



PBPI 2023 Trauma Query

Level 1 Trauma Incident Review

Transporting patients to the appropriate hospital in order to receive the correct care is important to positive patient outcomes. Serious traumatic injuries require immediate interventions which specially designated Level 1 Trauma Centers can provide. Specific criteria guide paramedics in the pre-hospital setting to assure the patient is being transported to the appropriate level of care. To study how well the system as a whole is appropriately applying those criteria, a query was performed on all incidents from November 1st, 2022 until September 30th, 2023, a span of eleven months. These months were chosen due to the change in criteria that were released in November of 2022.

Six thousand—six hundred-sixty nine incidents meet the query criteria to be included within the review. Criteria included being transported to a hospital but not by a private ambulance, not being a traumatic arrest, having a primary or secondary impression that included the term “injury” or “trauma”, and having paramedics answer “Yes” to the question as to whether or not there was a possible injury.

Average	62.11
Mode	84
Median	69
Minimum	0
Maximum	122

Less than 1	9
Between 1 and 9	131
Between 10 and 64	2805
65 and over	3724

Across the 6,669 incidents, the average patient age was 62 years old. More statistics on the patient’s age can be found in Table 1. The counts for the various significant age ranges can be found in Table 2.

The 6,669 incidents were transported to a eighteen different hospitals by the various system agencies. Table 3 has the counts of patients transported to each of those hospitals. Northwest Community Hospital being the most central hospital in the system, unsurprisingly, had the most transports. One incident did not complete the destination hospital data field.

Receiving Hospital	Incidents
Northwest Community Hospital	2586
Ascension Alexian Brothers	1146
Advocate Good Shepherd Hospital	888
Ascension Saint Alexius	888
Advocate Condell Medical Center	348
AdventHealth GlenOaks	266
Lutheran General Hospital	185
Glenbrook Hospital	124
Northshore Hospital - Highland Park	95
UofC / Advent Health GlenOaks	43
NM Central DuPage Hospital	31
Northwestern Lake Forest Hospital	20
Northwestern Medicine McHenry Hospital (NIMC)	19
Advocate Good Samaritan Hospital	15
Elmhurst Memorial Hospital	11
Edward Hines Jr VA	1
<i>BLANK</i>	1
Loyola University MC	1
Good Samaritan Regional Health Center.	1



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Across the 6,669 incidents in the analysis, there was a total of 144 different selected causes for the injury. The top ten selected reasons can be found in Table 4. Falls are the most common cause for injury amongst those patients included in this analysis.

Cause of Injury	Incidents
Fall from standing position due to slipping, tripping and stumbling, or other	2984
Car vehicle traffic accident	729
Fall from bed	323
Other fall	260
Fall from stairs and steps	234
Fall from chair	172
Assault by bodily force	170
Crashing of motor vehicle, undetermined intent	160
Striking against or struck by other objects	114
Slipping, tripping and stumbling without falling	102

Level 1 decision for transport is based up physiological criteria and can be separated into five categories:

1. Motor GCS score less than 6
2. A respiratory rate that is under 10 or over 29
3. Room Air SpO₂ < 90%.
4. Reduced age specific Systolic Blood Pressure
5. Heart Rate exceeding the Systolic Blood Pressure.

Each incident was initially analyzed to determine if any of the vital signs met Level 1 physiological criteria. The number of incidents which meet each of the seven different physiological criteria and how many were transported to a Level 1 hospital can be found in Table 5.

Mental status & vital signs	
All patients	
<ul style="list-style-type: none"> - Unable to follow commands (Motor GCS < 6) - RR < 10 or > 29 - Respiratory distress or need for ventilatory support - RA SpO₂ < 90% 	<u>Age 0-9 years:</u> SBP < 70 + (2 X age)
	<u>Age 10-64 years:</u> SBP < 90 mmHg HR > SBP
	<u>Age ≥ 65 years:</u> SBP < 110 mmHg HR > SBP

	Motor GCS < 6	Respiratory Rate <10	SPO₂ < 90% on	Systolic <	Systolic < 90	HR > SBP	Systolic < 110
Number of Incidents	214	202	186	0	43	227	324
Percentage of All (6669)	3.21%	3.03%	2.79%	0.00%	0.64%	3.40%	4.86%
Transported to Level 1	80	47	32	0	14	41	30
Percent To Level 1	37.38%	23.27%	17.20%	N/A	32.56%	18.06%	9.26%

The initial review to determine compliance with Level 1 transport strictly looked at the documented vitals. To assure greater accuracy of the data, each incident was reviewed to determine if the patient should have been transported to a Level 1 hospital based upon all of the incident information documented.

