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Research Article

The Go Sheet: Evaluation and Implementation of a Tool for Mass Neonatal Transport

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Abstract

Minimal tools are available to assist with disaster-related mass transport of hospitalized neonates. We describe the validation of a tool to safely transport neonates during a disaster. The Go Sheet was designed to quickly relay information required for patient care on arrival at a new facility. One hundred randomly selected infants from a level IV neonatal intensive care unit were included in the study. The gold standard physician, a resident, nurse, and patient care technician completed Go Sheets. A blinded physician evaluated each, compared it to the gold standard and determined if it was possible to care for the patient. Residents had the greatest percentage of agreement with the gold standard in most categories. There was high agreement with all raters in vital signs and allergies. The greatest variability occurred in reporting of medication dosing and timing. Simulations indicate that the Go Sheet completed by residents could be used to quickly convey information during a disaster.

Abbreviations: NICU: Neonatal Intensive Care Unit

Introduction

Natural disasters cause chaos and place patients at considerable risk, not only from the disasters themselves, but also from the risks associated with medical errors, which can occur during complicated hospital transfers. Newborns represent a particularly vulnerable population that are unable to relay medical information about themselves, and have unique physiological, developmental, and psychological needs. Technology-dependent NICU (Neonatal Intensive Care Unit) patients present an especially difficult transport and care challenge during emergency situations. Hurricane Katrina, one of the largest more recent threats to a local NICU population in US history, provided clear evidence of the difficulties which occur during such disasters [1]. Experience gained during such tragedies has led to the recognition of the need for better planning to deal with the unique problems present for NICU patients. NICU-specific plans must address coordination of care, communication of relevant medical information, and safe interfacility transport [1,2]

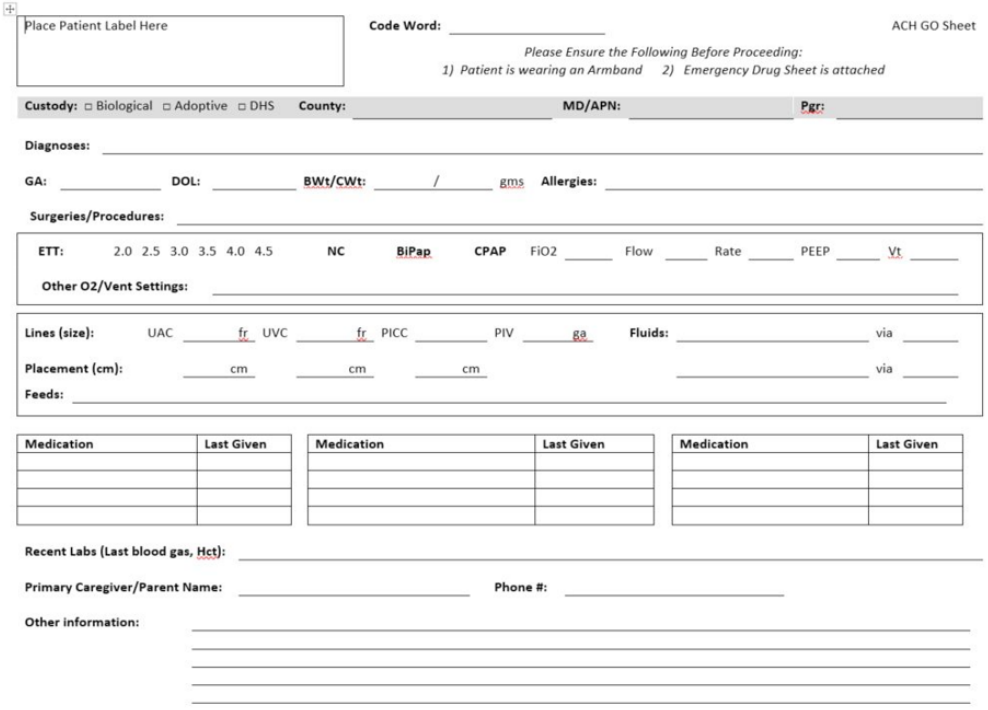
Although transportation difficulties such as liability, security, and bed space to accommodate the special needs of newborns exist, the need for reliable communication is paramount [2]. Safe evacuation and transfer of patients to other hospitals is dependent on the transfer of medical records as well as the physical ability to transport these infants safely [3]. The process of obtaining relevant clinical information for initial care by providers at the receiving hospital could take hours to days and is often dependent upon electricity, internet, and phone services remaining operational. Steps must be taken to provide clear and timely patient information

