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RESEARCH REPORT

ASSESSING PROVIDER UNDERSTANDING OF INTERFACILITY EMERGENCY MEDICAL SERVICES TRANSFERS

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ABSTRACT

Background: Interfacility transfers between hospitals are integral to regional healthcare systems. The decisions sending clinicians make regarding emergency medical services (EMS) transport team capability and transport modality (ground versus air) can dramatically impact patient care, emergency departments' workflow, hospital length of stay, and EMS resource availability. More research is needed to assess emergency medicine clinicians' understanding of interfacility transport.

Methods: We developed six patient scenarios to test knowledge of EMS transport team capabilities and mode of interfacility transfer. Seven board-certified EMS physicians determined the optimal answer to each patient scenario. We distributed a survey with the scenarios to regional healthcare partners via a database of persons who utilize or interface with interfacility transport services. We collected answers to the patient scenarios and clinician characteristics (primary practice site, sex, age, specialty, years since graduation, clinician degree, respondent-reported EMS training received). Descriptive statistics were performed, and Fisher's exact tests described differences in correct answers as they varied by specialty (emergency medicine or other specialty), clinician type (physician or advanced practice provider), and reported training in EMS level of care.

Results: Seventy-six emergency medicine clinicians responded (5%), including 68 physicians and eight advanced practice providers. The mean total score on the case scenarios was 69%, with scores ranging from 33% to 100%. The mean scores on questions testing transport team capability and transport modality were 67% and 70%, respectively. No significant difference was found in test scores between emergency medicine and other specialties (p=0.718), clinician level of training (p=0.644), or respondent-reported training in EMS transport capabilities (p=0.943).

Conclusion: Variability exists in clinicians' knowledge of interfacility transport throughout the region studied. Regional healthcare systems could benefit from clinician education on interfacility transfer resources and capabilities.

INTRODUCTION

Interfacility transfer of patients by emergency medical services (EMS) between hospitals is an integral component of healthcare, which relies on the interconnectivity of a regionalized system. Emergency medicine clinicians' decisions regarding transport team capabilities and transport modality (ground versus air) can dramatically affect patient care, emergency departments' workflow, hospital length of stay, and systemwide interfacility resource availability. Despite this, a statement from the Interfacility Transfer Workgroup and the Emergency Medical Services National Research Agenda declared that a lack of scientific knowledge "about optimal interhospital transfers" has confused clinicians and left them floundering to provide the best care without the guidance of good science (NHTS, 2006). In this setting, it is important for clinicians to be educated in local resource availability and capabilities to make informed decisions when transferring patients.

The impact of interfacility transfer to patients can be substantial. Transfer includes potentially significant cost and travel away from families and social support networks. (Allen, 2014, p. 346; Britton, 2017, p. 565; Coleman, 2003, p. 549; Coleman, 2003, p. 556; Enderlin, 2013, p. 47, Hirschman, 2018, p. 58; Marengoni, 2011, p. 430; Naylor, 2011, p. 746; Dwyer, 2014, p. 759). Furthermore, the needs of patients requiring interfacility transfer vary dramatically; some patients have emergent, time-critical diagnoses whereas some are clinically stable without urgent needs. Selection of appropriate resources by sending clinicians is important to optimize systemwide EMS utilization and ensure availability of the necessary level of care and mode of transport for each patient.

Despite the need, there is little standardization or education on local resource availability and appropriate utilization for interfacility transfer. Additionally, there is a paucity of research to assess the understanding of interfacility transport by emergency department clinicians. The aim of this study was to test sending clinicians' knowledge regarding interfacility transfers within a regional healthcare system in the midwestern United States via a series of case scenarios.

METHODS

We developed seven clinical cases with multiple choice answers specifically to test knowledge around the appropriate level of care for interfacility transfer (critical care, advanced life support, or basic life support) and appropriate mode of transport (air versus ground) (Supplemental Figure 1).

