

Pre Hospital Analysis of Northern Trauma Outcome Measures

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Introduction

Throughout the North of England both Ambulance services (**NEAS/NWAS**) and the Air Ambulance service (**GNAAS**) provide vital pre-hospital care for patients who have suffered major traumatic injuries. Major trauma is considered to be injuries that pose a serious and immediate threat to life. Events that can cause these kinds of injuries can be anything from falls to **RTCs**, and in some cases may require major interventions such as **thoracostomies** or **RSI**.

Aims

In this research we were aiming to identify how effective the tasking was for GNAAS (including the **specificity** and **sensitivity**) and how the use of **HEMS** effects the outcomes for patients. The questions for this research were:

Is there a difference in the number of survivors between Ground Crews and Air Ambulance teams?
How accurate is current tasking and can it be improved?

At present there is little to no data relating directly to tasking specificity and sensitivity that also looks at outcomes for patients. This can be difficult to compare as there can be big differences between the various services e.g. the size of the area that they cover etc. The current GNAAS tasking system is based on the framework for a high performing Air Ambulance Service, published in 2013 by the Air Ambulance Association. This highlights the importance of good tasking principles, responsibilities, and criteria and aims to provide a robust system of deployment. ⁽¹⁾ Although this deals with a number of operational timings, The PHANTOM project aimed to look at the link between tasking, a requirement for life saving interventions and patient outcomes.

Methods

Patients were identified from **TARN**, using PHANTOM criteria. This looked at the nature and severity of the injuries and in particular selected patients with a high **ISS**.

These patients were all brought into the **RVI** Major Trauma Centre between 8AM and 10PM throughout the whole of 2014. Once these patients had been identified a retrospective review of all pre-hospital and in patient notes was undertaken.

This data was then tabulated in order to compare **ISS/Ps** and to examine the accuracy of tasking using sensitivities and specificities. The data collected from the RVI was then combined with similar data using the same selection criteria, from air ambulance cases taken to the **JCUH**. This had been undertaken by a senior member of the PHANTOM team.

Results

	2014							
	JCUH GNAAS	% of Total	JCUH Other	% of Total	RVI GNAAS	% of Total	RVI Other	% of Total
Total number	49	—	98	—	40	—	198	—
Mortality	7	14	15	15	12	30	41	20
Morbidity	7	14	9	9	14	35	97	49
Average ISS	19	—	23	—	29	—	25	—
Average Ps	86	—	83	—	77	—	81	—
Ps < 75	9	39	19	19	16	40	51	26
RSI PH	28	57	0	0	22	55	0	0
PH thoracostomies	9	18	0	0	8	20	0	0
ED RSI	2	4	40	41	0	0	31	16
ED Chest drain	2	4	13	13	4	10	18	9
Blood ED	11	22	24	24	8	20	22	11
ITU	26	53	54	55	26	65	101	51

Table 1- Combined 2014 data for JCUH and RVI for Patients that hit PHANTOM criteria

GNAAS Tasked	Critical Care interventions	
	Yes	No
Yes	75	374
No	137	702

Table 2- Total number of Major Trauma positive patients

Total MT +ve GNAAS Tasked	449
Total MT +ve Not GNAAS Tasked	839
GNAAS Tasking Sensitivity	$((75/449)*100)=35\%$
GNAAS Tasking Specificity	$((702/702+374)*100)=65\%$

Table 3- Sensitivity and Specificity of GNAAS tasking



Acronyms/ Key Terms

- RVI**- Royal Victoria Infirmary
- JCUH**- James Cook University Hospital
- NEAS** – North East Ambulance Service
- NWAS** – North West Ambulance Service
- GNAAS** – Great North Air Ambulance Service
- HEMS**- Helicopter Emergency Medical Service
- RTC**- Road Traffic Collision
- Thoracostomy**- A small incision made in the chest wall to help with drainage of air/fluid
- RSI**- Rapid Sequence Induction-Emergency anaesthetic
- TARN**- Trauma Audit and Research Network- A verified UK database of patients from major trauma
- Specificity**- Percentage of negatives correctly identified
- Sensitivity** -Percentage of positives correctly identified
- ISS**- Injury Severity Score- An anatomical scoring system to assign a numerical value to the severity of injury⁽²⁾
- Ps**- Probability of Survival- Patients with a Ps <75 are considered high risk.⁽³⁾
- Morbidity**- Long term and wider reaching effects of injuries
- Mortality**- Patients who die as a result of their injuries

Conclusion

This study has shown that in the pre hospital setting early critical interventions undertaken by GNAAS appear to be of benefit for those patients who require it. It is also evident that improvements can be made regarding the specificity and sensitivity of GNAAS tasking. A proactive review of tasking system design would be required in order to improve this.

In monitoring cases in which GNAAS has been involved, TARN is an invaluable resource, but it does not necessarily contain all of the relevant information needed to complete a comprehensive data set. This could be improved by the design of a form that reflects real time GNAAS specific data. Which would allow regular reviews (e.g. quarterly) and continued audit and research. The tasking itself also clearly needs improvement. One suggestion for change that has been made is to implement a system whereby a HEMS Paramedic or Doctor is available to speak directly to the caller where the incident/ injury is deemed to be significant and use a GNAAS specific tasking triage, employing pertinent questions. By doing this, the aim would be to get the right team to the right scene, the first time, and maximise the potential better outcomes in these patients.

Discussion

Using the data from Table 1, it becomes possible to begin identify the benefits of HEMS.

Looking specifically at the data for JCUH, it is clear that although the percentages for the morbidity/ mortality/ Ps remained largely consistent, the availability of more critical care interventions pre- hospital has a large effect on what is required once the patient reaches ED (only 4% of GNAAS patients required RSI in ED compared to 41% from other services). This particular data however does little to demonstrate if this availability is of benefit to patients.

The data collected from the RVI however shows more contrasts. While the critical care interventions received pre hospital by the GNAAS patients is also higher across the board, this demonstrates a greater effect on the patient outcomes. The percentage of patients picked up by GNAAS and taken to the RVI with a Ps <75 (40%) is considerably higher than those picked up by other services (26%). Average ISS is also higher in these patients (GNAAS- 29, Other Services- 25). Despite this however, although the mortality and number of patients that go to ITU is slightly higher in GNAAS patients, the morbidity is lower (GNAAS-35%, Other Services- 49%). This appears to suggest that the availability of these interventions, earlier on in their care improves their outcomes.

By combining the data from tables 2 and 3 however, it becomes evident that the Tasking used by GNAAS does not demonstrate a very high Specificity or Sensitivity. This means that a large number of patients who could potentially benefit from HEMS are not being identified. While those patients who did receive this care did appear to benefit, if patients are not being correctly identified, the overall benefit is limited.