to the providers at the receiving hospital [3]. In a report by the National Advisory Committee on Children and Disasters, most facilities had disaster plans regarding interfacility transfers for adult patients during a disaster event, but only 47% of hospitals had a plan in place for pediatric patients [4].

Successful interfacility transfers depend upon timely and accurate transfer of patient information. A prospective study from Missouri Medicine measured the compliance with interfacility transfer communication and found opportunity for improvement [5]. The study introduced a simple checklist to enhance communication between providers and improve the quality of information transferred. Another study developed a triage tool for inpatients called the TRAIN™ tool, which provides a way to triage pediatric patients, by resource allocation [6]. The Missouri Medicine study advises that a wider adoption of similar practices would improve patient care and increase compliance with the Joint Commission National Patient Safety Goal regarding communication [5]. The Neonatal Disaster Preparedness Toolkit and Pediatric/Neonatal Disaster Reference Guide provides in depth guidance for preparation for many different types of disasters [7,8]. The toolkit provides action sheets for each job in the NICU, evacuation protocols, and multiple bioterrorism treatment responses [7]. Our study arises to build upon the need for a transport tool specifically for NICU patients.

Methods

Our project began with the development of the Go Sheet (Figure 1), our NICU patient transport sheet. A team of providers including the Disaster Medical Director and Director of Transport Medicine at our institution created and edited this document to include the minimal information needed to appropriately care for a patient upon arrival at a new facility, where prior knowledge of the patient is unavailable. To validate this tool, 100 patients were randomly selected from our level 4 NICU, excluding only those patients on extracorporeal membranous oxygenation. The institutional review board determined that this project was not human subject research. Go Sheets were completed during simulations over a period of 18 months. Each simulation included 15 to 30 patients and was performed over 2-3 hours.



Place Patient Label Here

Code Word: _____ ACH GO Sheet

Please Ensure the Following Before Proceeding:
1) Patient is wearing an Armband 2) Emergency Drug Sheet is attached

Custody: □ Biological □ Adoptive □ DHS **County:** _____ **MD/APN:** _____ **Pgr:** _____

Diagnoses: _____

GA: _____ **DOL:** _____ **BWt/CWt:** ____/____ gms **Allergies:** _____

Surgeries/Procedures: _____

ETT: 2.0 2.5 3.0 3.5 4.0 4.5 **NC** **BiPap** **CPAP** FiO2 ____ Flow ____ Rate ____ PEEP ____ Vt ____

Other O2/Vent Settings: _____

Lines (size): UAC ____ fr UVC ____ fr PICC ____ PIV ____ ga **Fluids:** _____ via ____

Placement (cm): ____ cm ____ cm ____ cm _____ via ____

Feeds: _____

Medication	Last Given	Medication	Last Given	Medication	Last Given

Recent Labs (Last blood gas, Hct): _____

Primary Caregiver/Parent Name: _____ **Phone #:** _____

Other information: _____

Figure 1: GO Sheet developed and used for project.