The Delphi technique was utilized to refine the patient scenarios and select the correct answer based on local protocols, policies, and resources (Dalkey, 1963, p. 458; Goodman, 1987, p. 729). A regional group of seven faculty emergency medicine physicians, all dual board-certified in Emergency Medicine or (in one case) Pediatric Emergency Medicine and EMS, participated in refining the questions and answers. This group included medical directors for six distinct EMS agencies that provide prehospital care and interfacility transports throughout Indiana. The cases were reviewed, discussed, and refined over the course of three separate meetings and tested on five outside clinicians. The case sce-

narios were entered into a REDCap (Nashville, TN) form and distributed to 1,236 recipients of a marketing customer distribution list of the largest interfacility transport entity in the region from various hospital systems and public safety agencies. The distribution also went to up to 16 hospital staff emergency medicine physicians (250 clinicians) at the discretion of each site's emergency medicine medical director, who received the survey instrument with a request to distribute it to their respective teams.

We collected case answers and clinician characteristics (primary practice site, sex, age, specialty, years since graduation from training, clinician degree, and any EMS training received).

Descriptive statistics were performed in Prism GraphPad (San Diego, CA). We performed Fisher's exact tests to describe the differences in ability to correctly answer the case scenario questions as they varied by specialty (emergency medicine or other specialty), clinician type (physician or advance practice provider), and any training in EMS transport resource capabilities as reported by the respondent.

This study was approved by the Institutional Review Board #13707.

RESULTS

Seventy-six emergency medicine clinicians responded, including 68 physicians and eight advanced practice providers. This represented a response rate of 5%. Respondents listed 20 different emergency departments throughout Indiana as their primary practice sites. Most respondents (42, 55.3%) were male, and the median respondent was 41 years (interquartile range 36 - 50). Most clinicians (69, 90.8%) identified emergency medicine as their specialty; three were EMS board-certified. Slightly more than half (42, 55.2%) indicated they received some training in selecting interfacility transfer team level of care (Table 1).

	Number of Respondents (n=76)
Gender	
Male	42 (55.3%)
Female	29 (38.2%
Prefer not to identify gender	5 (6.6%)
Age	
Median years (IQR)	41 (36-50)
Years from residency completion	
< 5 years	15 (19.7%)
5-10 years	19 (25.0%)
11-15 years	14 (18.4%)
>15 years	27 (35.5%)
Physician or non-physician	
Physician	68 (89.5%)
Advanced Practice Provider	8 (10.5%)
Clinician Specialty	
Emergency Medicine	69 (90.8%)
Family Medicine	5 (6.6%)
Internal Medicine	2 (2.6%)
Respondent-reported Training in Interfacility Transfer Selection	
Yes	42 (55.2%)
No	34 (44.7%)

Table 1. Characteristics and training level of survey respondents.

	Number of Respondents (n=76)
Responsible for level of care selection	
Physicians	67 (88.2%)
Advanced practice providers	2 (2.6%)
Transfer center	2 (2.6%)
Unknown by respondent	5 (6.6%)

Table 2. Clinician impression of who in the emergency department is primarily responsible for the level of care during interfacility transfer.

Most clinicians (67, 88.2%) reported that physicians were primarily responsible for determining the level of care for interfacility transfer (Table 2).

No significant differences were found between physicians and advanced practice providers or between clinicians whose primary specialty was emergency medicine and those whose primary specialty was not emergency medicine in correctly answering the questions (Supplemental Tables 1 and 2). Total correct answers (number and percent) included answers that agreed with the subject matter experts' consensus and are included in the survey shown in Supplemental Figure 1. Training in EMS transport resource capabilities reported by the respondent did not correlate with a significant difference in correct answers for the level of care questions (p=0.231) or the transport modality questions (p=0.182) (Table 3).

