



Contents lists available at ScienceDirect

## African Journal of Emergency Medicine

journal homepage: [www.elsevier.com/locate/afjem](http://www.elsevier.com/locate/afjem)

## ORIGINAL ARTICLE

## Challenges relating to the inter-facility transport of high acuity paediatric cases



Craig Vincent-Lambert\*, Geraldine Wade

Department of Emergency Medical Care, Faculty of Health Sciences, University of Johannesburg, Doornfontein Campus, PO Box 17011, Doornfontein 2028, South Africa

## A B S T R A C T

**Introduction:** The motivation for this study came from anecdotal reports and observations that there was a potential need for improvement to the systems that support inter-facility transfers of high acuity paediatric cases between referring and receiving facilities in Johannesburg, South Africa. In this exploratory study, we formally document and describe challenges being experienced by members of the healthcare team in facilitating the inter-facility transport of high acuity paediatric cases.

**Methods:** A qualitative, explorative design was applied, making use of interviews with purposefully-identified role players involved in paediatric transportation and care. Verbatim transcripts from audio recorded interviews underwent content analysis to allow for the identification of common categories.

**Results:** Participants described a number of challenges, which included time delays, lack of qualified ambulance personnel, poor communication between role players, and lack of appropriate equipment.

**Discussion:** There are significant challenges experienced by members of the healthcare team with regard to inter-facility transport of high acuity paediatric and neonatal cases in Johannesburg, South Africa. Whilst we acknowledge the African context and resource constrained setting, health systems managers need to explore the feasibility of establishing dedicated and suitably resourced retrieval teams who specialise in the transfer of high acuity paediatric and neonatal patients in order to improve quality of care and overall patient outcomes in this population.

## African relevance

- There are significant challenges with inter-facility transport of high acuity paediatric and neonatal cases.
- This is mainly due to local resource constraints.
- The feasibility of establishing dedicated and suitably resourced retrieval teams should be considered.

## Introduction

One of the Millennium Development Goals (MDGs), decided at the United Nations Millennium Health Summit in 2000, was an attempt to reduce childhood mortality worldwide by two thirds by the year 2015; however, this MDG unfortunately was not reached. Every year, four million of the 130 million babies born worldwide will die in the first month of life. The highest rates of childhood deaths remain in sub-Saharan Africa. Despite being one of the more developed countries in this region [1,2], South Africa's National Department of Health has subsequently acknowledged that infant and neonatal mortality rates are

unacceptably high, with an under-five mortality rate 41 per 1000 births in 2012 [3]. Whilst some progress has been made in recent years, it is believed that as many as one in five such deaths are due to causes that could have potentially been prevented if the appropriate level of care had been provided [4]. It is well known that paediatric and neonatal patients decompensate rapidly in comparison to adults. Unless appropriate interventions are initiated and continued by persons who are appropriately qualified and comfortable in dealing with critically ill or injured paediatric patients, poor clinical outcomes may result [5]. Stabilisation and care of ill and injured paediatric and neonatal patients commonly requires specialised interventions and a level of care "higher" than that normally rendered in a number of smaller, community-based public healthcare facilities. As the majority of the case-load seen by members of the healthcare team are adults, many healthcare professionals are not confident in dealing with critically ill or injured children [6]. In instances where the required level of definitive care cannot be delivered, patients are routinely referred and transported to alternative facilities that are better equipped to manage them. However, unless the level and quality of care is maintained

Peer review under responsibility of African Federation for Emergency Medicine.

\* Corresponding author.

E-mail address: [clambert@uj.ac.za](mailto:clambert@uj.ac.za) (C. Vincent-Lambert).<https://doi.org/10.1016/j.afjem.2017.12.001>

Received 18 July 2016; Received in revised form 22 August 2017; Accepted 6 December 2017

Available online 03 February 2018

2211-419X/ 2018 African Federation for Emergency Medicine. Publishing services provided by Elsevier. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

