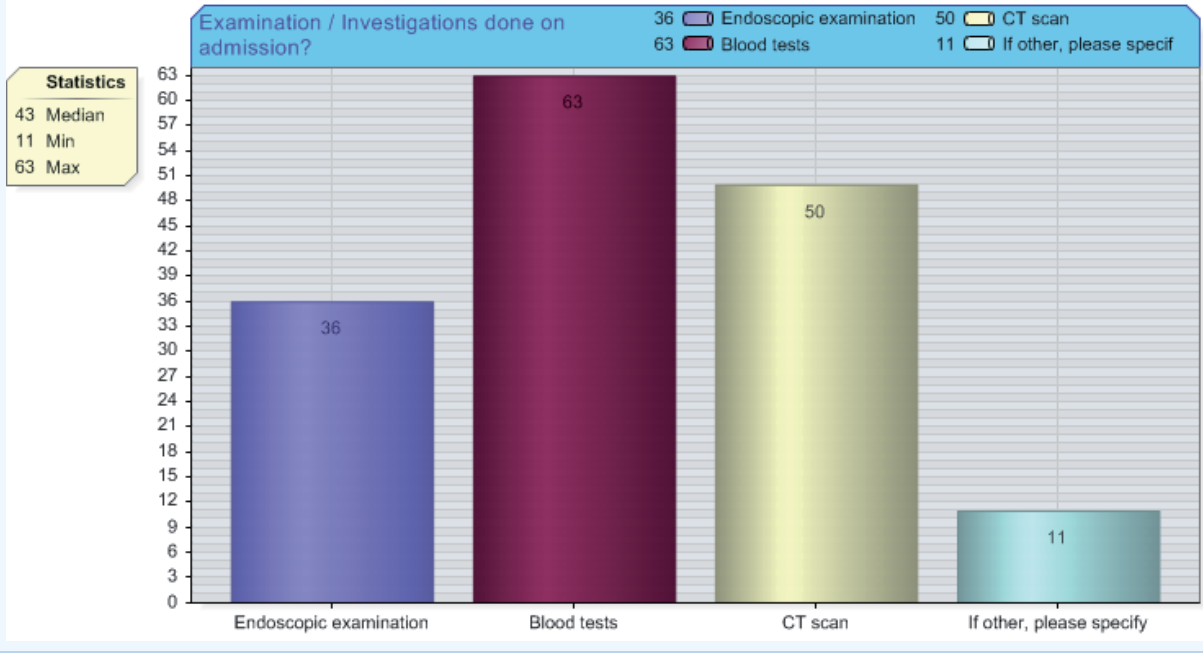
**8. If antibiotics were given, please specify the duration of use prior to admission?**

	Responses	Percent
<48 hrs:	20	37.74%
2 - 4 days:	16	30.19%
5 - 7 days:	8	15.09%
8 - 14 days:	4	7.55%
>14 days, please specify :	5	9.43%
Total Responded to this question:		53 67.95%
Total who skipped this question:		25 32.05%
Total:		78 100%