DISCUSSION

This study highlights the need for improved clinician training in appropriately selecting interfacility transfer resources. Although EMS systems vary considerably from one agency to the next, the regionalization of healthcare means that clinicians at sending facilities should have a basic understanding of the resources available in their geographic region for interhospital transfer and the capabilities of prehospital clinicians at different levels of care. Interhospital transfer resources are limited; patients requiring interhospital transfer may have time-critical emergencies. Thus, to appropriately utilize available resources and provide optimal care to each patient, it is imperative that sending clinicians have an up-to-date, comprehensive understanding of the appropriate modality for transport, and capabilities of different clinician levels.

Question Topic	Total (n=76)	With EMS Training (n=42)	Without EMS Training (n=34)	p-value
Level of Care				
Case 1	50 (65.8%)	25 (59.5%)	25 (73.5%)	0.232
Case 2	43 (56.6%)	25 (59.5%)	18 (52.9%)	0.644
Case 3	47 (61.8%)	26 (61.9%)	21 (61.8%)	0.999
Case 4	64 (84.2%)	35 (83.3%)	29 (85.3%)	0.999
Case 5	34 (44.7%)	17 (40.5%)	17 (50.0%)	0.489
Case 6	68 (89.5%)	35 (83.3%)	33 (97.1%)	0.068
Total Correct	**306 (67.1%)**	**163 (64.7%)**	**143 (70.1%)**	**0.231**
Type of Transport				
Case 1	26 (34.2%)	17 (40.5%)	9 (26.5%)	0.232
Case 2	64 (84.2%)	36 (85.7%)	28 (82.4%)	0.758
Case 3	54 (71.1%)	30 (71.4%)	24 (70.6%)	0.999
Case 4	64 (84.2%)	36 (85.7%)	28 (82.4%)	0.758
Case 5	67 (88.2%)	38 (90.5%)	29 (85.3%)	0.503
Case 6	44 (57.9%)	26 (61.9%)	18 (52.9%)	0.488
Total Correct	**319 (70.0%)**	**183 (72.6%)**	**136 (66.7%)**	**0.182**
Total Score	**625 (68.5%)**	**346 (68.7%)**	**279 (68.4%)**	**0.943**

Table 3. Clinician responses as they varied with or without EMS training.

Question Topic	Total (n=76)	Physician (n=68)	Advanced Practice Provider (n=8)	p-value
Level of Care				
Case 1	50 (65.8%)	46 (67.7%)	4 (50.0%)	0.434
Case 2	43 (56.6%)	38 (55.9%)	5 (62.5%)	0.999
Case 3	47 (61.8%)	40 (58.8%)	7 (87.5%)	0.14
Case 4	64 (84.2%)	57 (83.8%)	7 (87.5%)	0.999
Case 5	34 (44.7%)	30 (44.1%)	4 (50.0%)	0.999
Case 6	68 (89.5%)	61 (89.7%)	7 (87.5%)	0.999
Total Correct	**306 (67.1%)**	**272 (68.7%)**	**34 (70.8%)**	**0.628**
Type of Transport				
Case 1	26 (34.2%)	25 (36.8%)	1 (12.5%)	0.251
Case 2	64 (84.2%)	57 (83.8%)	7 (87.5%)	0.999
Case 3	54 (71.1%)	46 (67.7%)	8 (100.0%)	0.096
Case 4	64 (84.2%)	58 (85.3%)	6 (75.0%)	0.605
Case 5	67 (88.2%)	59 (86.8%)	8 (100.0%)	0.587
Case 6	44 (57.9%)	40 (58.8%)	4 (50.0%)	0.714
Total Correct	**319 (70.0%)**	**285 (69.9%)**	**34 (70.8%)**	**0.999**
Total Score	**625 (68.5%)**	**557 (68.3%)**	**68 (70.8%)**	**0.644**

Table 4. Physician versus advanced practice provider responses to questions.

