Pediatric Patient Safety:
Common Problems in the Use of Resuscitative Aids for
Simplifying Pediatric Emergency Care

When caring for a critically ill or injured child, many emergency care providers use some type of resuscitative aid, chart, book, or other device to assist them in determining equipment sizes and drug dosing for pediatric patients. Use of such aids is reasonable during stressful events, and in fact, the issue of cognitive load and the use of resuscitative aids during pediatric emergency care have been described.1 These aids are particularly important in completing complex mathematical equations when determining drug dosing, but they must be used correctly.

In 2001 we reported a series of mock pediatric resuscitation exercises conducted in emergency departments in North Carolina2 and recommended that all ED staff incorporate the use of the Broselow-Luten Resuscitation Tape (B-L Tape) into all pediatric patient contacts. Since then we have continued to conduct mock resuscitations in emergency departments, both in North Carolina and beyond, as well as in other hospital units responsible for the care of pediatric patients. During these assessments, we have observed critical safety issues in the use of the B-L Tape that must be addressed by clinicians if the tool is to be used effectively.

Positioning and mechanics regarding the resuscitation aid

As discussed in our original article,2 the most common error we observed in the use of the B-L Tape was improper positioning during patient measurement. Another mechanical practice we observed caused this error to be more pronounced. In several institutions the B-L Tape had been encased in plastic and hung on the wall or rested against something, such as a commercially available cart, in the
patient care area. We noticed during the mock resuscitations that if the B-L Tape was either hung on the wall or placed against another item with the “Measure From This End” red arrow at the bottom, then the clinician inevitably placed the tool on the bed in this manner, which caused the “patient” to be measured from the incorrect end, resulting in incorrect equipment sizing and medication dosing. This problem can be avoided by ensuring that when the aid is placed in plastic or laminated, the red measuring arrow is always upright. Additionally, if a hole is drilled in the plastic, it should be drilled through this same end. One other similar issue is that often the end of the tape is not level with the end of the heavy plastic sleeve. Some clinicians measured from the end of the plastic rather than from the red arrow on the tape, which also would cause an incorrect length measurement.

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Incorrect use and confusion regarding information on the resuscitation aid

In several instances, clinicians had difficulty using the B-L Tape to determine the correct medication and equipment size to use. First, we noticed that the 1998 “Rainbow” version of the B-L Tape (the one most commonly used in the emergency departments we visited) has 2 areas that can be confused. The smallest zone has no color on this aid, only a weight; some clinicians mistakenly called this a “white” zone, even though there is a “white” zone defined on the tape that is significantly different from this one. The confusion occurred when one person measured the “patient” and called out the zone “white” and then handed the tape to another clinician to determine equipment sizes and medication dosing. It quickly became evident with equipment sizing that the zone was incorrect; however, inaccurate dosing may not be discovered as quickly. In the 2002 version of the B-L Tape, the smallest color zone is gray, eliminating the problem. From a patient safety standpoint, it would seem that replacing the 1998 version of the aid with the 2002 version would help reduce the potential for error.

The second difficulty occurred because of confusion about determining the correct dose of dextrose for a patient with hypoglycemia. On both versions of the B-L Tape, dextrose is listed under “overdose.” Some clinicians were concerned that this would not be the same medication dosing as for other causes of hypoglycemia. Although this concern may seem minor, we observed that any degree of confusion during the stressful situation of resuscitation greatly increased the stress level and frustration of the clinician.

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Another issue we observed was the use of the resuscitation aid as an “algorithmic” tool, especially when the 2002 version was used. Several categories are listed on the aid that assist the clinician in choosing the appropriate medication. Under “seizure,” several anticonvulsants are listed; under “resuscitation,” medications such as epinephrine and atropine are listed; and the category of “Rapid Sequence Intubation” includes medications that might be used for premedication, induction, and paralysis. First, we found that if clinicians asked for a medication that was not listed on the B-L Tape, they often changed their medication choice to one listed on the tape, even if they were not sure if that second medication was listed on their hospital formulary. Second, we found that many clinicians used more than one medication from each category. When asked the reason for this choice, they responded that they thought the medications were a care map, clinical plan, or algorithm. Whereas some readers might have difficulty understanding this, it is important to remember that the majority of emergency care providers rarely encounter this type of pediatric emergency and might become easily confused.
The use of organizers

The next issue of concern involves the use of organizers, whether purchased commercially or created by individual institutions. First, as we reported in our previous article, the majority of commercially available carts were locked, some with a single lock for the entire cart and some with individual locks for each drawer. Staff would “check the cart” by documenting that the lock was intact. When asked, clinicians continue to be unaware of what is actually contained in each drawer of the cart because it is used so infrequently. The reluctance to open the cart, even during a scheduled mock resuscitation, was evident in almost every institution. No clinician reported that they opened the cart for training.

Most nurses reported that someone other than the ED staff restocked the cart after it was used for patient care. The fact that ED staff believed that restocking the cart was an inefficient use of nursing time is understandable; however, there must be some way to ensure that the nurse is aware of the contents of the cart. We found that most of the equipment placed in these drawers (or envelopes or bags, whichever was used) was directly reflective of the equipment size recommended on the tape. For example, in most institutions that stocked the drawers themselves, there was usually only one size of each item. However, an experienced clinician knows that sizes for more than one color zone may be needed. For example, during pediatric intubation, one should have the endotracheal tube sized above and below the recommended tube size. This method of stocking the drawer resulted in the opening of several color zone drawers and more confusion about which color they were actually using. We continue to recommend that the individual items in the cart drawers be marked in some fashion as to which color zone they might be included in.

The emergency nurse as resource for other hospital departments

One other area of concern was revealed during our visits to non-emergency departments in hospitals, such as inpatient pediatric areas, surgical services, outpatient care areas, and primarily adult patient intensive care units. Many hospitals have chosen to standardize resuscitation carts hospital-wide. This standardization often involves replacing an existing pediatric “code cart” or separating pediatric from adult equipment for the first time, usually with color coded carts that are designed to match the B-L Tape. However, outside the emergency department, it was unusual to find a staff member who knew what the color scheme on the cart represented or one who was familiar with the B-L Tape and its use.

This issue presents an opportunity for the ED staff to educate colleagues who might be caring for children in other areas of the hospital. Some resources to assist emergency nurses in presenting a standardized approach to learning how to use the tool are as follows: a nursing competency for the use of the B-L Tape, which can be found in the Nurse Educator column of the February 2002 issue of the Journal; a no-cost Web-based educational packet for the use of the tool, which can be found at www.deps.dukehealth.org; and the Pediatric Education for the Prehospital Professional course, available from the American Academy of Pediatrics (www.PEPPsite.org), which contains a video that outlines how to use the B-L Tape.

REFERENCES


Send descriptions of procedures in emergency care and/or quick-reference charts suitable for placing in a reference file or notebook to:

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