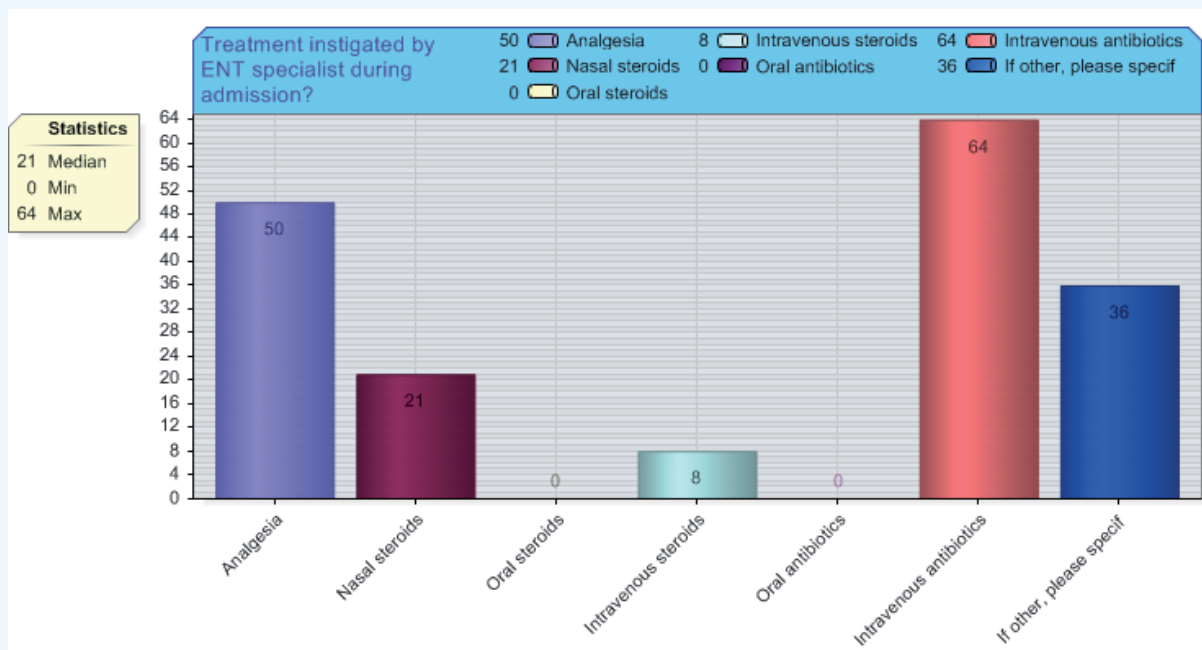
**9. Examination / Investigations done on admission?**

	Responses	Percent
Endoscopic examination:	36	51.43%
Blood tests:	63	90%
CT scan:	50	71.43%
If other, please specify :	11	15%
Total Responded to this question:		70 89.74%
Total who skipped this question:		8 10.26%
Total:		78 100%



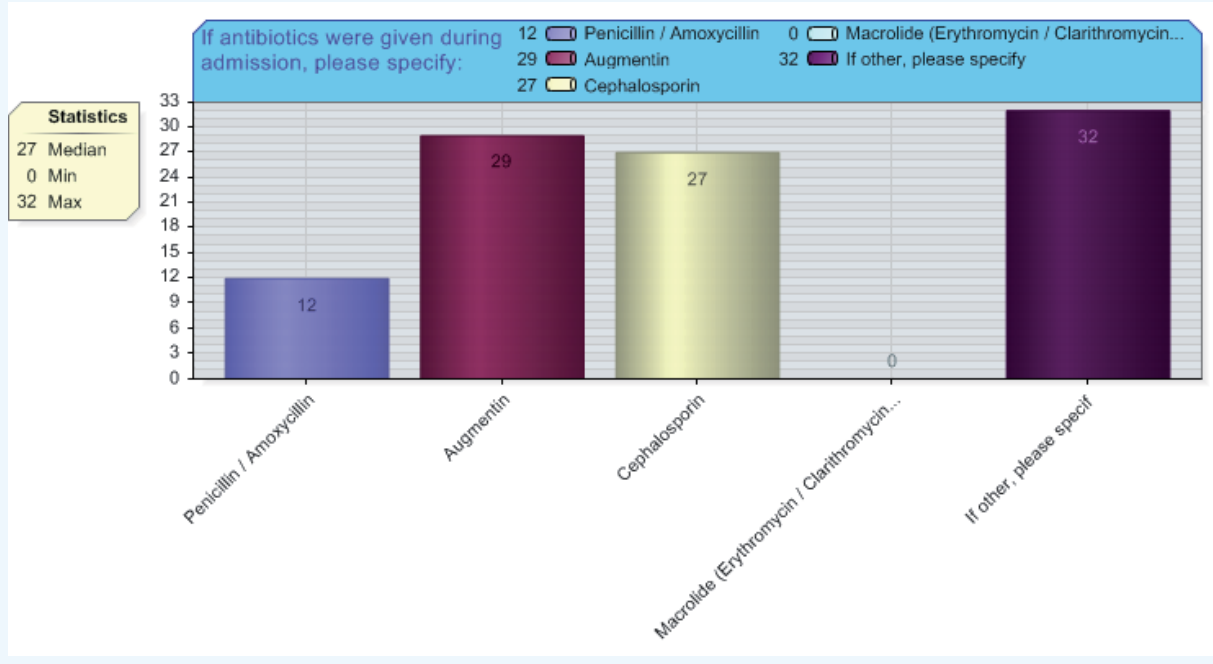
**10. Treatment instigated by ENT specialist during admission?**