Question Topic	Total (n=76)	Emergency Medicine (n=69)	Non-Emergency Medicine (n=7)	p-value
Level of Care				
Case 1	50 (65.8%)	45 (65.2%)	5 (55.3%)	0.999
Case 2	43 (56.6%)	40 (58.0%)	3 (38.2%)	0.46
Case 3	47 (61.8%)	43 (62.3%)	4 (57.1%)	0.999
Case 4	64 (84.2%)	59 (85.5%)	5 (55.3%)	0.304
Case 5	34 (44.7%)	31 (44.9%)	3 (38.2%)	0.999
Case 6	68 (89.5%)	62 (89.9%)	6 (85.7%)	0.557
Total Correct	**306 (67.1%)**	**280 (67.6%)**	**26 (61.9%)**	**0.492**
Type of Transport				
Case 1	26 (34.2%)	23 (33.3%)	3 (38.2%)	0.685
Case 2	64 (84.2%)	57 (82.6%)	7 (100.0%)	0.589
Case 3	54 (71.1%)	50 (72.5%)	4 (57.1%)	0.406
Case 4	64 (84.2%)	57 (82.6%)	7 (100.0%)	0.589
Case 5	67 (88.2%)	60 (87.0%)	7 (100.0%)	0.589
Case 6	44 (57.9%)	42 (60.9%)	2 (28.6%)	0.124
Total Correct	**319 (70.0%)**	**289 (69.8%)**	**30 (71.4%)**	**0.999**
Total Score	**625 (68.5%)**	**569 (68.7%)**	**56 (66.7%)**	**0.712**

Table 5. Emergency medicine versus other specialty clinician responses to questions.

Only about half (55.2%) of clinicians reported any training in EMS level of care, which was surprising because experience in EMS is required training by the American College of Graduate Medical Education for emergency medicine residents (ACGME, 2022). It is possible that clinicians received only limited training that was not recalled or received training that did not include EMS transport team capabilities. Given that resources and capabilities in EMS can change, local EMS agencies and their partnering hospitals may consider standardized training and updates for clinicians utilizing transport resources.

Clinicians who reported training on EMS level of care did not perform better on the six case scenarios or the level of care questions. This raises the possibility that the EMS training offered could have effectively educated clinicians, specifically in EMS transport team capabilities. It is also possible that training was remote, without regular refresher training, or the EMS capabilities changed over time. Regardless, a better global understanding of EMS transport resource capabilities can likely improve stewardship of such resources.

LIMITATIONS

The overall low respondent rate limits this study. Although we attempted to develop and test the survey through a generally accepted methodology, any survey is open to interpretation. Furthermore, the questions and answers selected in the survey are applicable to the region in question and may not be externally valid. Real-world decisions around interfacility transfer from one hospital to another are complex, with additional factors contributing to the decision of level of care or transport type. Such factors could include the existing regional transport capabilities and the distance between the sending and receiving facilities. It is possible that clinicians may not always be the individuals requesting transport resources and that individuals such as unit secretaries and other stakeholders should be included in future investigations since they are typically involved in requests for transport resources at the behest of clinicians in some localities such as the one studied here.

CONCLUSION

This study provides valuable insight to leaders in EMS and emergency departments who work with clinicians who regularly transfer patients. The study results suggest that those clinicians have a limited understanding of the interfacility transfer system. Further study should explore details of EMS training already offered, regional variation of that training, and the optimal delivery methods to improve clinicians' baseline knowledge in interfacility transfer topics.

SUPPLEMENTAL MATERIAL - SURVEY CONTENT

Surveys with clinical scenarios were distributed to test knowedge of the appropriate level of care and transport mode for patients undergoing interfacility transfer. Correct scenario answers are highlighted.

What site do you work at?

Who in your department determines level of care for transfer?
A. I don't know
B. Physician
C. Nursing staff
D. Transfer center
E. Unit secretary
F. APP

Age:

Gender
A. Male
B. Female
C. Other
D. Prefer not to identify

Board certification – EM/ subspecialty/Advance Practice Provider?