**Table 1**  
Profile of participants.

Role Player	Description of role	Background
1 Consultant (Paediatrician)	Participant worked at a specialist level one receiving facility. They would have received the high acuity patients being transferred to their facility	The participant has been a state doctor for more than 20 years. They have experience in the referral and receiving of paediatric and neonatal patients, as they oversaw these inter-facility transfers on a daily basis
2 Specialist (Paediatrician)	Participant working as a senior specialist Medical Officer (MO) at a district/community health facility. They would have been responsible for making the decision to initiate a transfer of the patient to a facility capable of rendering a higher level of definitive care	The second participant was a paediatrician who was in charge of clinical governance relating to paediatric cases in public primary level facilities in Johannesburg
3 Nursing sister	Participant working within the primary healthcare and community clinic level. Many of these facilities are operated by nurses and do not have an attending MO present at all times. When high acuity paediatric cases present, nurses are responsible for organising the referral and transfer of patients	This participant was a nurse and head of department at a maternity obstetrics unit (MOU) in Johannesburg. They had been working in this role for the past 19 years
4 Facility Manager	In many cases, local practice is that facility managers who are also (but not always) MOs are responsible to authorise the transfer of patients between facilities	This participant was a MO in charge of the emergency room at a primary healthcare clinic in Johannesburg. They had been in their current position for four years. The participant was directly involved in organising transfers from their clinic to a facility more appropriate for that patient's needs
5 Emergency Medical Services (EMS) Manager	In the area where this study took place, the EMS system is operated separately from hospital services. EMS managers, via their call centres and transfer desks, are responsible for activating ambulance crews to service the hospital requests for inter-facility transfers	This participant was in a management position at an ambulance service in Johannesburg. They had been in this position for nine years
6 Ambulance Crew Member	Ambulance crew members are responsible for attending to the calls for transfers. They take responsibility for continuity of care during the transfer and for handing the patients over to the receiving facility	The participant was an Advanced Life Support paramedic working for a Johannesburg-based ambulance service. They had been in this role for the last four years

during the out-of-hospital transfer phase between the referring and receiving facilities, the hard work and effort of the doctors and nurses who provided initial stabilisation may be rapidly undone.

The idea for this study was stimulated by anecdotal reports and observations that there was a potential need for improvement to the systems that support the inter-facility transfer of critical paediatric cases between referring and receiving facilities in a South African metropolitan setting. When considering potential ways of improving a system, a logical starting point is to identify the experiences of role players within the system itself. Gathering and documenting such information became the central aim of our study, in which we explored and described the experiences of members of the healthcare team associated with managing the inter-facility transport of high acuity paediatric patients. In the context of our study, “transfer” refers to the transportation of patients from one facility to another, and “high acuity” refers to patients with potentially life-threatening conditions requiring a higher level of care. The transfer “system” includes both the emergency medical services (EMS) and in-hospital healthcare systems and the way in which the associated role players interact to facilitate the movement of patients between healthcare facilities. Despite anecdotal observations and reports that certain high acuity paediatric and neonatal transfers between public facilities in Johannesburg were being conducted in sub-optimal conditions, little empirical evidence existed to confirm or refute this. Similarly, there was no literature formally describing experiences of healthcare professionals with regard to the care and transport of high acuity paediatric and neonates between facilities in South Africa, or in sub-Saharan Africa in general. Our study aimed to explore and describe the experiences of individual members of the healthcare team with regard to the facilitation of inter-facility transfer of high acuity paediatric cases in Johannesburg.

## Methods

A qualitative design was followed, employing one-on-one interviews with purposefully selected participants between July and August 2013. Qualitative designs are useful to generate ideas in an unknown field and are well suited to describe and give meaning to human experiences [7]. Telephonic interviews were conducted, as this was an easier way to engage with participants because it promoted flexibility and eliminated

costs associated with time and travel.

During the interviews, an open agenda and format was followed; this allowed the interviewer to clarify any ambiguities with the participants and facilitated prompting to obtain richer data where necessary. Prompts and follow-up questions were asked according to the participants' responses. Through this process, we were able to further explore responses until a full and deep understanding of each of the participants' experiences was achieved.

The two researchers who conducted this study consisted of a final year emergency medical care student and a research supervisor that is an academic within the Department of Emergency Medical Care at the University of Johannesburg and has 20 years of experience as a pre-hospital emergency care provider (ECP). The research was conducted with participants working within Johannesburg, a large metropolitan city in South Africa. The city has a population of around 4.4 million and a high population density of about 2900 people per square kilometre. At the time of the study, there were around 40 hospitals (public and private) and over 20 different EMS providers that serviced the population. Whilst there are a large number of medical facilities in the region, there are only four level one trauma centres. Stabilisation and care of ill and injured paediatric and neonatal patients commonly requires specialised interventions and a level of care that is higher than that which is normally rendered in smaller facilities. Hence, there is great need for transferring high acuity cases between facilities, so as to ensure patients are placed at a facility that is best suited to provide optimal levels of care. These inter-facility transfers are conducted by road ambulance by a number of EMS service providers. Regretfully, a lack of central regulation and the fragmented nature of EMS in the Johannesburg metropolitan region makes the gathering of accurate data relating to the frequency of inter-facility transfers of specifically high acuity paediatric cases difficult. Having said this, current estimates are that between two to five such cases are conducted on a daily basis in the region.