Four Go Sheets were filled out for each patient. One sheet was completed by an attending physician (gold standard). A pediatric resident physician, the bedside nurse, and a patient care technician (raters A, B, and C respectively) also completed one sheet per patient. The gold standard physician (author JB) remained the same for all 100 patients. The patient's bedside information card and the electronic medical record were used to obtain the information needed to complete each sheet. The Go Sheets were then given to a blinded neonatal-perinatal medicine fellow (author DM) to evaluate whether the patients could be cared for properly at a receiving institution. The same fellow evaluated Go Sheets for all 100 subjects. Each section of the Go Sheet was evaluated on a yes or no basis for 15 different data points (Figure 2). This included many points from allergies, ventilator settings, feeding method and type, medication dosage and timing to the guardian's contact information.

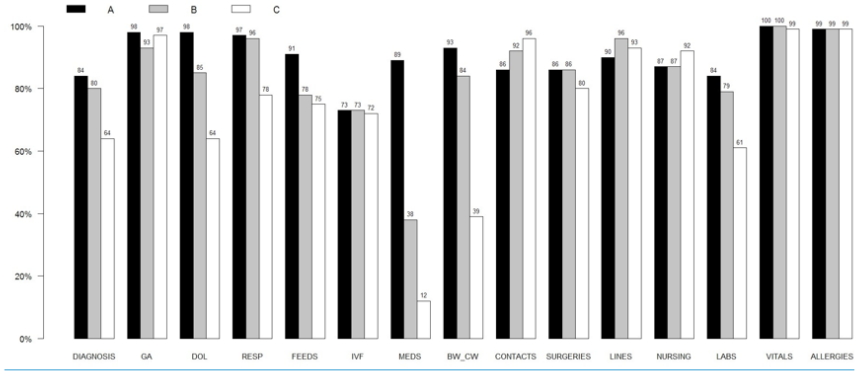


Figure 2: A-Resident B-Nurse C-Technician as compared to the Gold Standard.

Results

The greatest agreement occurred between the gold standard and the resident-completed forms. The least agreement occurred between the gold standard and the patient care technician-completed forms. Percentages that matched with the gold standard ranged from 73% to 100% for rater A, 38% to 100% for rater B, and 12% to 99% for rater C. In most cases, rater A (resident physician) had the highest percentage matched, except for "contacts," "lines," and "nursing." Overall, rater C (patient care technician) had the lowest percent matched. Of all variables evaluated, "vitals" and "allergies" had the highest overall percentage matched among all 3 raters, while "medications" had the most varied percentage matched (rater A 89%, B 38%, C 12%) (Figure 2).

Limitations

This study's limitations include the exclusive use of resident physicians in comparison with the gold standard. The addition of an attending physician or nurse practitioner comparison group would have been helpful against the gold standard especially since a majority of nonacademic NICUs are staffed by attending physicians and neonatal nurse practitioners only. There were also 3 residents, approximately 60 nurses, and 2 patient care technicians used in this study. The entire patient care team could not fill out the Go Sheet together due to time constraints and availability during work hours. During a disaster event it would be unlikely for the entire team to fill out each sheet in a 100 bed ICU. This decreases the variability and potential reliability based on the quality of pediatric residents chosen for the project.

Conclusions

The Go Sheet validation in the neonatal population is important in efforts to improve outcomes for this vulnerable population during disaster events. More research is needed to better identify areas of weakness during transport of neonatal patients during disasters. Integration of the Go Sheet into the electronic medical record should bring increased accuracy which represents another area for research. Frequency of updates to the Go Sheet should also be considered, including a more frequent update interval when natural disasters can be anticipated, such as with the forecast of hurricane landfall. Tabletop exercises help discover gaps in information and improve areas of planning [9]. Anticipation of all disaster-planning needs requires a full simulation drill. The Go Sheet is a useful tool, which can be completed reliably by pediatric residents and used to prepare for the mass transport of NICU patients. Future efforts should target evaluating integration of similar tools into the electronic medical record.

Author Contributions

Each author contributed in the collection of the data and/or writing of this paper.

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Conflicts of Interest

The authors have no relevant disclosures or conflicts of interest.

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