Year graduated from residency:

Did you receive any training in EMS level of care?
A. Yes
B. No

EMS Transport Survey Scenarios

Case 1*: 72-year-old female with history of HTN, DM presents with left sided weakness and facial droop. CT imaging is concerning for large MCA stroke. Last known well was 3 hours ago. Patient is not a tPA candidate but is a thrombectomy candidate. Patient is hemodynamically stable without airway compromise. Your hospital is 60 miles from the nearest comprehensive stroke center. Your impression is that the patient has a time-dependent emergency requiring a higher level of care but will require minimal if any interventions while in transit.*

What is the lowest level of care appropriate?
a) Critical care
b) Advanced Life Support (ALS)
c) Basic Life Support (BLS)

Please select the most appropriate mode of transport, assuming all resources are available and there are optimal traffic and weather conditions.
a) Rotor
b) Ground
c) Most readily available

Case 2*: A 3-year-old male with no significant PMH presents after swallowing a foreign body. You note a button battery in the airway on the chest x-ray. The patient has intermittent stridor, but otherwise the patient is in no acute distress. You are 15 miles from a Children's Hospital. Please select the most appropriate transport. You anticipate that the patient may possibly, but not necessarily, require advanced airway maneuvers during transit in the event of acute decompensation.*

Please select the most appropriate level of care
a) Critical care transport
b) ALS
c) BLS
d) Transport resource (ALS or critical care transport) with the earliest available ETA at the destination facility

Please select the most appropriate mode of transport, assuming all resources are available and there are optimal traffic and weather conditions.
a) Rotor
b) Ground

***Case 3**: A 25-year-old male presents as major trauma alert. On CT imaging you note a grade 2 splenic laceration and multiple fractures of his extremities. He otherwise has no other injuries and is hemodynamically stable. There is no respiratory distress. You believe that the patient is unlikely to decompensate, but he does require a higher level of care for admission for his traumatic injuries. After discussion with the receiving trauma surgeon, you do not believe this is time critical. You are 60 miles from the nearest level one trauma center.*

Please select the most appropriate level of care.
a) Critical care transport
b) ALS
c) BLS
d) Transport resource (ALS or critical care transport) with the earliest available ETA at the destination facility

Please select the most appropriate mode of transport, assuming all resources are available and there are optimal traffic and weather conditions.
a) Rotor
b) Ground
c) Most readily available with the earliest available ETA at the destination facility

***Case 4**: A 68-year-old female with PMH for Factor V Leiden presents with shortness of breath. On CT imaging, she is noted to have a PE without right heart strain. Her vital signs are HR: 110, RR 22, O2 Sat: 94 on 2L nasal cannula. She is on a heparin drip that does not require any titration during transit. She requests transfer for admission as her specialists are in Indianapolis. You are 60 miles from the receiving hospital.*

Please select the most appropriate level of care.
a) Critical care transport
b) ALS
c) BLS

Please select the most appropriate mode of transport, assuming all resources are available and there are optimal traffic and weather conditions.
a) Rotor
b) Ground
c) Most readily available with the earliest available ETA at the destination facility

***Case 5**: A 78-year-old male with PMH of CHF, DM, HTN, presents with fever, and flank pain. The patient is hypotensive and is eventually started on low dose norepinephrine with improvement. The patient has maintained a Mean Arterial Pressure of 65 without norepinephrine titration for an hour. The patient otherwise is in no distress, AAOx4. Your work-up is revealing for an infected nephrolithiasis and antibiotics are given. You do not have Urology available and need to transport for definitive care at a tertiary care hospital, which is 30 minutes away for overnight observation with possible urological intervention in the next 24 hours.*

Please select the most appropriate level of care.

a) Critical care transport

b) ALS

c) BLS

d) Transport resource (ALS or critical care transport) with the earliest available ETA at the destination facility

Please select the most appropriate mode of transport, assuming all resources are available and there are optimal traffic and weather conditions.

a) Rotor

b) Ground

c) Most readily available with the earliest available ETA at the destination facility

***Case 6**: A 65-year-old septic patient who has received appropriate antibiotics and fluid resuscitation is now requiring a second pressor to maintain hemodynamic stability and is intubated with ARDS. The patient is being transferred 30 miles for ICU resources not available at the sending facility.*