Participants were all from the public health sector, working either in the healthcare facility itself or for the EMS provider. They were purposefully and conveniently selected to be interviewed based on their roles with regard to the facilitation of inter-facility transfers of paediatric cases. Simply put, we included those people that we felt would have sufficient background knowledge on the problem and who were experiencing the problem directly. The inclusion criterion was that each

participant would need to have been working in their domain for at minimum one year. This meant they were able to provide rich and meaningful information on the subject [8]. The participant grouping was also such that each of the main role players commonly associated with the inter-facility transfer system was represented. The list of participants is summarised below (Table 1).

Each interview began with the same central open question: What challenges do you encounter, or are aware of, relating to the paediatric referral, receiving, care, and/or transfer system?

Follow-up probing questions were then tailored according to the participants' responses and the role they played in the transfer system. Interviews were audio recorded with permission of the participants; audio files were then downloaded onto secure computer and a verbatim transcript of each recording was produced.

Verbatim transcripts from the audio recorded interviews were carefully read through line-by-line, allowing for identification of categories linked to the aim of the study [7,8].

The researchers attempted to enhance trustworthiness through consideration of strategies to ensure credibility, transferability, dependability, and confirmability of the study [8]. Credibility was enhanced by the research supervisor's prior engagement with the field of emergency care, peer evaluation, and the use of the in-depth interviews. Transferability was enhanced by providing an in-depth description of the participants and a rich description of the results through the provision of direct quotations of the participants that supported the findings. Dependability was enhanced by a detailed description of the research methodology, allowing for step-wise replication of the interviews. Confirmability was enhanced in that the interviews were audio recorded and verbatim transcripts were produced. These were electronically stored by the interviewer with field notes, thereby providing a chain of evidence in the research process.

Ethical clearance for this study was provided by the University of Johannesburg's Faculty of Health Sciences Higher Degrees and Ethics Committee (Ethical Clearance Number: AEC01242014). Ethical considerations for this study included ensuring informed consent, confidentiality, and the right to withdraw from participation at any time during the study. The researchers took care to ensure that only they had knowledge of whom the participants were, and participant names are not presented anywhere in this article. Information about the study was provided in an email inviting participation, and each participant signed a consent form wherein it was indicated they had a right to withdraw from the study at any stage should they wish to.

## Results and discussion

Four main categories emerged from the data analysis: Time Delays; low levels of education and training of Basic Ambulance Attendants; poor communication between role players; and lack of appropriate equipment.

### Time delays

Participants interviewed said that lengthy time delays were frequently encountered when it came to transferring high acuity patients. Participants said it could take "hours" for an ambulance to arrive at their facility to perform a transfer; one participant said that on some occasions, the ambulance did not arrive at all.

*"...so we spend a long time doing the motivation, waiting for the transport office to kind of approve it, and getting approval from the CEO of the hospital; that all involves quite a lot of unnecessary time lag."* – Consultant

*"And at the end of the day, transportation can sometimes, when we have very sick patients, can take hours."* – Specialist from receiving facility  
*"...the main problem really is the delay in getting children transferred from the primary level care to the tertiary facility."* – Facility manager

*"...it's delay of the ambulance."* – Nurse

The time delays described by the participants are clearly undesirable in the case of critically ill or injured paediatric patients, as they decompensate rapidly in comparison to adults [9]. Delays in activating and conducting inter-facility transfers may therefore have a negative impact on the condition of the patient prior to and during the transfer, as well as when they finally arrive at the receiving facility. The possible reasons put forward included for such delays included: a shortage of vehicles, the illogical placement of vehicles, and delays in getting authorisation to use a private EMS provider.