	Responses	Percent
Analgesia:	50	71.43%
Nasal steroids:	21	30%
Oral steroids:	0	0%
Intravenous steroids:	8	11.43%
Oral antibiotics:	0	0%
Intravenous antibiotics:	64	91.43%
If other, please specify :	36	51%
Total Responded to this question:		70 89.74%
Total who skipped this question:		8 10.26%
Total:		78 100%



**11. If antibiotics were given during admission, please specify:**

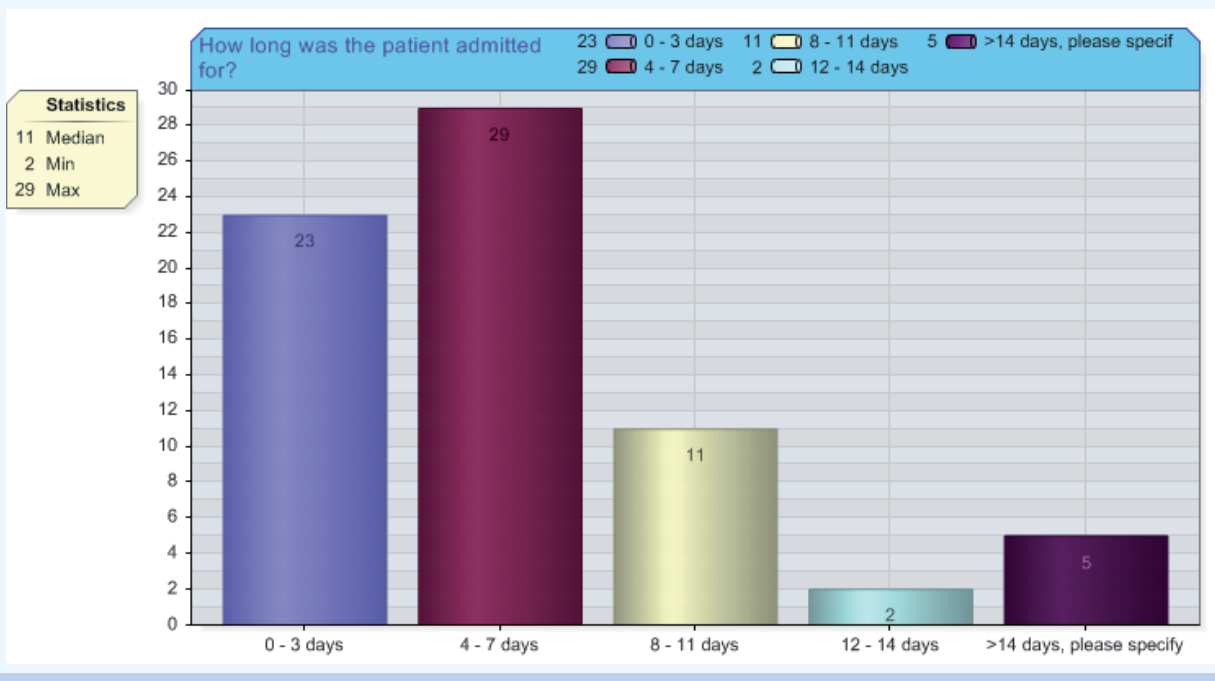
	Responses	Percent
Penicillin / Amoxicillin:	12	17.39%
Augmentin:	29	42.03%
Cephalosporin:	27	39.13%
Macrolide (Erythromycin / Clarithromycin):	0	0%
If other, please specify :	32	46%
Total Responded to this question:		69 88.46%
Total who skipped this question:		9 11.54%
Total:		78 100%





**12. How long was the patient admitted for?**

	Responses	Percent
0 - 3 days:	23	32.86%
4 - 7 days:	29	41.43%
8 - 11 days:	11	15.71%
12 - 14 days:	2	2.86%
>14 days, please specify :	5	7.14%
Total Responded to this question:		70 89.74%
Total who skipped this question:		8 10.26%
Total:		78 100%



**13. Patient outcome?**

	Responses	Percent
Resolved with conservative management:	38	54.29%
Resolved after surgical intervention:	28	40%
Further complications - please specify :	4	5.71%
Total Responded to this question:		70 89.74%
Total who skipped this question:		8 10.26%
Total:		78 100%