Please select the most appropriate level of care.

a) Critical care transport

b) ALS

c) BLS

d) Transport resource (ALS or critical care transport) with the earliest available ETA at the destination facility

Please select the most appropriate mode of transport.

a) Rotor

b) Ground

c) Most readily available with the earliest available ETA at the destination facility

REFERENCES

ACGME. ACGME Program requirements for graduate medical dducation in emergency medicine. [cited 2022 December 20]. Available from: https://www.acgme.org/globalassets/pfassets/programrequirements/110_emergencymedicine_2022_tcc.pdf

Allen, J., Hutchinson, A. M., Brown, R., & Livingston, P. M. (2014). Quality care outcomes following transitional care interventions for older people from hospital to home: A systematic review. *BMC Health Services Research*, *14*, 346. https://doi.org/10.1186/1472-6963-14-346

Britton, M. C., Ouellet, G. M., Minges, K. E., Gawel, M., Hodshon, B., & Chaudhry, S. I. (2017). Care transitions between hospitals and skilled nursing facilities: Perspectives of sending and receiving providers. *Joint Commission Journal on Quality and Patient Safety, 43*(11), 565–572. https://doi.org/10.1016/j.jcjq.2017.06.004

Coleman, E. A. (2003). Falling through the cracks: Challenges and opportunities for improving transitional care for persons with continuous complex care needs. *Journal of the American Geriatrics Society, 51*(4), 549–555. https://doi.org/10.1046/j.1532-5415.2003.51185.x

Coleman, E. A., Boult, C., & American Geriatrics Society Health Care Systems Committee. (2003). Improving the quality of transitional care for persons with complex care needs. *Journal of the American Geriatrics Society, 51*(4), 556–557. https://doi.org/10.1046/j.1532-5415.2003.51186.x

Dalkey N, Helmer O. (1962). An experimental application of the Delphi method to the use of experts. 3 ed. *Management Science*. p. 458-67. https://www.rand.org/content/dam/rand/pubs/research_memoranda/2009/RM727.1.pdf

Dwyer, R., Gabbe, B., Stoelwinder, J. U., & Lowthian, J. (2014). A systematic review of outcomes following emergency transfer to hospital for residents of aged care facilities. *Age and Ageing, 43*(6), 759–766. https://doi.org/10.1093/ageing/afu117

Enderlin, C. A., McLeskey, N., Rooker, J. L., Steinhauser, C., D'Avolio, D., Gusewelle, R., & Ennen, K. A. (2013). Review of current conceptual models and frameworks to guide transitions of care in older adults. *Geriatric Nursing, 34*(1), 47–52. https://doi.org/10.1016/j.gerinurse.2012.08.003

Goodman, C. M. (1987). The Delphi technique: A critique. *Journal of Advanced Nursing, 12*(6), 729–734. https://doi.org/10.1111/j.1365-2648.1987.tb01376.x

Hirschman, K. B., & Hodgson, N. A. (2018). Evidence-based interventions for transitions in care for individuals living with dementia. *The Gerontologist, 58*(suppl_1), S129–S140. https://doi.org/10.1093/geront/gnx152

Marengoni, A., Angleman, S., Melis, R., Mangialasche, F., Karp, A., Garmen, A., Meinow, B., & Fratiglioni, L. (2011). Aging with multimorbidity: A systematic review of the literature. *Ageing Research Reviews, 10*(4), 430–439. https://doi.org/10.1016/j.arr.2011.03.003

National Highway Traffic Safety Administration. *Guide for interfacility patient transfer 2006*. Available from: https://www.ems.gov/pdf/advancing-ems-systems/Provider-Resources/Interfacility_Transfers.pdf

Naylor, M. D., Aiken, L. H., Kurtzman, E. T., Olds, D. M., & Hirschman, K. B. (2011). The care span: The importance of transitional care in achieving health reform. *Health Affairs (Project Hope), 30*(4), 746–754. https://doi.org/10.1377/hlthaff.2011.0041