Participants stated that they felt there was simply insufficient number of ambulances to meet the demand. According to the 2012–13 Gauteng Provincial Government Health Annual Report, Gauteng EMS has one ambulance for every 435,000 people when, in fact, one ambulance is required per 200,000 people [10]. The EMS participant who was in charge of the transfer desk said that there were four intensive care unit (ICU) ambulances for the whole of the Gauteng Province, which has a population over 30 million. This data does, however, differ from other sources. Further complicating reporting is the fact that the multiple agencies in the region make it difficult to determine exactly how many ambulances are actually available on a given day.

One participant suggested a reason for these delays was that the public ambulance service is separate from the hospital, and that the ICU ambulances are not based at the referring or receiving facilities. This means that, when a patient needs to be urgently moved, the vehicle must first leave its base station and then come to the referring facility. This additional travel time further adds to the time taken to complete the transfer. This is in contrast to many other countries and regions where ICU vehicles do, in fact, base their ICU ambulances at receiving and/or referring hospitals [11,12].

According to participants, time delays are also experienced when transfers are outsourced to the private sector. This can happen in instances when public sector ambulances crews are either not available or are ill-equipped to perform the transfer of a particularly high acuity case. Permission and authorisation must first be obtained from senior staff in hospital transport offices and, in some cases, specifically the CEO of the hospital. Apparently, this processes of motivation and application can take a long time.

### Low levels of education and training of ambulance attendants

Participants from referral or receiving facilities said that their experience was that, when an ambulance arrived to perform a high acuity transfer, it was often manned with personnel who were not adequately trained and experienced to deal with such patients. In support of this, both participants that worked for the public EMS providers agreed that many of their personnel were not confident in carrying out high acuity paediatric transfers.

*"And, very frequently, the ambulance arrives with just the basic level staff paramedics on board, who don't have the skills and don't have the equipment."* – Specialist from receiving facility

*"Staff is actually, I don't know whether is reluctant or incompetent, to deal with such paediatric calls."* – Ambulance crew

*"There's only one B.Tech [ECP] practitioner practising, so I don't have sufficient contacts"* – EMS manager

Over the last 30 years, much data has been accumulated that suggests that when personnel that do not have the appropriate level of training undertake a neonatal transfer, poorer outcomes are experienced [13–15]. In many high-income countries, such as the United States of America and the United Kingdom, there are specialist retrieval teams responsible for the transfer of critically ill or injured paediatric and neonatal patients between facilities [13,16]. There is evidence to support that, when these high care transfers are carried out by specialist retrieval teams, the risk of adverse events is significantly reduced [13].

In the United Kingdom, every paediatric ICU has access to a specialised transport team. When the team is not available, which occurs 25% of the time, a local team is charged with undertaking the transfer. In order to optimise these transfers in such circumstances, a combination of good communication, personnel with appropriate experience, and use of standardised guidelines is key [13]. In African settings, there are no specialised neonatal and paediatric transfer teams, and these transfers are often performed by pre-hospital emergency care workers who have as little as four weeks of training. Ideally, these cases should be attended to by ECPs who have completed a four-year bachelor degree in prehospital emergency medical care, not basic ambulance crews with minimal training.

#### Poor communication between role players

All six participants said that communication between the relevant parties involved in arranging and carrying out the transfers was ineffective. One participant described communication during the transfer process as being “appalling”.

“...But we don't seem to work off one similar sheet, one protocol which says this is how it must be done A to Z.” – Specialist from the receiving facility

“...often we are disappointed when they do arrive and we find that the communication along the way somehow may have been less than perfect.” – Consultant

Another participant said that when calling from a referring facility to arrange a transfer, the phone call usually went unanswered.

“...normally, they don't answer the phone.” – Nurse

“...throughout the day, you will phone and phone and phone, and they don't pick up.” – Specialist from receiving facility

It was also reported that the call takers did not understand basic medical terminology and were therefore unable to prioritise the transfer correctly. This resulted in additional time delays.

“...there's always multiple interpretations of the classification for the injury.” – Ambulance crew

According to one participant, it would often happen that, after calling the transfer desk to arrange for a child to be picked up, the ambulance just did not arrive. Usually, no effort would be made by the transfer desk to make the referring facility aware of this.

Referring facilities often have to rely on private EMS providers to perform high acuity paediatric transfers. However, they are not empowered to arrange them directly. Rather, they are required to phone the public EMS call centre and obtain a reference number from their transfer desk before they can proceed. Failure to do this can result in the cost of the transfer not being covered by the state. This again results in a time delay in getting the ill or injured paediatric or neonate to definitive care.

