Impact of Catastrophic Brain Injury Guidelines on Donor Management Goals at a Level I Trauma Center

L. Quinn, W. McTague, and J.P. Orlowski

ABSTRACT

Background. An organ procurement organization (OPO) and a level I trauma center developed catastrophic brain injury guidelines (CBIGs) to assist in the care of severely brain-injured adult patients before brain death. The CBIGs provided a set of clinical guidelines to maintain patient stability and optimize opportunity for organ donation.

Objective. The aim of this study was to determine if the use of the CBIGs affected the OPO’s ability to achieve donor management goals (DMGs) before organ recovery.

Methods. We conducted a retrospective analysis comparing the number of DMGs met in the hospital’s donors before and after the CBIGs were used. The analysis included 133 cases; 67 donors in the pre-CBIG data and 66 donors in the post-CBIG review. Donor management goals measured included: systolic blood pressure >100 mm Hg; I pressor ≥10 µg/kg/min; urine output 1–2 mL/kg/h; pO₂ >100 mm Hg; Na <160 meq/L; pH within normal limits (7.35–7.45); temperature 36.5–37.5°C; arterial line in place and central line in place with monitor.

Results. After the introduction of the CBIGs, 78% of DMGs were met more often, with 1 goal (Na) remaining equivalent and 2 goals (pO₂ and pH) met less often. Increase in achievement of individual DMGs ranged from 4% to 33%. The pre-CBIG cases averaged 2.90 missed goals per donor compared with an average of 1.79 in the post-CBIG data. Only 5 pre-CBIG donors (7%) achieved all of the DMGs. That figure rose to 12 donors (18%) in the post-CBIG data.

Conclusions. While other factors may have contributed to our results, we think that there is a positive relationship between the CBIGs and the increase in meeting most DMGs. As we refine our donor management, we will focus on the factors we met less successfully. Ultimately, the use of the CBIGs before brain death led to more stable donors, maximizing transplantable organs.

In 2006, the Center for Donation and Transplant (CDT) and Albany Medical Center developed a set of guidelines for the treatment of critically brain injured patients before brain death. The Care for the Catastrophically Brain Injured Guidelines (CBIGs) were written by the hospital’s directors of the medical and surgical intensive care units with input from the CDT’s clinical director, and was intended to provide a clear and concise set of guidelines for the care of patients with severe neurologic insults or injuries. The CBIGs were implemented on all brain-injured patients as an appropriate standard of care, but were not an order set, pathway or protocol; nor was documentation on

From the Center for Donation and Transplant (L.Q., W.M.), Albany, New York; and LifeShare Transplant Donor Services of Oklahoma (J.P.O.), Oklahoma City, Oklahoma.

Address Reprint requests to: L. Quinn, Center for Donation and Transplant, 218 Great Oaks Blvd, Albany, New York 12203.

E-mail: lquinn@cdtny.org
organ donors, the use of the CBIGs before brain death was considered to be a best clinical practice that ultimately benefited donor stability and maximized the recovery of transplantable organs.

We decided to analyze the CBIGs’ impact to determine if their use before brain death ultimately affected the CDT’s ability to achieve donor management goals (DMGs) before organ recovery. DMGs are standards of care or clinical parameters that are considered to be an acceptable barometer of successful donor management and have been shown to result in the optimization of organ recovery and transplantation.1,2 Although donor management performance was not measured against DMGs in all cases in the data set at the time the cases were facilitated, we thought that the goals in place in 2008–2010 were a reliable measurement of successful donor management (Table 1).

METHODS

To examine the impact of the CBIGs, we conducted a single-center retrospective analysis comparing the number of DMGs successfully achieved on cases before and after the implementation of the CBIGs. Two cases were removed due to missing documentation on multiple goals. We also removed one DMG, the measurement of CVP, from our analysis because data about that factor was poorly documented in 34% of the cases. A total of 133 cases were reviewed, including 67 cases from January 16, 2001 to February 9, 2006, in the pre-CBIG data, and 66 cases from March 6, 2006, to December 15, 2010, in the post-CBIG cohort.

RESULTS

After implementation of the CBIGs, 78% of DMGs were met more often compared with the pre-CBIG cohort, with one goal remaining equivalent and two goals met less often after the CBIGs were implemented. The increase in successful attainment of individual DMGs ranged from 4% to 33% (Fig 1).

The pre-CBIG cohort averaged 2.90 missed goals per donor, compared with an average of 1.79 missed goals per donor in the post-CBIG cohort. Only 5 pre-CBIG cases (7%) achieved 100% of the DMGs. That figure rose to 12 cases (18%) in the post-CBIG cohort.

DISCUSSION

Although other factors may have contributed to our results, the data indicates that there was a positive relationship between the implementation of the CBIGs and the increase in achievement of most of the DMGs. Of the 9 goals reviewed, the 2 goals that were met less often in the post-CBIG cohort were pO₂ and pH. There may be several explanations for this result. These goals are reflective of ventilator management and are often challenging to treat. The post-CBIG cohort included more extended-criteria donors and had an older median and mean patient age. It may be that the post-CBIG donors had more complicating factors in pulmonary function or longer hospital stays that affected the ability to achieve these goals. Because this was a single-center study, the variability of donor characteristics in the 2 data cohorts was more pronounced, which also may have affected our results. We do not think that the guidelines affected our success rate in achieving these goals, but as the CDT continues to work on improving donor management, there will be a concentrated focus on the DMGs met less successfully.

It is worth noting that the hospital in this study is a large donor hospital and an institution that had a great deal of experience in donor management before the development of the CBIGs. The CDT has since expanded the use of the CBIGs in all hospitals with donor potential within its donor service area. We intend to repeat this study on a broader multicenter level, where we expect the increases in successful attainment of DMGs may be more pronounced. The donor characteristics of the 2 cohorts in the present study varied so considerably that an analysis of the organs transplanted per donor (OTPD) could not have been related to the implementation of the CBIGs. Future studies may wish to examine this relationship through the use of a larger sample size or a statistical

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**Table 1. CDT’s Donor Management Goals, 2008–2010**

<table>
<thead>
<tr>
<th>Systolic BP &gt; 100 mm Hg</th>
<th>pH within normal limits (7.35–7.45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pressor ≤10 μg/kg/min</td>
<td>Temperature 36.5–37.5°C</td>
</tr>
<tr>
<td>Urine output 1–2 mL/kg/h</td>
<td>Arterial line in place</td>
</tr>
<tr>
<td>pO₂ &gt;100 mm Hg</td>
<td>Central line in place with monitor</td>
</tr>
<tr>
<td>Na &lt;160 meq/L</td>
<td></td>
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</tbody>
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**Fig 1.** Attainment of DMGs before and after CBIGs.
analysis of OTPD based on donor type or similar donor populations.

Ultimately implementation of the CBIGs before declaration of brain death led to more stable donors, as evidenced by the increase in successful achievement of the DMGs, which maximized opportunities for donation at this hospital.

REFERENCES

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