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Motor GCS < 6 Incident Review

Initial review of physiological criteria resulted in 214 incidents having at least one documented Motor GCS that was less than six. Initially, 80 of the 214 (37.38%) were transported to a Level 1 hospital. Review of the 134 non-Level 1 transport incidents determined that 32 of the 214 (15%) qualified as patients who should have been transported to a Level 1 hospital. The main reason for people not meeting criteria was due to minor injury but at their base line mental status per the caregiver. Therefore, a total of 112 incidents were identified where the patient should have been transported to a Level 1 hospital based upon the physiological criteria of a Motor GCS score less than 6. **The system transported 71.43% of those patients (80 out of 112).**

Respiratory Rate <10 or >29 (age > 2)

Initial review of physiological criteria resulted in 202 incidents having at least one documented respiratory rate that was under 10 or exceeded 29 for any patient over the age of 2 years old. Initially, 47 of the 202 (23.27%) were transported to a Level 1 hospital. Review of the 155 non-Level 1 transport incidents determined that 21 of the 155 (13.5%) qualified as patients who should have been transported to a Level 1 hospital. 42 of the 155 incidents (27.1%) were identified as having a typographical error within the vitals documented which caused the incident to be included in the review. Therefore, a total of 68 incidents were identified as where the patient should have been transported to a Level 1 hospital based upon the physiological criteria for respiratory rate. **The system transported 69.12% of those patients (47 out of 68).**

SPO2 <90% on Room Air

Initial review of physiological criteria resulted in 186 incidents having at least one documented SPO2 value that was under 90%. Initially, 32 of the 186 (17.20%) were transported to a Level 1 hospital. Review of the 154 non-Level 1 transport incidents determined that 23 of the 154 (14.9%) qualified as patients who should have been transported to a Level 1 hospital. Therefore, a total of 55 incidents were identified as where the patient should have been transported to a Level 1 hospital based upon the physiological criteria for SPO2. **The system transported 58.18% of those patients (32 out of 55).**

HR > SBP

Initial review of physiological criteria resulted in 227 incidents having at least one documented heart rate value that was greater than the documented systolic blood pressure value at the same time. Initially, 41 of the 227 (18.06%) were transported to a Level 1 hospital. Review of the 186 non-Level 1 transport incidents determined that 47 of the 186 (25.3%) qualified as patients who should have been transported to a Level 1 hospital. Therefore, a total of 88 incidents were identified as where the patient should have been transported to a Level 1 hospital based upon the physiological criteria of having a heart rate greater than the corresponding systolic blood pressure. **The system transported 46.59% of those patients (41 out of 88).**



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Systolic Blood Pressure < 70 + 2 x Age (age<10)

Initial review of physiological criteria resulted in no incidents found where a patient under the age of 10 years old had a documented systolic blood pressure less than 70 plus two times the patient's age.

Systolic Blood Pressure < 90 (10 ≤ age < 65)

Initial review of physiological criteria resulted in 43 patients who's age was equal to or greater than ten but less than sixty-five and had a documented blood pressure less than 90mmHg. Initially, 14 of those 43 (32.56%) were transported to a Level 1 hospital. Review of the 29 incidents determined that none of the 43 (0%) qualified as patients who should have been transported to a Level 1 hospital. Therefore, a total of 14 incidents were identified as where the adult patient should have been transported to a Level 1 hospital based upon the physiological criteria for systolic blood pressure. **The system transported 100.0% of those patients (14 out of 14).**

Systolic Blood Pressure < 110 (age ≥ 65)

Initial review of physiological criteria resulted in 324 patients who's age was equal to or greater than sixty-five and had a documented systolic blood pressure less than 110mmHg. Initially, 30 of those 324 (9.26%) were transported to a Level 1 hospital. Review of the 294 incidents determined that 100 of the 294 (34.0%) qualified as patients who should have been transported to a Level 1 hospital. Therefore, a total of 130 incidents were identified as where the adult patient should have been transported to a Level 1 hospital based upon the physiological criteria for systolic blood pressure. **The system transported 23.1% of those patients (30 out of 130).**

Table 8 below summarizes the final numbers for each Level 1 physiological criteria, showing the number of patients transported, the number of non-transported patients who should have been after individual incident review, the total number of patients qualifying for transport, and finally the percent of patients who were transported by the system.

Table 8—Final Level 1 Transport Percentages

	<i>Motor GCS < 6d</i>	<i>Respiratory Rate <10</i>	<i>SPO2 < 90% on Room</i>	<i>Systolic <</i>	<i>Systolic < 90</i>	<i>HR > SBP</i>	<i>Systolic < 110</i>
Transported to Level 1	80	47	32	0	14	41	30
Non-Transport Should	32	21	23	0	0	47	100
Total Patients	112	68	55	0	14	88	130
Percent To Level 1	71.43%	69.12%	58.18%	N/A	100%	46.59%	23.1%