“Getting approval from the CEO of the hospital, that all involves quite a lot of unnecessary time.” – Specialist from receiving facility

Another problem pointed out with regards to communication was that there was no standardisation of how the transfer process should be carried out. Doctors at receiving and referring facilities and medical personnel carrying out the transfer all seem to be on a different page and were reported to almost be “speaking different languages”. There also does not seem to be any standardisation with regards to how patients are prioritised.

“We all kind of assume things will just workout and often I find that we're speaking almost different languages...” – Consultant

The participants in this study paint a picture of a system in which poor communication between role players continues to hamper their operations. This is problematic, as clear communication has been

shown to play a fundamental role in patient care and the execution of a safe and efficient transfers [13]. It is important that members of a transfer team communicate well amongst themselves as well as with staff at the referring and receiving facilities, and with the patients' family [13].

#### Lack of appropriate equipment

In this study all of the participants cited a lack of functioning equipment as a common problem when dealing with a high acuity paediatric or neonatal inter-facility transfer.

“When that ambulance service comes here, it's shocking that we then don't have all the equipment or the necessary skills in terms of the personnel that is required for the transportation of the child.” – Consultant

The participant who was in charge of a transfer desk at a public EMS acknowledged that their service was insufficiently equipped to deal with paediatric transfers on a daily basis.

“We're insufficiently equipped to deal with the paediatric emergencies on a day-to-day basis.” – EMS manager

Most ambulances only have adult-specific equipment and sourcing an ambulance with the correct equipment takes time. Four of the participants from referring and receiving facilities said that ambulances often arrived without the correct equipment for that specific transfer, or without basic equipment such as oxygen or a ventilator.

“We've got some ventilators that are just glorified BVM's that we just can't use on neonates at all.” – Ambulance crew

“If they come, they come without oxygen, and then you've told them when you phoned, that you asked for oxygen.” – Nurse

It is widely acknowledged that equipment that is in good working order is required when performing a neonatal or paediatric high acuity transfer [15]. Participants in this study cite instances where there was a lack of equipment suited for paediatric and neonatal inter-facility transfer. Also concerning were reported instances where ambulances allegedly arrived without basic items such as oxygen or a bag-valve-mask manual ventilator. It would appear that certain local ambulances only have adult-specific equipment and, according to the participant in charge of the public transfer desk, sourcing an ambulance with the correct equipment for a high acuity ventilated case takes time and suitably-equipped ambulances are not always available. This situation is clearly undesirable and not reflective of international best practice, where it is accepted that specialised equipment in good working order is required when performing a neonatal or paediatric high acuity transfers [15].

The crew and equipment should thus be able to provide continuous high acuity care throughout the journey. In order to cater for unexpected delays and equipment malfunction, oxygen requirements should be calculated to make sure there is enough oxygen for twice the expected trip duration [15]. Participants reported some ambulances being without oxygen at all when they arrived to perform a transfer. Again, this is not indicative of best practice, which dictates that a transfer team should be self-sufficient and should not have to rely on the referring facility for supplies [15].

#### Conclusion

Paediatric patients decompensate rapidly in comparison to adults. Unless appropriate interventions are initiated and continued by persons who are adequately trained, equipped, and comfortable in dealing with critically ill or injured paediatrics, poor clinical outcomes may result [6]. In instances where the required level of definitive care cannot be delivered by a facility, patients need timely referral and transport to alternative facilities that are better equipped to provide optimum treatment and care. Literature highlights that a “best practice” inter-



facility transfer system catering for high acuity paediatric cases should be able to provide rapid safe transfers of patients in well-equipped vehicles that are crewed by highly skilled ECPs. The inter-facility transfer system as a whole should be characterised by well organised and structured communication channels and a cohesive team approach that involves all role players from both the receiving and referring facilities as well as the EMS call centres and pre-hospital care providers. The experiences of the participants in this local study highlights that there is still much work that needs to be done in this area within the South African public healthcare system. Healthcare managers need to take steps to ensure that their systems for transferring high acuity paediatric cases are characterised by minimal time delays, with well-defined pathways in place for communication between dispatching and receiving facilities. In turn, EMS managers need to ensure that transfers are conducted by properly qualified ambulance crews who are equipped with the appropriate resources. A system for monitoring and quality assuring the activities related to the inter-facility transfers of high acuity paediatric cases need to be developed and implemented. Further research is required to accurately determine the frequency of inter-facility transfers of high acuity paediatric cases, as well as clinical changes and mortality associated with the transfer process. This will allow for a better understanding of the need for, as well as the potential benefits and costs surrounding, the establishment of specialist paediatric retrieval/transfer teams.

A significant limitation of this study was the fact that we only interviewed one participant from each grouping. Further in-depth research should be considered with larger samples from each of the respective groupings. The exploratory, qualitative nature of the study means that, whilst we are able to describe in depth the experiences of our participants, the experiences described may not necessarily be the same as those in the broader South African or African healthcare systems or EMS population. Furthermore, we accept that the experiences of staff conducting inter-facility transfers of high acuity paediatrics may differ both between regions between public and private sector EMS providers. Finally, the use of telephonic interviews limited the interviewer's ability to pick up on non-verbal cues, as one would do in face-to-face interviews.

### Conflicts of interest

The authors declare no conflicts of interest.

### Dissemination of results

The results of this study have been shared with and viewed by the

persons within the academic unit marking the report upon which the article is based.

### Authors' contributions

GD and CL conceived the original idea. GW collected and analysis the data. CL drafted the manuscript. CL and GW approved the final version that was submitted.

### References

- [1] Lloyd LG, de Witt TW. Neonatal mortality in South Africa: how are we doing and can we do better? *S Afr Med J* 2013;103(8):518–9.
- [2] Velaphi S, Rhoda N. Reducing neonatal deaths in South Africa—are we there yet, and what can be done? *S Afr J Child Health* 2012;6(3):67–71.
- [3] Morbidity and Mortality in children under 5 years (COMMIC): 2014 [Internet]. 2014 Available from: [www.kznhealth.gov.za/mcwh/2nd-CoMMiC-Triennial-Report-Abridged.pdf](http://www.kznhealth.gov.za/mcwh/2nd-CoMMiC-Triennial-Report-Abridged.pdf).
- [4] Bateman C. Child mortality committee launch—a chance missed. *S Afr Med J* 2008;98(4):254–6.
- [5] Thwala M. The quality of neonatal inter-facility transport systems within the Johannesburg metropolitan region. 2012 [cited 2013 Sep 8];(5):1–75. Available from: <http://wiredspace.wits.ac.za/handle/10539/11031>.
- [6] Scone R, Reynolds F, Cray S, et al. Scone R, Reynolds F, Stevens C, editors. *Managing the critically ill child. A guide for anaesthetics and emergency physicians*. Cambridge: Cambridge University Press; 2013.
- [7] Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today* 2004;24(2):105–12.
- [8] Shenton AK. Strategies for ensuring trustworthiness in qualitative research projects. *Educ Inf* 2004;22:63–75.
- [9] Urden L, Stacey K, Lough M. *Thelan's critical care nursing: diagnosis and management*. 5th ed. Philadelphia: Mosby Elsevier; 2006.
- [10] Finance P, Act M, Legislature G, Rules S. *Gauteng provincial government health annual report 2012/13 Part A*: [Internet] Johannesburg 2013. p. 75. Available from: [http://www.health.gpg.gov.za/Documents/Annual report 2013 Gauteng Department of Health.pdf](http://www.health.gpg.gov.za/Documents/Annual%20report%2013%20Gauteng%20Department%20of%20Health.pdf).
- [11] New York-Presbyterian Hospital [Internet]. [cited 2014 Apr 16]. Available from: <http://nyp.org/about/ems/ambulance-services.html>.
- [12] UC Davis Health System [Internet]. [cited 2014 Apr 16]. Available from: [http://www.ucdmc.ucdavis.edu/welcome/features/20090107\\_ambulance/index.html](http://www.ucdmc.ucdavis.edu/welcome/features/20090107_ambulance/index.html).
- [13] Fortune P-M, Playfor S. Transporting critically ill children. *Anaesth Intensive Care Med* 2009;10(10):510–3.
- [14] Fenton AC, Leslie A. Who should staff neonatal transport teams? *Early Hum Dev* 2009;85(8):487–90.
- [15] Felmet K, Orr RA, Han YY, Roth KR. Pediatric transport: Shifting the paradigm to improve patient outcome. *Pediatric critical care*. Elsevier Inc; 2011.
- [16] Atwood J, Peeples L, Donovan K. St. Louis Children's Hospital Critical Care Transport Team. *Air Med J* 2011;30(5):246–8.